Qué es un good code-switch? Testing the Functional Head Constraint within Noun Phrases

Paola E. Dussias and Ellen H. Courtney*
University of Arizona

The Functional Head Constraint (Rubin and Toribio, 1994) states that no code-switch is allowed between a functional head and its complement. This was tested in an experiment with Spanish/English code-switched sentences. Subjects in the experiments were native speakers of Spanish (N=21), who were proficient English speakers, and had learned English during adulthood. The experiment used the Matching Task described in Freedman and Forster (1985). In this procedure, two sentences are presented sequentially on a computer screen, and are kept on the screen for 2 milliseconds. Subjects press a "yes" button or a "no" button to indicate whether the sentences on the screen are identical. In this experiment, three conditions were used: condition 1, where the determiner and the noun were Spanish; condition 2, where the determiner was Spanish and the noun was English; and condition 3, where both the determiner and the noun were English. Grammaticality of the code-switch was established by comparing matching times on all SAME items for the two conditions. Here, condition 2 violates the functional head constraint; thus, matching times for this condition should be significantly slower than for conditions 1 and 3. The results obtained are interpreted under the Minimalist Program of Chomsky (1992).

INTRODUCTION AND BACKGROUND

Since the mid-1970s, the goal of researchers exploring the syntactic constraints on code-switching has been to provide a characterization of what constitutes "a possible sentence" in code-switched speech (Bokamba, 1989). Many studies of code-switching have attempted to address the fundamental question of how to describe and explain the morphosyntactic features of code-switching phenomena. From these studies, several hypotheses have been advanced regarding the nature of the rules that determine "a possible sentence" in code-switched speech. Also, numerous constraints have been proposed to characterize the process by which bilinguals effortlessly switch from one language to the other within sentences. In many of these proposals, efforts have been made to subsume the proposed constraints on code-switching by invoking concepts independently motivated in linguistic theory. One such attempt is Toribio and Rubin's (1993) proposal in favor of the Functional Head Constraint. This constraint resorts to Chomsky's (1993) concept of feature checking in order to account for the ungrammaticality of switches between a determiner (DET) and a noun (N), as exemplified in their Tunisian Arabic and English code-switching data.

The purpose of the present study is to explore the predictions made by the Functional Head Constraint for cases of Spanish-English code-switching. An important motivation in this study is the informal observation that bilingual Spanish-English speakers commonly code-switch between determiners and nouns within noun phrases. This phenomenon may jeopardize the generality of the Functional Head Constraint.

Proposed constraints on intrasentential code-switching

Ever since researchers came to recognize that the intrasentential code-switches produced by fluent bilingual speakers are not random, they have attempted to formalize the syntactic contexts in which intrasentential code-switching is licensed. They have put forth numerous and varied constraints on such switches. In his study of Marathi and English code-switching, Joshi (1985) proposed two constraints to account for certain types of ungrammatical Marathi-English code-switches:

---

* The order in which the authors are listed was determined by the toss of a coin.

(1) **The Asymmetry Constraint:** Switching a category of the matrix grammar to a category of the embedded grammar is permitted, but not vice-versa.

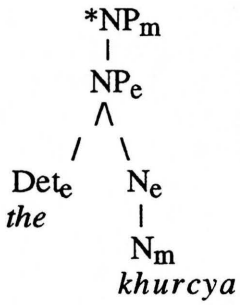
(2) **The Constraint on Closed Class Items:** Certain closed class items (e.g. Tense, Aux, and helping verbs) cannot be switched when they appear in main VP.

Taken together, these two constraints account for the ungrammaticality of the Marathi-English code-switch in (3) as well as the grammaticality of (4) below. Both examples mean "the chairs".

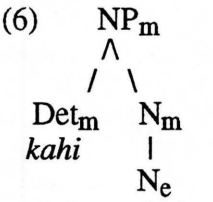
(3) * the *khurcya*
(4) *kahi* chairs

Schematically, these would be represented as (5) and (6), as follows:

(5)



(6)

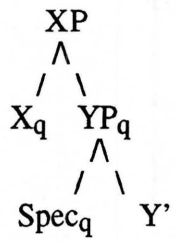


In (5) and (6), the matrix language [m] is Marathi, and the embedded language [e], is English. According to the Asymmetry Constraint, the switch from the embedded to the matrix language is not permitted. Hence, the Marathi *khurcya* ("chairs") in (5) is disallowed. By contrast, (6) constitutes a well-formed switch since switches from the matrix to the embedded language are possible.

