Spanish-English code-mixing at the Auxiliary Phrase:
Evidence from eye-movement data

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Two experiments investigates the nature of the quantitative distributional differences reported in the Spanish-English code-mixing literature, involving phrases of the type AUXILIARY + PARTICIPLE. For each experiment, the lexical realization of the auxiliary was varied so that in Experiment 1, the Spanish auxiliary *haber* ('have') was used, and in Experiment 2, *estar* ('be') was employed. In addition, switch site was manipulated in each experiment to create two conditions. In Condition 1, the switch occurred immediately before the auxiliary phrase (e.g., for Experiment 1, '…*terroristas* HAVE INJURED THE MAN' and for Experiment 2, '…*ciudadanos* ARE SUPPORTING THE WAR') and in Condition 2, it occurred between the auxiliary and the participle (e.g., '*terroristas* HAN INJURED THE MAN' and '*ciudadanos* ESTÁN SUPPORTING THE WAR'). English-Spanish bilinguals read sentences representing each condition. Data were collected using an Eyelink eyetracker, which recorded reading times on the critical region (i.e., the auxiliary phrase). The findings revealted that participants took significantly longer to read switches at the juncture between the auxiliary *haber* and the participle, compared to a control condition. However, switches that occurred between Spanish *estar* and English participle did not incur a significant reading cost. These findings suggest that switches at the auxiliary phrase are processed differently, depending on the lexical items that fill the auxiliary node. The results support the hypothesis that the degree of boundedness of the elements in the auxiliary phrase impact the ease with which they participate in code-switching.

1. Introduction[*]

A primary distinction, long established in the code-switching
literature, is the division between two types of language switching:
intersentential and intrasentential. Intersentential switching refers
fundamentally to language shifting at sentence boundaries.
Intrasentential switching, on the other hand, involves the shift from
one language to another within a single sentence. This latter type
of switching, characterized by a smooth and often uninterrupted
transition from one language to another within a sentence, has
raised much interest, as it provides valuable insights into the
organization of the bilingual cognitive mechanism (cf., Lipski
1985, Milroy & Muysken 1995, Muysken 2000, Myers-Scotton
1993, Romaine 1995, Toribio 2001b, and Zentella 1997 for
relevant discussions).

   Quantitative studies on intrasentential switching involving a
variety of language pairs have revealed that certain types of
syntactic junctures are more prone to undergo language switching,
and that syntactic boundaries are permeable to intrasentential shifts
(Timm 1975, Clyne 1987, Gingràs 1974, Gumperz & Hernández-
Chavez 1971, Halmari 1997, Lipski 1986, Mahootian 1993,

Myers-Scotton 1993, Nortier 1990, Pfaff 1979, Poplack 1980, Sankoff & Poplack 1980, Reyes 1978, Zentella 1997 for relevant discussions). For example, Sankoff & Poplack (1981), looking at Spanish-English data, note that constituent boundaries are clearly subject to a hierarchy ranging from a very high propensity to be the site of a switch (e.g., at the juncture between predicate adjective and preceding category, or between a verb and the following object noun phrase) to a total absence of switching (e.g., at the negation phrase). There are other instances, however, where the distinction between permissible and non-permissible junctures becomes murky. In this respect, a bifurcation in the literature on Spanish-English switching occurs at the auxiliary-verb site. Specifically, a number of cases involving switches between the auxiliary *estar* and its corresponding verb complement, shown in (1)-(4), are documented in quantitative analyses of Spanish-English corpora (cf., Lipski 1978 and 1985, Poplack 1980, Pfaff, 1979). On the other hand, switches involving the auxiliary *have*, exemplified in (5), appear to be precluded:

(1)　*Mi marido está WORKING ON HIS MASTER'S* . (Spanish/English)
　　　'My husband is working on his master's.'

　　　　　　　　　　　　　　　　　　　　　　(Redlinger 1976, cited
　　　　　　　　　　　　　　　　　　　　　　　in Lipski 1978: 265)

(2)　*Siempre está PROMISING cosas.*　　　　(Spanish/English)
　　　'He is always promising things.'　　　(Poplack 1980: 596)

(3)　*¿Dónde estás TEACHING?*　　　　　　(Spanish/English)
　　　'Where are you teaching?'　　　　　　(Pfaff 1979: 299)

(4)   *Estaba TRAINING para pelear.*   (Spanish/English)
      'I he/she was training to fight.'   (Pfaff 1979: 299)

(5)   **Los estudiantes han ELECTED A NEW REPRESENTATIVE.*
      'The students have elected a new representative.'
                                    (Spanish/English; Toribio 2001b: 226)

Admittedly, only a handful of cases involving the type of language mixing exemplified in (1)-(4) have been attested in naturalistic data; according to Muysken's (2000) count, at least six cases are documented, and as will be seen in Section 2, the actual number is probably closer to twenty. However, the switch depicted in (5) is close to non-existent, and it is precisely this fact that has led scholars to posit categorical constraints against this type of switch.

To some, the discrepancy between the frequency distribution of these two types of switches could simply reflect fluke phenomena, a consequence of speech errors and slips of the tongue commonly found in sentence production data (cf. Garrett 1975, Muysken 1995 for relevant discussions). However, as remarked in Muysken, "we do not yet know enough about the relation between frequency distributions of specific grammatical patterns in monolingual speech data and properties of the grammar to handle frequency in bilingual data with any assurance" (1995: 185, 2000: 29). The findings reported in quantitative studies of Spanish-English switching suggest that speakers do refrain from switching at the auxiliary juncture when present and past perfect forms are involved, although speakers are more flexible in the case of progressive forms. The instability that characterizes switches at the auxiliary juncture in Spanish-English language shifting may therefore not be accidental, but rather reflect the motivation for shifts in determinable circumstances.

The aim of the present study is to investigate the nature of the quantitative distributional differences reported in the Spanish-

English code-mixing literature. The syntactic site under investigation involves the functional element Auxiliary (AUX), lexically realized either with the perfective or with the progressive auxiliary, and its selected complement. The primary aim of this paper is to establish the standing of these switches with respect to their grammatical status. A secondary aim is to present a new methodology, grounded on psycholinguistic experimental techniques, to gather code-mixing data that would allow for the examination of what bilingual speakers view as possible and impossible language alternations.

   This paper is organized as follows. Section 2 provides a cursory overview of research specific to the auxiliary phrase, restricting the discussion to the area of code-switching. Section 3 provides an overview of the experimental methodologies that have been employed in code-mixing studies. Section 4 describes the present study, in which eye-tracking measures are collected to investigate the on-line performance of Spanish-English bilinguals while reading sentences containing licit and illicit code-mixes. The final section provides an explanation for the observed results and suggests some possible avenues for future research.

2. The linguistic behavior of the auxiliary phrase: A code-mixing perspective

Early linguistic studies of language contact viewed code-mixing primarily as part of the performance of the nonfluent bilingual, who switched because of a speaker's inability to continue a conversation in the language of the floor at the moment (Myers-Scotton 1993: 47). However, as scholars began to observe that code-mixing did not occur haphazardly, studies devoted to the search for patterns and for the linguistic constraints that could be responsible for such patterns began to emerge. As a result, a

number of influential studies have examined the regularity of occurrence of certain types of code-switches.

