The architecture of the bilingual language faculty: evidence from intrasentential code switching

JEFF MACSWAN
Arizona State University

In this article, the author addresses the question of how the mind represents two languages in simultaneous bilingualism. Some linguistic theories of intrasentential code switching are reviewed, with a focus on the Minimalist approach of MacSwan (1999b); the author concludes that evidence from code switching suggests that bilinguals have discrete and separate Lexicons for the languages they speak, each with its own internal principles of word formation, as well as separate phonological systems. However, the author argues that computational resources common to the two languages generate monolingual and bilingual syntactic derivations alike. Advantages of the Minimalist Program for the analysis of code switching data are discussed at some length.

How does the mind represent two (or more) languages? The answer to this basic question has implications for linguistics, education, developmental psychology, and the general cognitive sciences. With respect to second language (or sequential) bilingualism, there has been considerable debate on the topic. While sometimes differing with respect to how second languages are learned, some researchers have suggested that a second language is represented in essentially the same way as a first language (Dulay & Burt, 1974; Krashen, 1981; White, 1989), while others have claimed that non-linguistic mental resources of some kind, in conjunction with first language competence, represent a second language (Clahsen & Muysken, 1986; Schachter, 1988; Bley-Vroman, 1989).

However, in the case of simultaneous bilingualism, in which both languages are acquired in infancy, the natural assumption is that the two languages are represented in the human language faculty in essentially the same way. Limiting our focus to simultaneous bilingualism, the question of interest in this article then becomes (1a), with (1b) as a crucial question of first order importance.

(1a) Which components internal to the language faculty may be shared by the two languages, and which components must be independent (duplicated)?
(1b) What are the components of the human language faculty?

Considerable attention has been given to (1b), which is in fact a central topic in Chomsky's (1995) Minimalist Program.

The present article is organized as follows. I begin with a review of the code switching literature, outlining several approaches, each of which I claim is inadequate for empirical and theoretical reasons. To provide background for subsequent sections, I then outline the Minimalist Program in some detail, focusing on those aspects which are most relevant to the present discussion. A Minimalist approach to intrasentential code switching is then introduced, and it is argued that the approach has empirical and theoretical advantages over previous proposals. Answers to the questions in (1) are developed in the final section along with other conclusions.

But first a word regarding acceptable code switching data is in order. Arguments have been advanced in favor of both naturalistic (Mahootian, 1993) and elicited (Toribio & Rubin, 1996) code switching data, and much discussion in evaluating opposing theories has been devoted to discrediting one or the other (Mahootian & Santorini, 1996). It has also been argued that code switching data from subjects for whom one of the languages has been acquired relatively late in life should be excluded, or at least questioned (MacSwan, 1999b). Unless otherwise indicated, data cited below comes from the naturalistic and elicited Spanish–Nahuatl corpora of MacSwan (1999b),[1] produced by native bilinguals from Southeast Puebla, Mexico. Important charac-

[1] More specifically, the data in (9) are naturalistic, and (7), (8), (14), (15), (17c), (22), (25) and (42)–(45) are elicited. Judgments on these constructions were made by two young adult males who had spoken both Spanish and Nahuatl since infancy.

Address for correspondence
Arizona State University, P.O. Box 872011, Tempe, AZ 85287–2011, USA
E-mail: macswan@asu.edu

https://doi.org/10.1017/S1366728900000122 Published online by Cambridge University Press

teristics of other data presented will be noted when appropriate.

Intrasentential code switching

Code switching is a speech style in which fluent bilinguals move in and out of two (or more) languages, as illustrated in the Spanish–English examples in (1) and (2), taken from Belazi, Rubin, & Toribio (1994).

(2a) The students *habían visto la película italiana*[2]
The students had seen the Italian movie
(2b) *The student had *visto la película italiana*
The student had seen the Italian movie

Code switching at sentential boundaries is generally referred to as intersentential code switching, while switching below sentential boundaries, as illustrated in (2), is called intrasentential code switching. Note, too, that code switching at some boundaries is licit, as in (2a), while switching at other boundaries is not, as in (2b).

Some of the earliest and most enduring work on grammatical aspects of code switching is due to Poplack (1980, 1981) and Poplack & Sankoff (1981), who proposed constraints which govern the interaction of the two language systems. Specifically, Poplack proposed the Equivalence Constraint and the Free Morpheme Constraint, defined in (3) and (4).

(3) *The Equivalence Constraint*
Codes will tend to be switched at points where the surface structures of the languages map onto each other.
(4) *The Free Morpheme Constraint*
A switch may occur at any point in the discourse at which it is possible to make a surface constituent cut and still retain a free morpheme.

The idea in (3), given Poplack's examples, is that code switches are allowed within constituents so long as the word order requirements of both languages are met at S-structure; (4), stated differently, tells us that a code switch may not occur at the boundary of a bound morpheme. To illustrate, (3) correctly predicts that the switch in (5) is disallowed, and (4) correctly disallows (6).