In an attempt to subsume under one generalization several of the constraints proposed on code-switching, DiSciullo, Muysken and Singh (1986) invoked the concept of government, a central notion in Chomsky's Government and Binding Theory (1986). Accordingly, these authors postulated that switching is possible only between elements which do not hold a government relation. Their hypothesis was formalized in the following terms:

(7) **Government Constraint:**
a. If the L_q carrier has index q, then Y^{max} q.
b. In a maximal projection Y^{max}, the L_q carrier is the lexical element which asymmetrically c-commands the other lexical element or terminal phrase nodes dominated by Y^{max}.

On their account, the language carrier (L_q) within a governed constituent is the highest and leftmost element. This element must have the same language index (q) as the governor of the constituent. In the following configuration, for example, X governs YP. Therefore, Spec within YP is the language carrier, and it must be in the same language as X. This means that a switch is possible only between Spec and Y' within the YP.



If XP were a verb phrase and X were the verb, the Government Constraint would require YP, the direct object complement, to be in the same language as the governing verb. Hence, the constraint predicts that verbs and their complements must be in the same language, as must prepositions and their complements.

DiSciullo *et al.* proposed this constraint to account for the following data, both instances of code-switches between Italian and French:

(8) Ha portato il CADEAU.
Has brought the CAKE

(9) Io posso fare i CHEQUES.
I can make the CHECKS

As predicted by DiSciullo *et al.* , both code-switches are grammatical since the governors (the verbs, *portare* and *fare*) and the L_q elements within the governed noun phrases (the articles, *il* and *i,* respectively) appear in the same language, Italian.

It is important to note that both Joshi's Constraint on Closed Class Items and DiSciullo *et al.'s* Government Constraint allow a code-switch to occur between a determiner and a noun, even though the two constraints impose different restrictions on the direction of the switch. Whereas Joshi claims that closed class elements may switch only from the matrix language into the embedded language, DiSciullo *et al.* maintain that the closed class element must be in the same language as its governor.

With the advent of Chomsky's (1993) Minimalist Program, linguists may now approach the characterization of the constraints on intra-sentential code-switching from a new analytical perspective. Among the pioneers in this approach are Toribio and Rubin (1993), who have proposed the Functional Head Constraint, defined in (10) below:

(10) **Functional Head Constraint:** 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. (p. 4)

According to the Functional Head Constraint, then, no switches are allowed between the following functional heads and their complements:

COMPLEMENTIZER (C) and INFLECTIONAL PHRASE (IP);
INFLECTION (INFL) and VERB PHRASE (VP);
NEGATIVE (NEG) and its complement;
QUANTIFIER (Q) and its complement;
DETERMINER (D) and the rest of the NOUN PHRASE (N').

Below are contrasting pairs from the data provided by Toribio and Rubin to support the Functional Head Constraint. Sentences (11) and (12) are code-switches combining Tunisian Arabic and French, while (13) and (14) are code-switches between English and Spanish.

(11) **Id-daw i lli* il m'a donné n'est pas bon.
the-medicine that he gave me [NEG] is [NEG] good

(12) *Id-daw* qu'il m'a donné n'est pas bon.
the-medicine that he gave me [NEG] is [NEG] good

(13) *The students had *visto la película italiana.*
The students had seen the movie Italian

(14) The students had seen *la película italiana.*
The students had seen the movie Italian

The ungrammaticality of (11) and (13) is explained straightforwardly under the Functional Head Constraint. In (11), the complementizer (C) is in Tunisian Arabic [*illi*], while its complement, the IP [il m'a donné n'est pas bon], is in French. Since the functional head and its complement are in different languages, feature checking cannot take place. In like manner, feature matching is prevented in (13) because the functional head, INFL [had] and its complement, the VP [*visto la película*], are in different codes.

Challenges to the proposed constraints

Having outlined some of the elegant constraints which have been proposed to explain code-switching phenomena, we must unfortunately acknowledge a disconcerting fact: counter-examples abound which invalidate these constraints. A brief review of a few of these counter-examples will serve to illustrate the difficulties for these proposals.