Among the precursors of the study of code-mixing as a phenomenon that obeys a stringent set of rules is Timm (1975) who, in a study of Spanish-English bilinguals, proposed several constraints on the type of constructions which can undergo code-switching. Timm argued that switches do not occur between pronominal subjects and the finite verbs to which they belong (6-7), between a verb and its pronominal object (8-9), and between verbs and negative elements (10). Timm also proposed that in verb phrases containing auxiliaries (11), code-mixing does not occur:

(6) * *Yo WENT*; *El WANTS*; *Ellos GAVE*
     'I went; he wants; they gave'

(7) * *I FUI*; *he QUIERE*; *they DABAN*
     'I went; he wants; they were giving'

(8) * *Mira HIM*; *him MIRA*
     'She/he looks at him; she/he him looks'

(9) * *She sees LO*; *lo SHE SEES*
     'She sees him; him she sees'

(10) * *(I) don't QUIERO*; *(I) do NO want*; *(I) NO want*; *(I) not QUIERO*
     'I don't want'

(11) * *(I) must* ESPERAR, * *(he) has* VISTO, * *debo* WAIT, * *estaba* WALKING
     'I must wait; he has seen, (I) must wait, (he/she) was walking'

Relevant for the present discussion is Lipski's (1978) observation that occasional exceptions to the switches in (11) occur, and presents the following example from Redlinger (1976: 47, cited in Lipski 1978):

(12)   *Mi marido está WORKING ON HIS MASTER'S.*
        'My husband is working on his master's.'

This counterexample hints at the possibility that auxiliaries and their complements (e.g., participles, infinitive stems, etc.) do not all have the same status when it comes to combining them to form a code-mixed utterance, and that the lack of mixing patterns reported in Timm (1975) involving auxiliary phrases is probably due to sparse data.

In an in-depth discussion of Spanish-English code-mixing at the auxiliary phrase, Pfaff (1979) examines the realization of etymologically English verbs in Spanish contexts. Her study of code-switched utterances in actual performance led to the observation that morphologically unadapted English verbs typically follow conjugated Spanish auxiliaries. This is shown in (13)-(15):

(13)   *Estar* + presenta participle:
        (a) *Estaba TRAINING para pelear.*
            'I was training to fight.'

        (b) *¿ Dónde estás TEACHING?*
            'Where are you teaching?'

(14)   *Ir, anda* + present participle:
        Anda FEELING medio NICE y START BLOWING (SIC) AGAIN

'He goes on feeling rather nice and starts blowing
again.'

(15) *Haber* + participle:
    Yo creo que apenas se había WASHED OUT.
    'I think that it had just washed out.'

It is worthwhile noting that in Pfaff's corpus, code-mixing
involving Spanish auxiliaries and English present participles occur
more frequently than mixes involving the Spanish *haber* and the
English past participle. In her data, Pfaff finds 7 instances of *estar*
+ PRESENT PARTICIPLE, a total of 10 instances of *ir*, *andar* +
PRESENT PARTICIPLE, but only 2 instances of *haber* + PARTICIPLE.

    The general mixing pattern observed by Pfaff led her to the
formulation of the following functional constraint on verb mixing:

(16) "An English verb not morphologically adapted to
      Spanish is permitted only in sentences in which
      tense/mood/aspect and subject are otherwise marked
      (Pfaff 1979: 302).

    However, Pfaff (1979) also states that verb mixing patterns are
not all productive, and that mixing patterns can further be
restricted by lexical and semantic factors, as well as by structural
constraints (e.g., surface structures to both languages favor
mixing). Pfaff's pioneering work was the formulation of a set of
testable descriptive generalizations, which have served as the
stepping-stone for other scholars interested in the study of code-
mixing.

    At about the same time that Timm (1975) and Pfaff (1979) put
forth their constraints on code-mixing, Poplack (1980) conducted
a quantitative analysis on recorded Spanish-English code-
switched data from natural conversations, and proposed two of

the most-cited constraints in the code-mixing literature, the *Equivalence Constraint* ("codes will tend to be switched at points where the juxtaposition of language A and language B elements does not violate a syntactic rule of either language," 1980: 586) and the *Free Morpheme Constraint* ("codes may be switched after any constituent in discourse provided that constituent is not a bound morpheme," 1980: 585-586). Among her results, Poplack reports that the non-occurring switches are precisely those that would be generated by rules excluded in one of the two language; these include switches involving negation, reflexive and object pronoun clitics, and switches in which the subject NP follows the verb.

The boundary between an auxiliary/modal and its complement is subject to some mixing, although Poplack reports that the propensity of this site to participate in switching is of 0.9 %. In syntactic terms, the Equivalence Constraint predicts that Spanish-English mixing should be favored at the functional juncture between the auxiliary and its complement, because the VP rules that generate AUX + VERB constructions in English and Spanish are equivalent (see Belazi, Rubin & Toribio 1994 and more recently Toribio 2001b for a similar argument). The fact that this kind of mixing is not favored between the auxiliary and its complement is briefly addressed in Poplack (1980), who suggests that the boundary between the two elements is morphemic rather than syntactic, and that the switch thus falls under the domain of the Free Morpheme Constraint.

Since the mid 1980's, researchers have exploited universal language principles hypothesized to characterize monolingual competence to capture the syntactic constraints on code-switching, and have emphasized lexical dependency rather than syntactic equivalence (Muysken, 2000).[1] For example, Belazi, Rubin &

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[1]   Other researchers who have sought to explain code-switching in non-linear terms are DiSciullo, Muyken & Singh (1986), Joshi (1985), Myers-Scotton

Toribio (1994) combine the notion that functional heads check morphological features of the elements in their "checking domain" with the idea that functional heads also check features within their internal domains (i.e., the complement of the functional head). They extend Abney's (1987) proposal that functional heads are generally required to select the features of their complements (a process that Abney refers to as "f-selection") to include language index as one of the features being checked. Belazi, Rubin & Toribio refer to the language feature checking process of functional heads and their complements as the *Functional Head Constraint*, defined in (17):

(17)   The language feature of the complement f-selected by a functional head, like all other relevant features, must match the corresponding feature of that functional head (Belazi, Rubin & Toribio 1994: 11).

The Functional Head Constraint predicts, then, that no code-switching should be allowed between the functional head INFL and its VP complement. This prediction is borne out in their intra-sentential code-switching data by Spanish/English speakers:

(18)   *The students had VISTO LA PELÍCULA ITALIANA.
                                                        (Engl./Span)
        'The students had seen the movie Italian.'

(19)   *The students had seen la PELÍCULA ITALIANA .* (Engl./Span)
        'The students had seen the Italian movie.'