(5) *told *le*, le *told* (Poplack, 1981, 176)
told *to-him*, to-him *I-told*
"(I) told him"
(6) *estoy eat-*iendo* (Poplack, 1980, 586)
I-am eat-ing

[2] As is conventional in the literature, I will signal code switching boundaries by a change from regular to *italicized* text.

A shortcoming in Poplack's constraints is that there is no attempt to explain the facts described in (3) and (4), if indeed they are facts. In addition, because (3) and (4) are taken to be principles of the grammar, this approach suggests that code switching is governed by a sort of "third grammar" which constrains the interaction of the two systems in mixture, as pointed out by Mahootian (1993). In an effort to make the simplest assumptions, we should appeal to a "third grammar" only if forced to do so by the data under analysis.

The constraints in (3) and (4) also fail empirical tests. For instance, although the construction in (2b) is not disallowed by either of Poplack's constraints, it is nonetheless unacceptable. Also consider the examples in (7) and (8),[3] where code switches occur between a subject pronoun and a verb, both in their correct S-structure position for Spanish and Nahuatl,[4] yet one example is ill-formed and the other well-formed. The operative principle involved in code switching cannot therefore be Poplack's Equivalence Constraint.

(7) *Tú *tikoas tlakemetl*
tú ti-k-koa-s tlake-me-tl
you/SING 2S-3Os-buy-FUT garment-PL-NSF
"You will buy clothes"
(8) Él *kikoas tlakemetl*
él 0–ki-koa-s tlak-eme-tl
he 3S-3Os-buy-FUT garment-PL-NSF
"He will buy clothes"

Also, although it is sometimes difficult to know whether a morpheme is bound or free, some examples appear to indicate that the Free Morpheme Constraint is not correct. In (9a), for instance, *nik-* is indisputably a bound morpheme, as is *ki-* in (9b), both Nahuatl affixes attached to Spanish verbs.

(9a) Ne nik*amar*oa in Maria
ne ni-k-amar-oa in Maria
I 1S-3Os-love-VSF in Maria
"I love Maria"
(9b) Mo*tratar*oa de nin ki*rescatar*oa n Pocajontas
mo-tratar-oa de nin 0-ki-rescatar-oa in Pocajontas
REF-treat-VSF about this 3S-3Os-rescue-VSF in Pocahontas
"It deals with the one who rescues Pocahontas"

[3] Please refer to the Appendix for the definition of abbreviations used in glosses here and elsewhere.

[4] The variety of Nahuatl discussed here is Southeast Puebla Nahuatl; it has relatively fixed SVO word order and does not exhibit characteristics attributed to the class of "pronominal argument" languages. I will therefore assume a fairly traditional clause structure for Nahuatl constructions. See MacSwan (1999a) for discussion.

https://doi.org/10.1017/S1366728900000122 Published online by Cambridge University Press

Below I will argue that examples like those in (9) are best understood as instances involving borrowed stems, and I will incorporate Poplack's Free Morpheme Constraint into the PF Disjunction Theorem, which allows us to differentiate between cases like (6) and (9).

Joshi (1985) also developed a theory of code switching. In his system, the language which a code switched construction is judged to be "coming from" is defined as the *matrix language*, while the other language is the *embedded language*. A "control structure" permits shifting from a matrix language to an embedded language but not vice versa. Thus, switches are asymmetrical in this system. Joshi (1985) further proposes the Closed-Class Constraint which stipulates that a code switch is impermissible between a closed-class item and an open-class item, as in (10); however, this constraint applies only to switches *into* the embedded language.

(10) *Closed-Class Constraint*
Closed-class items (e.g., determiners, quantifiers, prepositions, possessives, Aux, Tense, helping verbs) cannot be switched.

For example, in Joshi's (1985) data, a Marathi postposition cannot be "switched into" in (11).

(11) *some chairs-*war* (Joshi, 1985)
some chairs-on
"on some chairs"

An unappealing aspect of Joshi's system is the existence of a special code switching rule, much as in Poplack's system, an important theoretical weakness. Perhaps more importantly, (10) fails on empirical grounds, as shown by the Farsi–English example in (12) (Mahootian, 1993) and the Italian–French example in (13) (Di Sciullo, Muysken, & Singh, 1986), as pointed out by Mahootian and Santorini (1996).

(12) Anyway, I figured *ke* if I worked hard enough, I'd finish in the summer
"Anyway, I figured that if I worked hard enough, I'd finish in the summer"

(13) No, *parce que* hanno *donné des cours*
no, because have given of the lectures
"No, because they have given the lectures"

In (12), *ke* marks a switch into the embedded language which begins with a closed-class item, a violation of (10). In (13), a switch is introduced with *parce*, also a closed-class item.

Also consider (14) and (15); in both instances, a switch occurs into the embedded language that is introduced with a closed-class item (Nahuatl *in* and Spanish *el*).

(14) Arrancó *in* vestido *non de Maria*
arranc-ó in vestido non de Maria
pull-PAST/3Ss in dress which of Maria
"She pulled on Maria's dress"

(15) Okipipitzo *el hermano de Maria*
o-0-ki-pipitzo el hermano de Maria
PAST-3S-3Os-kiss the brother of Maria
"Maria's brother kissed her"

We may conclude, then, on both theoretical and empirical grounds, that Joshi's (1985) constraint is not the operative principle which defines syntactic boundaries in code switching.