First, let us consider a challenge to Joshi's Constraint on Closed Class Items, which would disallow a switch between a preposition (a closed class element) and its complement. Belazi, Rubin and Toribio (1993) present data to show that this constraint does not hold up in Tunisian Arabic-French code-switching:

(15) Sajae:t ni-tkalmu Jal *l'anémie.*
sometimes we speak about the anemia

(16) *J'ai joué avec* il ku:ra
I played with the ball

Example (15) exhibits a grammatical code-switch between the Tunisian Arabic preposition [Jal] and the French noun phrase [l'anémie]. Similarly, (16) represents a well-formed switch between a French preposition [avec] and a Tunisian Arabic noun phrase [il ku:ra]. And yet Joshi's constraint would predict both switches to be ungrammatical.

A second set of code-switches provides a challenge to DeSciullo *et al.'s* Government Constraint. In fact, Klavans (1985) questions the constraint on the basis of data taken from two sources: (i) Spanish-English code-switches and (ii) DiSciullo *et al.'s* own Italian-English examples:

(17) Los hombres comieron *the sandwiches.*
The men ate the sandwiches

(18) Non voglio *smokemeat.*
(I) don't want smokemeat

In both instances, there is a switch between the governor--the verb in these sentences--and the language carrier element. Recall that the language carrier is the highest, leftmost element within the governed noun phrase. In (17) the language carrier element is the article [the], and in (18), it is the noun [smokemeat].

Finally, as previously mentioned, Toribio and Rubin's proposal is not without its problems. For example, it incorrectly predicts that the following switches, gathered from naturalistic production, are ungrammatical:

(19) Tenía tres semanas de estar *practicing* en la *band.* (Gingrás, 1974)
I had three weeks of being practicing in the band

(20) *I could understand* que *you don't know how to speak Spanish,* verdad?
I could understand that you don't know how to speak Spanish, right?
(Poplack, 1981)

(21) Kahi *chairs.* (Joshi, 1985)
the chairs

Both (19) and (21) exhibit switches between a determiner and its complement, and (19) also contains a switch between INFL and the VP, both violations of the Functional Head Constraint. Sentence (20) exemplifies a switch between a complementizer [que] and its complement [you don't know how to speak Spanish], yet another instance of a switch between a functional head and its complement. The Functional Head Constraint prohibits such a switch because a functional head and its complement must share the same language feature. In addition, Toribio and Rubin's account fails to explain the status of the pair of Marathi-English noun phrases cited by Joshi, in which neither of the switched elements is a functional head:

(22) * tall *petya*
tall boxes

(23) *unca* boxes
tall boxes

Joshi accounts for the ungrammaticality of (22) by invoking the Asymmetry Constraint: switches are unidirectional, from matrix language (Marathi) to embedded language (English), and not vice-versa. Toribio and Rubin's proposal simply lacks a mechanism to rule out (22).

The proliferation of counter-examples--and the mayhem they create for the proposed constraints--is partly due to the very disparate methods used by researchers to gather code-switching data. Among the preferred methods are interviews, recordings of natural discourse, and, to a lesser extent, grammaticality judgments. Unfortunately, these approaches are of questionable value in the study of code-switching. During an interview, speakers may refrain from switching because of the stigma attached to code-switching. For example, Spanish-English code-switching has acquired negative labels such as "Spanglish" and "Tex Mex", much to the detriment of those bilinguals who code-switch very frequently. In fact, in some communities code-switching is viewed as inappropriate mixing attributable to lack of education, bad manners, or insufficient control of the two languages. It is no wonder that bilinguals may be very reluctant to code-switch during an interview. For the same reason, grammaticality judgments are extremely unreliable: speakers may very well reject instances of code-switching, not on the basis of linguistic criteria, but merely because they are code-switches (all code-switches are bad).

The conflicting data reported above may also derive from variations among speakers with respect to their levels of competence in the participating languages. This idea is corroborated by Aguirre's (1977) finding, cited in Toribio *et al.* , that more balanced English-Spanish bilinguals exhibit a greater sensitivity to the nuances of different code-switching patterns than their more English-dominant or Spanish-dominant counterparts. In like manner, Belazi (1991), also cited in Toribio *et al.,* has demonstrated that fluent Arabic-French bilinguals are more sensitive to grammatical constraints on switching than are less fluent speakers of the two languages. These studies suggest that the degree of bilingualism must be taken into consideration in code-switching studies. Indeed, it may well be that the failure to control for bilingual competence in the previously cited studies has contributed to the proliferation of challenges to the proposed constraints.