The ungrammaticality of (18) is explained straightforwardly under the Functional Head Constraint: the feature-matching requirement

(1993), Bentahila & Davis (1983), Doron (1983), Azuma (1993), Woolford (1983), Pandit (1990), MacSwan (1997), and Boeschoten & Huybregts (1997).

cannot be satisfied because the finite verbal element *had* and the verb phrase *visto la película italiana* belong to two different codes. Despite the theoretical appeal of the Functional Head Constraint, it is clear from the distribution of switches such as those reported in DiSciullo, Muysken & Singh (1986), Köppe & Meisel (1995), Nortier (1990), Mahootian & Santorini (1996), and Poplack (1980) that their occurrence is much wider than predicted by the constraint. In addition, the constraint has the drawback of excluding the moderately frequent Spanish-English switches involving *estar/ir/anda* + PARTICIPLE, discussed in Pfaff (1979).

All in all, the studies discussed above present divergent proposals to capture the regularities observed in code-switched utterances. Some studies state that equivalence is an important variable. Others propose that the dependency relation that exists between words in a sentence is a crucial notion (cf. Muysken 2000 for extensive discussions on this topic). These proposals have been supported but also challenged on the basis of published natural speech data from the code-switching literature. In terms of Spanish-English code-mixing at the auxiliary phrase, neither proposal fully captures the bifurcation in the literature alluded to earlier: switches involving the Spanish *have* + English PARTICIPLE are largely absent in naturalistic corpus, whereas there are documented cases of switches between the Spanish *estar* + English PRESENT PARTICIPLE.

The current state of indeterminacy that characterizes Spanish-English switches at the AUX + COMPLEMENT juncture stems from the existence of code-switching corpus showing that these switches vary in terms of their frequency of occurrence depending on the lexical items that fill the terminal nodes (cf., Nortier 1990; see also Muysken 1995, 2000 for a discussion). Since the relation between statistical frequency and particular properties of linguistic structures is not well understood (Mitchell, Cuetos & Corley 1996; Gibson, Schütze & Salomon 1996), many researchers working on

code-mixing have opted to take the frequent types of code-switches as the primary body of evidence, and to disregard infrequent ones. Given this state of procedural uncertainty, it is important to devote research efforts into the development of psycholinguistic experimental techniques that would allow scholars to inform syntactic theoretical debates on code-mixing. Section 3 below discusses studies that have addressed this concern.

3. The study of code-mixing competence

To date only a handful of studies have attempted to use experimental techniques to access the code-mixing competence of bilingual speakers. Following the Chomskyan tradition of using grammaticality judgments as a window to language competence, grammaticality judgments have been the choice *par excellence* among scholars interested in the study of grammatical constraints on code-mixing. However, as Muysken writes "… intuitions about code-mixing are not always reliable (and we do not know when they are and when they are not)" (1995: 185, but see Toribio 2001b). Much insight into the mechanisms governing possible and impossible switches is to be gained from the use of more sophisticated psycholinguistic experimental techniques that are appropriate to opening up this area of study. We present a cursory review of some of these techniques below.

In the first study known to use reaction-time data to investigate code-mixing, Wakefield, Bradley, Lee Yom & Doughtie (1975) timed subjects' responses to sentences that varied systematically with respect to the site of an intrasentential switch. Wakefield et al. found that the response time to answer a true-false question related to the stimuli that participants heard is significantly longer when the switch does not occur at a definable syntactic boundary.

In a related study, Dussias (1997) used the *Response-Contingent Sentence Matching Task* to investigate the validity of the Functional Head Constraint. In this task, participants are asked to read a pair of sentences that are sequentially presented on a computer screen, the first above the second, and to then decide whether the sentences are the "same" or "different"(hence the name "sentence matching"). Among the pairs of sentences that subjects see, half are identical (i.e., *same sentences*), and half are not identical (i.e., *different sentences*). Crossed with sentence identity is sentence well-formedness, and these two together give rise to stimulus sentences that can be divided into four sets: (a) a set of same well-formed sentences, (b) a set of same ill-formed sentences, (c) a set of different well-formed sentences, and (d) a set of different ill-formed sentences. The *different sentences* act as distracters, and hence are removed from the tabulation of the results. What is left, then, is a series of response latencies that can be examined in the light of the contrast in well-formedness. The task was shown by Stevenson (1992) to be sensitive to a number of syntactic violations, including agreement violations, quantifier placement violations, phrase structure violations, and subjacency violations. Using this task, Dussias (1997) found that switches predicted by the Functional Head Constraint to be ungrammatical (i.e., between functional heads and their complements) were read faster than their respective control conditions. This result raises questions about the universal status of the Functional Head Constraint.

In another study, Dussias (1999) conducted a series of experiments to investigate whether the *functional element*[2] effect

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[2]   Numerous studies examining the regularity of occurrence of types of code-mixes in bilingual production data reveal that there is a systematic favoritism for certain grammatical categories to be more prone to participate in code-mixing. In this respect, the available literature indicates that whereas functional elements tend to appear in one language, their complements appear in the other language

(Muysken 1997) — often observed during sentence production — occurs in comprehension as well. To this end, participants' eye-fixation duration (measured in milliseconds) on target words were recorded while they were reading sentences with code-switches between functional heads and their complements (e.g., *La maestra no sabía* QUE/ THAT THE BOY HAD LEFT 'The teacher didn't know that the boy had left'). The findings revealed that fixation durations for sentences where the functional head and its complement appeared in the same language were significantly longer than the ones found in a control condition. These findings corroborate the results of corpus-analysis, replicating in reading times the preference patterns found in corpora frequencies.

In a study that investigated speech production, Dussias (2002) used an elicited oral production task to determine whether comprehension preferences in code-mixing could be replicated using experimental production data. In this task, two sentence fragments, one in Spanish (i.e., "La enfermera dijo …" [the nurse (fem.) said] and one in English ("…the patient didn't want to eat") were displayed on a computer screen, one below the other. Participants were instructed to read both phrases aloud and to produce a complete sentence by combining the two phrases using only one word, either from English or from Spanish. In all, the results suggest that linguistic, psycholinguistic and discourse principles may underlie the frequency patterns observable in spontaneous discourse for code-switched utterances.

Finally, Toribio (2001a) used a read-aloud reading task, an oral recounting task and a writing task to examine the grammatical status of different language alternations by Spanish-English bilinguals. Results revealed that in all three tasks, participants were remarkably uniform with respect to the patterns of the code-

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(Muysken 1997). This phenomenon has come to be known in the literature as "the functional element effect".

switches produced, attesting to the reliability of the methodologies to advance the study of bilingual code-mixing competence.

Before concluding this section, a word is in order regarding the methodology used in this study for data collection. The vast majority of the research that investigates code-mixing from a grammatical standpoint has been carried out through the examination of naturalistic data and the use of grammaticality judgment tasks, and to a lesser extent through psycholinguistic techniques that have been argued to tap into on-line processing. Researchers have undertaken the laborious task of conducting longitudinal studies, and have provided valuable data that has been used to formulate particular constraints on switching. However, because the real world is a complex bundle of many things, it is sometimes hard to distinguish between two competing explanations for a particular code-mixing phenomenon (for instance, does the frequency distribution of subject vs. object code-mixing reflect a grammatical or processing constraint, or it is simply accidental?). In order to illuminate further the area of code-mixing in a relevant manner, we need experimental tasks that provide objective, quantifiable evidence to settle specific questions with accuracy. What we need, then, are tasks that will enable us to provide a controlled look at what is observed in naturalistic data. I believe that use of eye-movement records is unusually helpful in this respect, as it can provide on-line evidence about the sources of difficulty during language comprehension and language processing.

4. The present study

The present study investigates the grammatical status of Spanish-English language switches at the auxiliary juncture when perfective and progressive forms are involved. In addition, the study seeks to ascertain the utility of eye-movement data as a tool

for informing the debates surrounding syntactic constraints on code-mixing.

Two experiments will be reported here. Experiment 1 examines switches at the Inflectional Phrase (INFL) involving the auxiliary *have (*Span. *haber)* and the main verb. Experiment 2 examines switches at the same juncture, this time involving the auxiliary *be (*Span. *estar).*

4.1.   *Experiment 1*

Participants: Twelve participants[3] were recruited for this study. The participants completed a language background survey designed to tap into several aspects of language proficiency and use by self-report. The language survey revealed that all participants had very similar language histories. All had learned Spanish from birth, and were of the following heritage: Puerto Rican (2 participants), Dominican (3 participants), Bolivian (2 participants), Venezuelan (2 participants), Salvadoran (1 participant) or Peruvian (2 participants). All participants were born in the U.S. and had lived in or around Philadelphia for a minimum of 16 years. Participants reported using both Spanish and English in their daily lives with family and friends, and in a variety of contexts, including academic and non-academic. Speakers reported being proficient readers of Spanish, and indicated that Spanish-English code-mixing was part of their daily linguistic behavior. Finally, all speakers reported being English dominant.

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[3]   An anonymous reviewer commented that the number of participants is rather small. As will become clearer below, the task used for data collection in this study required proficient reading abilities in both languages. Given that (a) bilinguals' abilities vary greatly, and (b) many are not proficient readers of Spanish, it became very difficult to find a more adequate number of participants.

Materials and design: 36 item sets were used in this experiment. An item set consisted of a pair of sentences in each of three versions, corresponding to three experimental conditions. Condition 1 represents sentences that switch immediately before the auxiliary. Condition 2 contains a switch between a Spanish auxiliary and an English participle. Finally, Condition 3 is an English monolingual sentence, included as the basis for comparison.[4] Experimental items are given in Appendix A.

Basing ourselves on theoretical approaches and on naturalistic data that are consonant with the claim that switches between AUX and the following verb are precluded (cf. Belazi, Rubin & Toribio 1994, Lipski 1978, 1985, Poplack 1980, Toribio 2001b for relevant discussions), we assume that Condition 1 represents a licit code-switch, and Condition 2 an illicit one. The three experimental conditions, along with an example of an item set, are given below:

Condition 1:   *El oficial piensa que los terroristas HAVE INJURED THE MAN.*

Condition 2:   *El oficial piensa que los terroristas HAN INJURED THE MAN.*

Condition 3:   *The officer thinks that the terrorists have injured the man.*

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[4]   An anonymous reviewer inquired about the reason for choosing English as the language for the control condition. Many studies that use reading times as a measure of processing difficulty require that the experimental conditions be as similar in lexical meaning and form as possible to ensure that any differences observed are not due to extraneous factors. If the control condition is in Spanish, differences in, say, lexical frequencies that could exist between English participle and their Spanish translations, or differences caused by the varying lengths of the auxiliary + participle phrase could influence the results. Given that the use of English would obviate these potential drawbacks, English was selected for the control condition.

All item sets were controlled as much as possible for total word length as well as for total character length so that Conditions 1-3 are formally as similar to each other as possible. In addition, verbs in the critical region (e.g., *have injured* above) were controlled for lexical frequency.[5] Finally, whenever possible, cognate nouns in Spanish and English were used to construct the experimental stimuli.

In addition to the experimental items, 60 filler sentences were added to serve as distracters. These items were similar in length to the experimental stimuli. Of the 60 fillers, 24 contained switches at syntactic sites different from those used in the experimental stimuli, and 36 were monolingual sentences. This ensured that participants were exposed to the same number of monolingual and bilingual sentences for the duration of the experiment. Also, 24 filler items were grammatical and the remaining 36 were ungrammatical, to evenly distribute grammatical and ungrammatical sentences throughout the duration of the experiment. Twelve practice items were added at the beginning of the experiment to familiarize participants with the requirements of the task and the type of stimuli. Finally, one third of the total number of items in the experiment was followed by a comprehension question. This was done to guarantee that participants were performing the reading task as expected. Half of the questions required a *yes* answer and half a *no* answer.

Three 108-item files were created, each containing 36 experimental items (12 in each condition), 60 filler items, and the 12 practice sentences. Each list contained exactly one version of each experimental sentence (i.e., one version of the sentences within an item set) and equal number of items in each condition. Experimental items and fillers were pseudo-randomly interleaved; this resulted in the items being presented in a different order to

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[5]   This was done by using Francis & Kucera' (1982) dictionary of lexical frequencies.

each subject, yet the items in each condition were evenly distributed throughout the duration of the experiment.

I predicted the following to occur:

- Condition 3, the monolingual condition, should produce the shortest eye-fixation durations (measured in milliseconds) at the critical region, i.e., the AUXILIARY + MAIN VERB.
- Reflecting the cost of switching from one language to another, Condition 1 should produce longer fixation durations at the critical region than Condition 3.
- Reflecting the different grammatical status of the two code-switches, Condition 2 should produce longer fixation durations at the critical region than Condition 1. In short, Condition 2 > Condition 1 > Condition 3.

Procedure: Stimuli were presented on a color monitor using an Eyelink eye-tracker, interfaced with an IBM-compatible PC. The system consists of three miniature cameras mounted on a leather-padded headband. Two of the cameras allow binocular eye tracking, while the third camera records the stimuli displayed on the computer screen. Recording of eye-fixations is done at a sampling rate of 250Hz. The eye-tracker is calibrated and validated for each participant at the start of the experimental session, and again after a short break.

Each sentence was displayed in its entirety across one line on the computer screen. Participants were instructed to read each sentence at their own pace, and to then perform a grammaticality judgment by pressing one of two hand-held buttons. In cases where the sentence was followed by a comprehension question, participants first provided the grammaticality judgment and then answered the comprehension question.[6]

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[6]   Half of the bilingual speakers participated first in Experiment 1 and the remaining half participated in Experiment 2. Approximately 6 weeks later, the

Results: Results obtained for the critical region AUX + VERB is the area of theoretical interest to the present study. The data are here reported in terms of gaze durations, and percentages for the acceptability ratings. *Gaze durations were defined as the sum of all left-to-right eye-fixations on the critical region, excluding re-reading* (Rayner, Sereno, Morris, Schmauder & Clifton 1989). Let us turn first to the means obtained for the three conditions shown in Table 1.

	Condition 1 (*terroristas* HAVE INJURED)	**Condition 2** (*terroristas* han INJURED)	**Condition 3** (*terrorists* have injured)
Mean times (in millisecs.)	603	998	535

Table 1.   Mean Gaze Duration Fixations for AUX (*haber*) + VERB in milliseconds.