Finally, there may be flaws in the proposed constraints themselves. One problem with the validity of the proposed constraints is the claim to universality. As Pandit has observed (cited in Toribio *et al.*), the constraints may apply only to specific language pairs. A case in point is Poplack' s oft-cited Free Morpheme Constraint (1981), which prohibits the attachment of bound morphemes from one language to free morphemes from another:

> **Free Morpheme Constraint:** A switch may occur at any point of the discourse at which it is possible to make a surface constituent cut and still retain a free morpheme. According to this constraint, it is possible to switch full sentences (including conjoined sentences, repetitions, and interjections), as well as any constituent within the sentence, provided that the constituent consists of at least one free morpheme. (p. 175)

The constraint was formulated to account for the non-occurrence of such Spanish-English forms as (24), where a switch occurs between a bound morpheme and a free morpheme:

(24) * Yo estoy *eat* - iendo.
I am eat - ing

And yet code-switches between Spanish and a different language partner, Quechua, manifest many instances of violations of the Free Morpheme Constraint (Courtney, 1993):

(25) A LA SRA. DELIA - q FAMILIA - n - ta
to the Mrs. Delia Gen familia Poss 3 sg Acc
"to Sra. Delia's family"

Here, we find two instances of free-bound morpheme switches. The first occurs between the Spanish name [Delia] and the Quechua genitive case morpheme [-q-]. The second such switch follows the Spanish noun [familia], which bears both the Quechua possessive marker [-n-] and the accusative case suffix [-ta].

It is clear from the examples above that one must be very cautious about proposing universal constraints on code-switching, as well as counter-examples to already existing constraints, since different language pairs may give rise to divergent types of code-switches.

As discussed above, one of the factors contributing to the disparate findings reported in code-switching studies is the variety of methodologies used for data collection. How might we investigate the validity of the Functional Head Constraint in Spanish-English code-switching without resorting to interviews and grammaticality judgments? What is needed in the exploration of constraints on code-switching is an on-line task which taps into the competence of bilingual speakers. The candidate selected for the present study is the Same-Different Matching Task developed by Freedman and Forster (1985).

The Same-Different Matching Task

The same-different matching task has interested a number of researchers [Freedman and Forster; Crain and Fodor (1987); Forster and Stevenson (1987)], who have used the procedure to explore the different levels of representation assigned by the parser to strings of words. The task requires a subject to read a pair of word sequences, with the second presented immediately below the first, and to decide as quickly as possible whether the sequences are identical or different. As described by Freedman and Forster, the total time required for reaching a decision in this task represents three component processes: developing the representations for the two strings, comparing the representations, and assessing the outcome of the comparison. The task is sensitive to degrees of grammaticality, since there is a matching-time advantage for fully grammatical sentences.

Freedman and Forster describe how the matching task works. Within the "race" model of language processing, although a linguistic cue is represented in the processor at different levels at the same time (e.g. letter, lexical, syntactic levels), the matching process may reach completion more rapidly at one level than at another. Accordingly, the decision is made on the basis of this controlling level of representation--the level that "wins the race"--even before the other levels have completed the matching process. This means, for example, that a pair of six-letter strings such as

RLPPUE / RLPPUE would take longer to match than a pair of words made up of the same six letters, e.g. PURPLE / PURPLE: in the first instance, the matching process requires comparing six separate element-pairs at the letter level, whereas, in the second, matching entails comparing only a single element-pair at the lexical level.

In like manner, a set of words may be presented as a grammatical sentence or as a random string:

JOHN HAS AN ENORMOUS DOG [well-formed sentence]
JOHN HAS AN ENORMOUS DOG

JOHN DOG AN HAS ENORMOUS
JOHN DOG AN HAS ENORMOUS [random string]

For the well-formed sentence pair, the controlling level is the syntactic level, with a sentential representation of only one element-pair. For the random word-sequence pair, however, matching is achieved fastest only at the lexical level, where five element-pairs must be matched. This accounts for the matching time advantage observed in well-formed sentences, even when these syntactic expressions are meaningless (e.g., A BLANER GORTLES TO THE WATTLE.) The advantage for well-formedness does not mean, of course, that the representation at a higher level is formed faster than those at lower levels; it simply means that there are fewer element-pairs to match at the controlling level.

Since the same-different matching task is sensitive to degrees of grammaticality, it is used in the following experiment as an alternative to grammaticality judgments of code-switches within noun phrases.

MATCHING TASK EXPERIMENT

The purpose of this experiment is to test the Functional Head Constraint with noun phrases by comparing the matching times on all the SAME items for three conditions:

Condition 1: All Spanish
Yo leí sobre el accidente en el periódico.
I read about the accident in the newspaper

Condition 2: Sp. **Det** + Eng. **Noun**
Yo leí sobre el accidente en el newspaper.
I read about the accident in the newspaper

Condition 3: Eng. **Det** + Eng. **Noun**
Yo leí sobre el accidente en the newspaper.
I read about the accident in the newspaper

The assumption underlying the possible outcomes is that there will be a matching time advantage for the monolingual Spanish sentence, since there should be a cost for code-switching. Accordingly, from the outset it is anticipated that the matching time for Condition #1 will be significantly faster than that of Conditions #2 and #3. Given this assumption, alternative hypotheses are proposed. If the Functional Head Constraint applies, Condition #3, where determiner and noun are in the same language, will be matched faster than Condition #2:

Hypothesis A *Response times:* **C1 < C3 < C2**
{Support for the Functional Head Constraint}

By the same token, if Condition #2 represents a well-formed code-switch, it will be matched at least as fast as Condition #3, which would challenge the Functional Head Constraint:

Hypothesis B *Response times:* **C1 < C2 ≤ C3**
{Problems for the Functional Head Constraint}

METHOD

Subjects. Twenty-one subjects, all adult bilingual speakers of Spanish and English, and self-reported code-switchers in bilingual discourse, were recruited from the university community.

Materials. Ninety-six sets of three conditions were constructed [forty-eight SAME pairs and forty-eight DIFFERENT pairs]. The three conditions were constructed in such a way as to control for lexical content, word frequency, length, plausibility, and the position of the noun phrase. In this regard, a lexical decision experiment, described in the following section, was undertaken with the same subjects to compare access times for the Spanish nouns and their English counterparts. Below is a sample set from the matching-task test materials:

Condition #1: La vida de esta gente está en gran peligro.
Condition #2: La life de esta gente está en gran peligro.
Condition #3: The life de esta gente está en gran peligro.

Each of the SAME and DIFFERENT items contained one of these conditions. The two sentences in each of the DIFFERENT item pairs differed only in one word; however, the mismatched words were of the same length. Moreover, the mismatch occurred at varying positions in the sentence. These measures were taken to prevent subjects from carrying out the matching task merely by making superficial visual comparisons. Below is an example of a DIFFERENT item pair for Condition #2:

La policía arrestó a los owners del casino.
La policía arrestó a los owners del camión.

It should be noted that responses to DIFFERENT items were eventually discarded, for the DIFFERENT items serve only to make sure that the subjects actually read the items.

Three versions of materials were prepared with a different semi-random order of items, one version for each group of seven subjects. [The subjects were randomly assigned to the groups.] Each test consisted of forty-eight SAME pairs and forty-eight DIFFERENT pairs, counterbalanced across three lists.

In addition to the ninety-six pairs of SAME and DIFFERENT items taken from the sets of conditions, each test version had the same ninety-six pairs of filler sentences, half SAME and half DIFFERENT. The fillers differed from the original sets of conditions in ways designed to prevent the development of response biases. For example, some of the fillers were entirely in Spanish. However, most of the fillers included code-switches occurring within noun phrases, between the quantifier and the rest of the NP, as follows:

Sus hijos pequeños tienen very few juguetes.

Finally, the test versions included the same initial eighteen practice items. In this way, each of the three versions of the test consisted of 210 pairs of sentences representing equivalent numbers of the three conditions and SAME vs. DIFFERENT item pairs.

Procedure. The items were presented on a computer-controlled video display. They were displayed in lower case letters except for sentence-initial letters and proper names; end punctuation

was included. Once the subject pressed the space bar, the first sentence in each item was displayed for 2800 milliseconds. Then, with the first sentence remaining on the screen, the second sentence was displayed directly below the first for another 2800 milliseconds, and the pair of sentences was erased from the screen. Subjects responded by pressing the right-hand shift key for SAME and the left-hand key for DIFFERENT. After each trial, feedback was provided (i.e. 'CORRECT' or 'WRONG').