As Table 1 makes clear, when the switch occurs at the syntactic boundary (Condition 1), there is an increase in gaze duration times, compared to the control condition (Condition 3). That is, the critical region in Condition 1 took on average 68 milliseconds (ms) longer to read than the critical region in Condition 3 (603 and 535 ms, respectively). In addition, there is numerical increase of 463 ms in fixation durations when the switch occurs at the juncture between the auxiliary and the verb, compared to the control condition (998 and 535 ms, respectively). Finally, more time was spent on the critical region in Condition 2 than in Condition 1 (998

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roles were reversed so that the participants in Experiment 1 now participated in Experiment 2, and participants in Experiment 2 now participated in Experiment 1.

and 603 ms, respectively). These data were submitted to a Repeated-Measures Analysis of Variance with Condition as the within-subject factor and File as the between-subject factor. The findings indicate a significant difference across the three means (F (2,18) = 108.06, p = .000). Subsequent pairwise contrasts indicate a significant difference between Conditions 1 and 3 (F (1,11) = 5.04, p = .04), confirming the prediction that code-mixing incurs costs to the processing mechanism. The difference between Condition 2 and Condition 3 was also statistically significant. (F (1,11) = 122.95, p = .000). Lastly, there was an effect of grammaticality, revealed in the significant difference between Condition 1 and Condition 2 (F (1,11) = 200.61, p = .000).

I now turn to the results obtained for the grammaticality judgments. Of the total number of items representing Condition 1 (n = 144; 12 sentences x 12 participants), 8.3% were judged as ungrammatical and the remaining 91.7 % as grammatical code-switches (12 items *ungrammatical* and 132 items *grammatical*). For Condition 2 (n = 144), 87.5 % of the total number of items were rejected as grammatical code-switches (126 items were judged *ungrammatical*). Finally, 3.4% of the monolingual sentences (Condition 3; n = 144) were viewed as ungrammatical sentences.[7]

The results of this experiment demonstrate that switches after the auxiliary *haber* (e.g., *... terroristas han INJURED*) take longer to read than switches that occur before the auxiliary (e.g.*, ... terroristas HAVE INJURED*). The observed differences in gaze

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[7]   Although we expect English monolinguals to judge the sentences as grammatical on all trials, subjects are known to sometimes make errors when pressing the button to indicate their responses (i.e., subjects can sometimes erroneously press the button indicating an "ungrammatical" response when they mean to press the button indicating a "grammatical" response). This mistake in their response may account for the less-than-perfect performance on the grammaticality judgment task observed in the monolingual group.

duration times between Condition 1 and Condition 2 cannot be a result of switching per se, given that both conditions included language switches. Rather, this difference supports the hypothesis, presented earlier, that a switch after the auxiliary, depicted in Condition 2, resists mixing. This account is corroborated by the robust findings obtained in the grammaticality judgment task: switches after the auxiliary were judged ungrammatical significantly more times than switches at the auxiliary. Further discussion of the implication of this finding for constraints on code-mixing will be postponed until after the second experiment, in which switches at INFL involving the auxiliary *be (estar)* are examined.

4.2. *Experiment 2*

Participants: these were the same recruited for Experiment 1.
Materials and design: The stimuli and design were similar to Experiment 1. The one difference was that item sets were constructed using *estar* 'be' rather than *haber* 'have'. As in Experiment 1, 36 item sets were used, each corresponding to one of three experimental conditions: Condition 1 represents sentences with a switch immediately before the auxiliary, Condition 2, contains a switch between the auxiliary *estar* and the present participle, and Condition 3 is the monolingual control. The three experimental conditions, along with an example of an item set, are given below:

Condition 1:   *El gobierno piensa que los ciudadanos ARE SUPPORTING THE WAR.*
Condition 2:   *El gobierno piensa que los ciudadanos están SUPPORTING THE WAR.*
Condition 3:   *The government thinks that the citizens are supporting the war.*

All item sets were controlled for sentence length and lexical frequency, in the same manner as described in Experiment 1. All fillers, practice sentences and item lists were created following the same procedures described in Experiment 1. Experimental stimuli are given in Appendix B.[8] On the basis of proposals made in the code-mixing literature regarding the impossibility of switching between AUX and the following verb, which were alluded to in Experiment 1, I expected the following to occur:

- Condition 3 will take the shortest time to read.
- Condition 1 will be read slower than Condition 3, reflecting the cost of switching from one language to another.
- Condition 2 will be read more slowly than Condition 1, reflecting the different grammatical status of the two code-switches.

Procedure: this was identical to Experiment 1.

Results: The data are reported in terms of gaze durations, and percentages for the acceptability ratings. The mean time that participants spent reading the critical region in each of the three conditions is given in Table 2.

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[8]   An anonymous reviewer points out that although most of the subjects of the subordinate sentences in Experiment 1 and 2 are [+animate] and [+human], some items contain subjects that are neither human nor animate. This raises the possibility that the findings could have resulted from differences in the experimental items. Although statistical analyses were not performed on the experimental items per se, a look at the fixation durations for the subordinate sentences with [+animate / +human] subjects did not appear to be different from the fixation durations for sentences with [-animate / -human] subjects.

	Condition 1 (*ciudadanos* ARE SUPPORTING)	**Condition 2** (*ciudadanos* *están* SUPPORTING)	**Condition 3** (*citizens are supporting*
Mean times (in millisecs.)	660	691	533

Table 2.   Mean Gaze Duration Fixations for AUX (*estar*) + Verb in milliseconds.

We observe that when the switch occurs immediately before the auxiliary (Condition 1), there is an increase of 127 ms in gaze duration times, compared to the control condition (Condition 3) (660 and 533 ms, respectively). The same occurs when we compare the mean of Condition 2 with that of Condition 3. In this case, the difference between reading times for the two conditions is of 158 ms (691 and 533 ms, respectively). Finally, there is a numerical advantage of 31 ms in favor of Condition 1 (660 ms for Condition 1 vs. 691 ms for Condition 2).

The data were submitted to a Repeated-Measures Analysis of Variance with Condition as the within-subject factor and File as the between-subject factor. The findings indicate a significant difference across the three means (F (2, 18) = 14.16, p = .000). Subsequent pairwise contrasts indicate a significant difference between Conditions 1 and 3 (F (1,11) = 10.93, p = .007). As in the previous experiment, I presume this to be caused by the cost associated with language switching. The difference in reading times between Condition 2 and Condition 3 was also statistically significant (F (1, 11) = 19.02, p = .001). Lastly, there was a difference in gaze duration, though not significant, between Condition 1 and Condition 2 (F (1, 11) = 1.22, p = .292).

   The results of the grammaticality judgment were as follows: items representing Condition 1 were judged as grammatical 95% of the time; items in Condition 2 were rated as grammatical 86% of the time items; and lastly, items in Condition 3 were judged as grammatical 96% of the times.

   To summarize, the monolingual English sentence took less time to read than the code-switched sentences. However, contrary to the predictions, switching before and after the Spanish *estar* does not seem to deter processing or acceptability.[9]

5. Discussion of results

The picture that emerges from the two experiments presented here is that Spanish-English bilingual speakers treat switches at the AUX phrase differently, depending on the lexical items that fill the AUX node. Switches that occur between the Spanish auxiliary *haber* and its English verbal complement cause significantly more processing difficulties than switches where the auxiliary and the verb match in language index (i.e., where both appear in English). This claim is substantiated by the longer gaze durations that were observed when Span. *have* was followed by an English past participle. The findings obtained from the eye-movement records are supported by the large percentage of "ungrammatical" responses that this code-switch type elicited from the participants, and are consonant with the prevailing view that the boundary between the auxiliary *haber* and a following participle is not conducive to a language switch.

   The motivation to propose a restriction against a switch between *haber* + PARTICIPLE emerges from the lack of recurrence of this kind of switch in naturalistic data. Researchers have

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[9] As pointed out by an anonymous reviewer, processing difficulty cannot only arise from ungrammaticality, but from other factors such as syntactic or lexical ambiguity, which are clearly unrelated to syntactic violations.

proposed different renditions of a constraint that captures the observation that an auxiliary and a main verb must appear in the same language during code-switched speech. For example, in a systematic study of the behavior of closed-class items in code-mixing, Joshi (1985) concludes that closed-class items, among which is AUX, resist code-mixing, and Klavans (1985) points to switches between AUX and verb as "grossly ungrammatical." In the same vein, Belazi, Rubin & Toribio (1994) and Myers-Scotton (1993) provide detailed discussions in support of the formulation for a cardinal rule against this type of switch.

However, the restriction against AUX/verb switches discussed in the literature contrast rather sharply with the findings obtained in Experiment 2. Eye-movement records revealed no significant differences in reading times between the two code-switched conditions when the switch involved the auxiliary *estar*. If the proposed constraints to switching within the auxiliary phrase are universal, the switches involving progressive forms should have produced an effect similar to those obtained for the perfective forms. Instead, the results from the eye-movement data and the grammaticality judgment task show that *estar* + PARTICIPLE combinations appear not to be constrained by the same syntactic restrictions that disallow *haber* + PARTICIPLE switching.

At this point, the question remains as to how to characterize the variable status of auxiliary-complement switching in the Spanish-English data presented here. The fact that the *haber* + PARTICIPLE site resists code-mixing suggests that these two elements act as an indivisible entity. This view, first put forth in Lipski (1978), advocates for a general rule on code-mixing which dictates that certain phrasal elements are "atomic" and, consequently, unbreakable points. On this point he states:

It is perhaps significant that, for example, in the evolution of the Romance languages from Latin, there have

frequently been interchanges between synthetic single-word forms and analytic multi-word forms, with precisely the same semantic values; this alternation has involved such categories as the future, conditional, present and pluperfect forms as well as various subjunctive forms.

(Lipski 1978: 253)

Evidence for the "indivisibility hypothesis" comes from the observation that in Spanish no element can appear between *haber* and the past participle. This suggests that the relationship between these two closely bound syntactic elements enters the domain of morphology: *haber* + PARTICIPLE can be analyzed morphologically, since no other syntactic category can appear between them. The boundedness that exists between this auxiliary and its verbal complement is further evidenced by the fact that *haber* can never occur by itself; if it is used, it needs to be accompanied by a participle.[10] What is relevant for our purposes is that the strong bond between *haber* and *participle* blurs the distinction between these two lexical elements, and considerably limits the possibility of code-mixing at this syntactic site; this explains why the participants not only processed switches after *haber* (i.e., at the participle) more slowly than their corresponding control conditions, but also judged them as ungrammatical.

In contrast to *haber*, auxiliary *estar* seems to be more autonomous in its syntactic behavior. First, *estar* can be followed by other expressions, such as adverbial and adjectival phrases (e.g., *estoy en el parque*/ 'I am at the park,' and *estoy molesto*/ 'I am angry'), apart from being followed the present participle (*estoy*

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[10]   I would like to thank an anonymous reviewer for bringing up the additional point that Span. *han* might govern its past participle suffix, making the sequence *han* + PARTICIPLE unbreakable.

trabajando/ 'I am working'). This suggests that the *estar* + PARTICIPLE sequence is more easily dividable.

Additional evidence for the autonomous status of *estar* vis-à-vis *haber* is found in the literature on grammaticalization.[11] "Grammaticalization" refers to a synchronic process whereby autonomous lexical items acquire grammatical status. In a detailed study of grammaticalization in progressive Spanish *–ndo* (i.e., Engl. *–ing*) constructions, Torres Cacoullos (1999) argues that periphrastic expressions composed of one of three AUXILIARIES (*estar/*'be'; *ir/*'go', from a verb meaning 'follow' or 'keep on'; *andar*/ 'walk, go around') plus a PRESENT PARTICIPLE have undergone different degrees of grammaticalization. Through a detailed analysis of the distribution of the three auxiliaries across types of main verbs (physical activity, general activity, mental, motion, and so forth) and of the different locative expressions that co-occur with each auxiliary, she shows that the auxiliaries still retain part of their original lexical meanings (*andar*, of general location; *estar*, of locative meaning, and *ir*, of allative mention meaning), although they have grammaticized, so that their locative and movement lexical meaning have generalized to progressive and continuous aspectual meanings. In terms of degrees of grammaticalization, *andar* represents the least grammaticized of the three auxiliaries, followed by *ir*, and then by *estar* — the most grammaticized one. On this account, switches between *estar* and the present participle are possible on the hypothesis that although the form has grammaticized to aspectual functions, it still retains some original lexical meaning attributed to the auxiliary (cf. Torres Cacoullos, 1999). This renders the elements in the constituent more discrete, which in turn allows for a code-switch to follow it.

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[11]   The reader is referred to Escobar (1997), Lipski (1994), Penny (2000), and Schwenter (1994) for recent discussions on the topic of grammaticalization in different Spanish varieties and constructions.

A question that remains unanswered in the present study concerns the possibility of code-mixing between *ir* + PARTICIPLE and *andar* + PARTICIPLE. We noted in Section 2 that these two code-mixing types are attested in the Spanish-English code-switching literature. It might be revealing to investigate whether these switches undergo different degrees of acceptabily and processability in terms of ease of codeswitching, and whether any gradiance observed parallels the degrees of grammaticalization proposed in Torres Cacoullos (1999). This area of inquiry is left open for future research.

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Appendix A: Stimuli Used in Experiment 1

Item #1
Condition 1   El oficial piensa que los terroristas have injured the man.
Condition 2   El oficial piensa que los terroristas han injured the man.
Condition 3   The officer thinks that the terrorists have injured the man.

Item #2
Condition 1   La madre sabe que los chicos have gone to the park.
Condition 2   La madre sabe que los chicos han gone to the park.
Condition 3   The mother knows that the children have gone to the park.

Item #3
Condition 1   El escultor cree que los organizadores have bought the clay.
Condition 2   El escultor cree que los organizadores han bought the clay.
Condition 3   The sculptor believes that the organizers have bought the clay.