Before initiating the test, each subject was provided with a set of written instructions and asked to be sure to read both sentences in each item pair. Subjects also received the eighteen practice items in order to become familiar with the task.

Lexical Decision Experiment

As previously mentioned, subjects were asked to carry out a lexical decision task in order to pre-test the code-switched noun pairs used in the matching task. This experiment was carried out as a means of ascertaining whether or not the items within each pair, e.g. *baile* vs. *dance,* yielded comparable access times for the pool of subjects who participated in the matching task experiment.

For this purpose, materials for two separate tests, one in English and one in Spanish, were prepared as follows.

Spanish lexical decision: --60 Spanish words
--60 legal Spanish non-words

English lexical decision: --60 English counterparts of Spanish words
--60 legal English non-words

Each subject performed both the Spanish and the English lexical decision tasks separately, with the order of presentation counterbalanced across subjects. Accordingly, on seeing each item displayed for 500 milliseconds on the computer-controlled video screen, subjects pressed the appropriate shift key to indicate whether or not the displayed item was a word.

The outcome of the lexical decision tasks for each pair of items revealed an almost uniform tendency towards faster access of the English word. In fact, the difference in mean response times for the English list as compared with that of the Spanish list is highly significant:

English: 654 milliseconds
Spanish: 824 milliseconds

This outcome will be discussed in the analysis of the matching task results presented below.

RESULTS OF THE MATCHING TASK EXPERIMENT

Following Freedman and Forster, response times for DIFFERENT items and for all wrong answers were discarded. Thus, the analysis was restricted to response times for SAME items with correct responses. Table #1 shows the mean response times and percentage error rates for the three conditions.

Table 1. *Mean sentence matching times (msec) and percentage error rates for monolingual Spanish, [Spanish Det + English Noun], and [English Det + English Noun]*

	C1 **[Sp. Det, Sp. N']**	**C2** **[Sp. Det, Eng. N']**	**C3** **[Eng. Det, Eng. N']**
Mean RTs (msec):	2182.24	2195.33	2168.86
% Errors:	2.37%	1.48%	1.18%

An analysis of variance with subjects (F1) as the random factor revealed a non-significant main effect of sentence type [F1 (2, 36) = .32; p = 0.732]. A separate analysis of variance was undertaken to compare the subject response times for Conditions #2 and #3, the two code-switching conditions. Again, there was a non-significant main effect of sentence type [F1 (1, 18) = .58; p = 0.458].

To sum up, then, there were no statistical differences among the mean subject response times for any of the three conditions. The mean for the response times for Condition #1, the monolingual Spanish sentences, was not faster than those for both Conditions #2 and #3, as had originally been predicted. For this reason, the results do not appear to support either Hypothesis A or Hypothesis B.

DISCUSSION

Why wasn't Condition #1 matched the fastest?

How might we account for the very surprising result that the monolingual Spanish sentences were matched no faster than the two code-switching conditions? One possibility is that the matching task is insensitive to code-switching. However, this possibility is unlikely: the task has already been shown to be sensitive to degrees of well-formedness in code-switches in previous experimental work undertaken with a different group of subjects (Dussias & Courtney, 1993). In that study, the matching task was used to investigate the grammaticality of code-switched embedded questions by comparing the matching times for well-formed switches (e.g. *The doctor told us QUE LA NINA TENIA)* with those of their ungrammatical counterparts (e.g. *The doctor told us QUE LA NINA TENIA).* The outcome of this experiment, a significant difference in matching times between the two conditions, suggested that the task is indeed sensitive to grammaticality in code-switches.

The relatively slow matching times for the monolingual Spanish sentences probably represent greater difficulty in the retrieval of Spanish lexical items, as compared to that of their English counterparts. The outcome of the lexical decision task supports this premise. For example, the subjects were much slower at accessing BAILE than they were at retrieving the English counterpart, DANCE. This might very well result in longer or equal reading times for sentence #1 below, as compared with sentence #2, even though we would expect a cost for code-switching:

#1 Juana quería ir conmigo a ese <u>baile</u>.
#2 Juana quería ir conmigo a ese <u>dance</u>.

The information provided by the subjects on a questionnaire about their language background and use [APPENDIX] lends additional support to this conjecture. From the questionnaire, a group profile emerges which suggests that most of the subjects are better readers in English, even though their first language was Spanish. In fact, fully two-thirds of the subjects reported having first learned to read and write in English. The highlights of the information compiled from the questionnaire are presented in Table 2 on page 11.