Item #4
Condition 1   El agente dice que los turistas have enjoyed the cruise.
Condition 2   El agente dice que los turistas han enjoyed the cruise.
Condition 3   The agent says that the tourists have enjoyed the cruise.

Item #5
Condition 1   El doctor admite que los actores have had the surgery.
Condition 2   El doctor admite que los actores han had the surgery.
Condition 3   The doctor admits that the actors have had the surgery.

Item #6
Condition 1   El autor supone que los empleados have sold the book.
Condition 2   El autor supone que los empleados han sold the book.
Condition 3   The author supposes that the employees have sold the book.

Item #7
Condition 1   El presidente piensa que los ministros have made the mistake.
Condition 2   El presidente piensa que los ministros han made the mistake.
Condition 3   The president thinks that the ministers have made the mistake.

Item #8
Condition 1   El dentista sabe que las recepcionistas have talked to the client.
Condition 2   El dentista sabe que las recepcionistas han talked to the client.
Condition 3   The dentist knows that the receptionists have talked to the client.

Item #9
Condition 1   La audiencia cree que los canadienses have won the medal.
Condition 2   La audiencia cree que los canadienses han won the medal.
Condition 3   The audience believes that the Canadians have won the medal.

Item #10
Condition 1   El juez dice que los acusados have committed the crime.
Condition 2   El juez dice que los acusados han committed the crime.
Condition 3   The judge says that the accused have committed the crime.

Item #11
Condition 1   El electricista admite que las secretarias have paid the bill.
Condition 2   El electricista admite que las secretarias han paid the bill.
Condition 3   The electrician admits that the secretaries have paid the bill.

Item #12
Condition 1   El profesor supone que los estudiantes have passed the exam.
Condition 2   El profesor supone que los estudiantes han passed the exam.
Condition 3   The professor supposes that the students have passed the exam.

Item #13
Condition 1   El arquitecto piensa que los pintores have painted the wall.
Condition 2   El arquitecto piensa que los pintores han painted the wall.
Condition 3   The architect thinks that the painters have painted the wall.

Item #14
Condition 1   El director sabe que los productores have gotten the money.
Condition 2   El director sabe que los productores han gotten the money.
Condition 3   The director knows that the producers have gotten the money.

Item #15
Condition 1   El sargento cree que los soldados have completed the mission.
Condition 2   El sargento cree que los soldados han completed the mission.
Condition 3   The sergeant believes that the soldiers have completed the mission.

Item #16
Condition 1   El piloto dice que los pasajeros have abandoned the plane.
Condition 2   El piloto dice que los pasajeros han abandoned the plane.
Condition 3   The pilot says that the passengers have abandoned the plane.

Item #17
Condition 1   El hospital admite que los pacientes have finished the treatment.
Condition 2   El hospital admite que los pacientes han finished the treatment.
Condition 3   The hospital admits that the patients have finished the treatment.

Item #18
Condition 1 El ingeniero supone que los hoteles have hired the workers.
Condition 2 El ingeniero supone que los hoteles han hired the workers.
Condition 3 The engineer supposes that the hotels have hired the workers.

Item #19
Condition 1 La policía piensa que los adolescentes have stolen the car.
Condition 2 La policía piensa que los adolescentes han stolen the car.
Condition 3 The police think that the adolescents have stolen the car.

Item #20
Condition 1 El técnico sabe que los teléfonos have improved the connection.
Condition 2 El técnico sabe que los teléfonos han improved the connection.
Condition 3 The technician knows that the phones have improved the connection.

Item #21
Condition 1 El asistente cree que las computadoras have completed the job.
Condition 2 El asistente cree que las computadoras han completed the job..
Condition 3 The assistant believes that the computers have completed the job.

Item #22
Condition 1 El crítico dice que los documentales have discussed the issue.
Condition 2 El crítico dice que los documentales han discussed the issue.
Condition 3 The critic says that the documentaries have discussed the issue.

Item #23
Condition 1 El investigador admite que los químicos have designed the test.
Condition 2 El investigador admite que los químicos han designed the test.
Condition 3 The investigator admits that the chemists have designed the test.

Item #24
Condition 1 El filósofo supone que las ideas have changed the argument.
Condition 2 El filósofo supone que las ideas han changed the argument.
Condition 3 The philosopher supposes that the ideas have changed the argument.

Item #25
Condition 1 El astrónomo piensa que los asteroides have influenced the weather.
Condition 2 El astrónomo piensa que los asteroides han influenced the weather
Condition 3 The astronomer thinks that the asteroids have influenced the weather.

Item #26
Condition 1 El científico sabe que los experimentos have increased the budget.
Condition 2 El científico sabe que los experimentos han increased the budget.
Condition 3 The scientist knows that the experiments have increased the budget.

Item #27
Condition 1   El zoólogo cree que los animales have moved to the lake.
Condition 2   El zoólogo cree que los animales han moved to the lake.
Condition 3   The zoologist believes that the animals have moved to the lake.

Item #28
Condition 1   El antropólogo dice que las civilizaciones have affected the future.
Condition 2   El antropólogo dice que las civilizaciones han affected the future.
Condition 3   The anthropologist says that the civilizations have affected the future.

Item #29
Condition 1   La nación admite que los políticos have altered the system.
Condition 2   La nación admite que los políticos han altered the system.
Condition 3   The nation admits that the politicians have altered the system.

Item #30
Condition 1   El especialista supone que las medicinas have helped the infected.
Condition 2   El especialista supone que las medicinas han helped the infected.
Condition 3   The specialist supposes that the medicines have helped the infected.

Item #31
Condition 1   El gobierno piensa que los ciudadanos have supported the war.
Condition 2   El gobierno piensa que los ciudadanos han supported the war.
Condition 3   The government thinks that the citizens have supported the war.

Item #32
Condition 1   La actriz sabe que los voluntarios have collected the money.
Condition 2   La actriz sabe que los voluntarios han collected the money.
Condition 3   The actress knows that the volunteers have collected the money.

Item #33
Condition 1   El sociólogo cree que las industrias have caused the problem.
Condition 2   El sociólogo cree que las industrias han caused the problem.
Condition 3   The sociologist believes that the industries have caused the problem.

Item #34
Condition 1   El príncipe dice que los helicópteros have joined the battle.
Condition 2   El príncipe dice que los helicópteros han joined the battle
Condition 3   The prince says that the helicopters have joined the battle.

Item #35
Condition 1   El senador admite que los ataques have defined the agenda.
Condition 2   El senador admite que los ataques han defined the agenda.

Condition 3   The senator admits that the attacks have defined the agenda.

Item #36
Condition 1   El artista supone que los mexicanos have sponsored the exhibition.
Condition 2   El artista supone que los mexicanos han sponsored the exhibition.
Condition 3   The artist supposes that the Mexicans have sponsored the exhibition.

Appendix B: Stimuli used in Experiment 2

Item #1
Condition 1   El oficial piensa que los terroristas are threatening the man.
Condition 2   El oficial piensa que los terroristas están threatening the man.
Condition 3   The officer thinks that the terrorists are threatening the man.

Item #2
Condition 1   La madre sabe que los chicos are going to the park.
Condition 2   La madre sabe que los chicos están going to the park.
Condition 3   The mother knows that the children are going to the park.