It is interesting to note that while over half of the subjects learned Spanish as their first language [57%], over half now consider themselves to be more proficient in English, in both speaking and reading. Thus, the self-report data coincide with the outcome of the lexical decision experiment.

It should be mentioned that pains were taken to ensure that all subjects involved in the matching task experiment actually code-switch in bilingual discourse. On the questionnaire, all subjects indicated that they code-switch sometimes (48%) or often (52%). Asked why they think they code-switch, the subjects provided a variety of responses, which might be collapsed into the following three reasons:

Natural mode of speech; personal choice:	38%
Phrase more effectively expressed in English:	14%
Don't know or can't remember Spanish word:	48%

Table 2. *Language Background Questionnaire: Summary of information reported by subjects on first language experience, early literacy instruction and general proficiency.*

	SPANISH	ENGLISH	BOTH / SAME
First language learned at home	12 [57%]	2 [10%]	7 [33%]
Level at which literacy initiated:			
ELEMENTARY	14 [67%]	19 [90%]	_____
HIGH SCHOOL	6 [29%]	2 [10%]	
UNIVERSITY	1 [4%]	--------	_____
Greater proficiency in SPEAKING:	4 [19%]	11 [52%]	6 [29%]
Greater proficiency in READING:	5 [24%]	12 [57%]	4 [19%]

Of particular interest in this discussion is the high percentage of code-switching attributed either to not knowing a word in Spanish or to retrieval problems. Moreover, fully 52% of the subjects revealed that they sometimes code-switch when they are talking with monolingual Spanish speakers, a circumstance which suggests similar vocabulary deficiencies or retrieval difficulties. The self-report data, which coincide with the outcome of the lexical decision task, present a picture of uneven bilingualism. While the subject group exhibits grammatical competence in both languages, it is generally English-dominant with regard to reading skill and vocabulary.

In the light of all this, it is interesting to compare the mean response times presented in Table 1 with those obtained in the previous matching-task experiment, conducted with a different group of subjects (Dussias & Courtney). These results, shown in Table 3 below, represent the matching times for code-switched sentences of exactly the same length as those used in the present study. As previously mentioned, subjects in the first experiment matched sentences which contained code-switches at different positions within embedded questions.

Table 3. *Mean sentence matching times (millsec) obtained in previous experiment with code-switches within embedded questions. [Dussias & Courtney]*

Mean Response Times [milliseconds]		English IP	Spanish IP
English SPEC:	*WHAT*	1865	1900
Spanish SPEC:	*QUE*	1948	1911

Even the slowest mean response time obtained in this experiment, that is, 1948 milliseconds, is far shorter than the fastest mean response time in the present experiment: 2168 milliseconds. Mostly graduate students in the Department of Spanish, the subjects in the first experiment were very competent Spanish readers with an extensive vocabulary in the language. By contrast, the subjects in the present experiment exhibit far less reading skill in Spanish, a deficiency which no doubt slowed them down in the matching task experiment.

The implications of the foregoing analysis relate to subject selection criteria. Clearly, subjects must not only be grammatically competent in both languages, but must also be proficient readers. Indeed, for this type of comprehension task, these criteria appear to outweigh the requirement that subjects actually code-switch in bilingual discourse.

Conditions #2 and #3: the code-switches

If we attribute the relatively slow response times for the monolingual sentences to the subjects' lower proficiency in reading Spanish, the non-significant difference in response times for the code-switching conditions may be meaningful after all. Subjects matched sentences such as the following at the same speed. How might we interpret this outcome?

Condition #2: La life de esta gente está en gran peligro.
Condition #3: The life de esta gente está en gran peligro.

Here, the only difference between the two strings is the language of the article, a closed-class item assumed not to affect the overall response times. According to the Functional Head Constraint, Condition #2 is an ungrammatical code-switch, whereas Condition #3 is well-formed. And yet, the comparable response times suggest that both code-switches are actually well-formed. In that case, it is likely that the Functional Head Constraint does not apply to code-switches within noun phrases.

CONCLUSION

An important goal in this study has been finding an alternative to interviews and grammaticality judgments as a means of investigating the constraints proposed for code-switching. While the matching task is a promising alternative, some methodological fine tuning is in order. Given the problem of uneven reading proficiency in the bilingual subjects, it may be necessary to recruit subjects who are fluent readers in both languages, even if they are not code-switchers. With subjects similar to those recruited for this study, the lexical decision task might be exploited to create a bank of lexical item-pairs, e.g. *baile* vs. *dance,* which yield comparable access times for the group of subjects who perform the matching task.