Item #3
Condition 1   El escultor cree que los organizadores are buying the clay.
Condition 2   El escultor cree que los organizadores están buying the clay.
Condition 3   The sculptor believes that the organizers are buying the clay.

Item #4
Condition 1   El agente dice que los turistas are enjoying the cruise.
Condition 2   El agente dice que los turistas están enjoying the cruise.
Condition 3   The agent says that the tourists are enjoying the cruise.

Item #5
Condition 1   El doctor admite que los actores are having the surgery.
Condition 2   El doctor admite que los actores están having the surgery.
Condition 3   The doctor admits that the actors are having the surgery.

Item #6
Condition 1   El autor supone que los empleados are selling the book.
Condition 2   El autor supone que los empleados están selling the book.
Condition 3   The author supposes that the employees are selling the book.

Item #7
Condition 1   El presidente piensa que los ministros are making the mistake.
Condition 2   El presidente piensa que los ministros están making the mistake.
Condition 3   The president thinks that the ministers are making the mistake.

Item #8
Condition 1   El dentista sabe que las recepcionistas are talking to the client.
Condition 2   El dentista sabe que las recepcionistas están talking to the client.
Condition 3   The dentist knows that the receptionists are talking to the client.

Item #9
Condition 1   La audiencia cree que los canadienses are winning the medal.
Condition 2   La audiencia cree que los canadienses están winning the medal.
Condition 4   The audience believes that the Canadians are winning the medal.

Item #10
Condition 1   El juez dice que los acusados are hiding the evidence.
Condition 2   El juez dice que los acusados están hiding the evidence.
Condition 3   The judge says that the accused are hiding the evidence.

Item #11
Condition 1   El electricista admite que las secretarias are paying the bill.
Condition 2   El electricista admite que las secretarias están paying the bill.
Condition 3   The electrician admits that the secretaries are paying the bill.

Item #12
Condition 1   El profesor supone que los estudiantes are passing the exam.
Condition 2   El profesor supone que los estudiantes están passing the exam.
Condition 3   The professor supposes that the students are passing the exam.

Item #13
Condition 1   El arquitecto piensa que los pintores are painting the wall.
Condition 2   El arquitecto piensa que los pintores están painting the wall
Condition 3   The architect thinks that the painters are painting the wall.

Item #14
Condition 1   El director sabe que los productores are getting the money.
Condition 2   El director sabe que los productores están getting the money.
Condition 3   The director knows that the producers are getting the money.

Item #15
Condition 1   El sargento cree que los soldados are planning the mission.
Condition 2   El sargento cree que los soldados están planning the mission.
Condition 3   The sergeant believes that the soldiers are planning the mission.

Item #16
Condition 1   El piloto dice que los pasajeros are leaving the plane.
Condition 2   El piloto dice que los pasajeros están leaving the plane.
Condition 3   The pilot says that the passengers are leaving the plane.

Item #17
Condition 1   El hospital admite que los pacientes are financing the treatment.
Condition 2   El hospital admite que los pacientes están financing the treatment.
Condition 3   The hospital admits that the patients are financing the treatment.

Item #18
Condition 1   El ingeniero supone que los hoteles are feeding the workers.
Condition 2   El ingeniero supone que los hoteles están feeding the workers.
Condition 3   The engineer supposes that the hotels are feeding the workers.

Item #19
Condition 1   La policía piensa que los adolescentes are washing the car.
Condition 2   La policía piensa que los adolescentes están washing the car.
Condition 3   The police think that the adolescents are washing the car.

Item #20
Condition 1   El técnico sabe que los teléfonos are improving the connection.
Condition 2   El técnico sabe que los teléfonos están improving the connection.
Condition 3   The technician knows that the telephones are improving the
                connection.

Item #21
Condition 1   El asistente cree que las computadoras are controlling the job.
Condition 2   El asistente cree que las computadoras están controlling the job.
Condition 3   The assistant believes that the computers are controlling the job.

Item #22
Condition 1   El crítico dice que los documentales are describing the issue.
Condition 2   El crítico dice que los documentales están describing the issue.
Condition 3   The critic says that the documentaries are describing the issue.

Item #23
Condition 1   El investigador admite que los químicos are discussing the test.
Condition 2   El investigador admite que los químicos están discussing the test.
Condition 3   The investigator admits that the chemists are discussing the test.

Item #24
Condition 1   El filósofo supone que las ideas are changing the argument.
Condition 2   El filósofo supone que las ideas están changing the argument.
Condition 3   The philosopher supposes that the ideas are changing the argument.

Item #25
Condition 1   El astrónomo piensa que los asteroides are varying the weather.
Condition 2   El astrónomo piensa que los asteroides están varying the weather
Condition 3   The astronomer thinks that the asteroids are varying the weather.

Item #26
Condition 1   El científico sabe que los experimentos are increasing the budget.
Condition 2   El científico sabe que los experimentos están increasing the budget.
Condition 3   The scientist knows that the experiments are increasing the budget.

Item #27
Condition 1   El zoólogo cree que los animales are moving to the lake.
Condition 2   El zoólogo cree que los animales están moving to the lake.
Condition 3   The zoologist believes that the animals are moving to the lake.

Item #28
Condition 1   El antropólogo dice que las civilizaciones are cleaning the river.
Condition 2   El antropólogo dice que las civilizaciones están cleaning the river.
Condition 3   The anthropologist says that the civilizations are cleaning the river.

Item #29
Condition 1   La nación admite que los políticos are creating the crisis.
Condition 2   La nación admite que los políticos están creating the crisis.
Condition 3   The nation admits that the politicians are creating the crisis.

Item #30
Condition 1   El especialista supone que las medicinas are helping the infected.
Condition 2   El especialista supone que las medicinas están helping the infected.
Condition 3   The specialist supposes that the medicines are helping the infected.

Item #31
Condition 1   El gobierno piensa que los ciudadanos are supporting the war.
Condition 2   El gobierno piensa que los ciudadanos están supporting the war.
Condition 3   The government thinks that the citizens are supporting the war.

Item #32
Condition 1   La actriz sabe que los voluntaries are saving the money.
Condition 2   La actriz sabe que los voluntarios están saving the money.
Condition 3   The actress knows that the volunteers are saving the money.

Item #33
Condition 1   El sociólogo cree que las industrias are causing the problem.
Condition 2   El sociólogo cree que las industrias están causing the problem.
Condition 3   The sociologist believes that the industries are causing the problem.

Item #34
Condition 1   El príncipe dice que los helicópteros are joining the battle.
Condition 2   El príncipe dice que los helicópteros están joining the battle
Condition 3   The prince says that the helicopters are joining the battle.

Item #35
Condition 1   El senador admite que los eventos are filling the agenda.
Condition 2   El senador admite que los eventos están filling the agenda.
Condition 3   The senator admits that the events are filling the agenda.

Item #36
Condition 1   El artista supone que los mexicanos are advertising the exhibition.
Condition 2   El artista supone que los mexicanos están advertising the exhibition.
Condition 3   The artist supposes that the Mexicans are advertising the exhibition.