As to the Functional Head Constraint, the object of investigation in the present study, further research is required to test the predictions made for the remaining Functional Head / Complement relationships. Since the outcome of this study suggests that switches between the determiner and the rest of the noun phrase are well-formed, it may be that the Functional Head Constraint is too general a restriction, encompassing too many Spec-Head relations.

NOTE

The work here is work in progress. As such, the authors do not wish to publish their test items. However, an appendix of test items can be provided upon request to private individuals. You may contact the authors at one of the following addresses:

Paola E. Dussias: pdussias@ccit.arizona.edu
Ellen H. Courtney: courtney@ccit.arizona.edu
or
c/o SLAT Program
Modern Languages, Rm. 347
Tucson, AZ 85721

THE AUTHORS

Paola Dussias is a fourth-year student specializing in L_2 Analysis in the Second Language Acquisition and Teaching Program at the University of Arizona, where she teaches first and second year Italian as well as develops tests for all levels of the Italian language program. She holds a Master's degree in ESL from the University of Arizona. Paola, a native of Caracas, Venezuela, is conducting on-line processing experiments with Spanish/English bilinguals.

Ellen Courtney first became interested in Quechua during her 19-year stay in Peru where she taught English at all levels from the primary to the university level. Ellen, a fluent speaker of Spanish, is a third-year student specializing in L_2 Analysis in the Second Language Acquisition and Teaching Program at the University of Arizona. She holds a Master's degree in ESL from the same institution and has taught both Spanish and Introductory English Linguistics.

REFERENCES

Belazi, H., Rubin, E.J. and Toribio, A.L. (1993). Code-switching and X-bar Theory: The Functional Head Constraint. To appear in *Linguistic Inquiry*, 25.2.

Bokamba, E. (1989). Are there syntactic constraints on code-mixing? *World Englishes*, 8: 277-292.

Chomsky, N. (1986). *Knowledge of Language.* New York: Praeger.

Chomsky, N. (1993). A Minimalist Program for Linguistic Theory. *MIT Occasional Papers in Linguistics,* Number 1. Cambridge, MA: MIT Working Papers in Linguistics.

Courtney, E.H. (1993). Quechua-Spanish Code-switching: A Preliminary Analysis. (unpublished manuscript).

Crain, S. and Fodor, J. (1987). Sentence matching and overgeneration. *Cognition,* 26: 123-169.

DiSciullo, A.M., Muysken, P. and Singh, R. (1986). Government and Code-mixing. *Journal of Linguistics,* 22: 1-24.

Dussias, P. and Courtney, E. H. (1993). The Sentence Matching Task and its Use in Exploring Constraints on Spanish-English Code-switching. (unpublished manuscript).

Forster, K.I. and Stevenson, B.J. (1987). Sentence matching and well-formedness. *Cognition,* 26: 171-186.

Freedman, S. and Forster, K.I. (1985). The psychological status of overgenerated sentences. *Cognitive Psychology,* 14: 178-210.

Gingrás, R. (1974). Problems in the Description of Spanish / English Intrasentential Code-switching. In G.D. Bills (ed.) *Southwest Area Linguistics* (167-174). San Diego, CA: University of California Institute for Cultural Pluralism.

Joshi, A. (1985). Processing of sentences with intra-sentential code-switching. In D. Dwity, L. Kartunnen and A. Zwicky (eds.), *Natural language processing: Psychological, computational and theoretical perspectives* (190-205). Cambridge: Cambridge University Press.

Klavans, J. (1985). The syntax of code-switching: Spanish and English. In L. King and C. Maley (eds.), *Selected papers from the XIIIth linguistic symposium on Romance languages* (213-231). Amsterdam: John Benjamins.

Poplack, S. (1981). Syntactic Structure and Social Function of Codeswitching. In R.P. Durán (ed.), *Latino Language and Communication Behaviour* (169-184). Norwood, NJ: Ablex Publication Corporation.

Toribio, A. and Rubin, E. (1993). Code-Switching in Generative Grammar. To appear in J. Jensen and A. Roca (eds.), *Spanish in Contact.* Amsterdam: John Benjamins.