Di Sciullo, Muysken, & Singh (1986) have proposed that there is an anti-government requirement on code switching boundaries, an approach recently defended in Halmari (1997). Their constraint is given in (16).

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

The proposed constraint in (16) has the virtue that it refers to an independently motivated principle of grammar (government), while other proposals considered so far have not. In this respect, it moves us closer to a system in which code switching may be explained in terms of the same principles as account for grammaticality judgments in monolingual speech, a much more parsimonious approach than either Poplack's or Joshi's.

However, it does not appear to meet the requirement of descriptive adequacy. Because government holds between a verb and its object and between a preposition and its object, (16) predicts that a verb or preposition must be in the language of its complement. This is shown to be incorrect by examples (17a, b), from Belazi, Rubin, & Toribio (1994), and (17c), from MacSwan (1999b), where switches occur in case-marked positions.

(17a) This morning *mi hermano y yo fuimos a comprar* some milk
"This morning *my brother and I went to buy* some milk"

(17b) J'ai joué avec *il-ku:ra*
I.have played with the-ball
"I have played with the ball"

(17c) Mi hermana *kitlasojtla in Juan*
mi hermana 0-ki-tlasojtla in Juan
my sister 3S-3Os-love IN Juan
"My sister loves Juan"

https://doi.org/10.1017/S1366728900000122 Published online by Cambridge University Press

Furthermore, since it has been argued that the government relation is not necessary in syntactic theory (Chomsky, 1995), independent, monolingual justification for the existence of government as a syntactic operation will be needed if (16) is to avoid becoming a code-switching-specific mechanism. In addition, although (16) is articulated in terms of government, we are left wondering why government, in particular, should be related to code switching, since the relation is presumed to be an operation of universal grammar (UG) that is invariant cross-linguistically. As before, we conclude that (16) is not the principle which underlies code switching for both empirical and theoretical reasons.

A more recent proposal is due to Mahootian (1993) and Santorini & Mahootian (1995), where an account is offered which focuses on the complement relation in phrase structure (see also Pandit, 1990, and Nishimura, 1997); they claim that (18) defines syntactic code switching boundaries.

(18) The language of a head determines the phrase structure position of its complements in code switching just as in monolingual contexts.

Mahootian & Santorini (1996) slightly modify (18) to focus on more general properties of syntactic heads, as shown in (19).

(19) Heads determine the syntactic properties of their complements in code switching and monolingual contexts alike.

Mahootian (1993) used a corpus of Farsi–English code switching data which she collected in naturalistic observations. In Farsi, objects occur before the verb, contrasting with basic word order in English. Mahootian (1993) observed that in code switching contexts the language of the verb determines the placement of the object, as she illustrates with (20).

(20) You'll buy *xune-ye jaedid*
you'll buy house-POSS new
"You'll buy a new house"

While it is parsimonious and quite promising, Mahootian's (1993) approach also appears to have some problems. She uses a tree-adjoining grammar (TAG) formalism which, she stresses, is an implementation of general work in the government and binding (GB) tradition. However, note that (20) is predicted by (15) or (17) only if the *branching direction* of the complement is encoded in the head. TAG formalisms encode branching direction by positing the existence of "auxiliary trees", partial structures which represent a complement on the left or right of its head, as appropriate to the language under consideration. However, classical GB Theory has long argued against encoding branching directionality (Stowell, 1981; Chomsky, 1981), and current work in this tradition posits a universal base in which all complements branch to the right (Kayne, 1995; Chomsky, 1995).

In addition, there are well-known counter-examples to the formulation in (19). In both English and Spanish, it is generally assumed that Neg(ation) selects a tensed verb to its right. Despite the adherence to (19), the code switches in (21) are strongly deviant.

(21a) *El no *wants to go* (Timm, 1975)
he not want to go
"He doesn't want to go"
(21b) *He doesn't *quiere ir* (Timm, 1975)
He doesn't want/3Ss go/INF
"He doesn't want to go"

Also consider the curious asymmetry in (22). In (22a), a Spanish negation may not occur before its Nahautl verbal complement, just as in (21a); however, a Nahuatl negation before a Spanish verbal complement is well-formed in (22b). Thus, despite the fact that basic subcategorization requirements are met in (21) and (22), the constructions are ill-formed, contrary to the prediction made by the principle in (18) (or its expanded form in (19)).

(22a) *No *nitekititoc*
no ni-tekiti-toc
not 1S-work-DUR
"I'm not working"
(22b) Amo *estoy trabajando*
amo estoy trabaja-ndo
not be/3Ss work-DUR
"I'm not working"

There are other counter-examples to Mahootian's system, addressed in Mahootian & Santorini (1996), but such examples are rejected as spurious by these authors because they do not come from naturalistic corpora. The basic argument for rejecting them relies upon the assumption that code switching is a socially stigmatized behavior, so code switchers may be influenced by this stigma in rendering judgments on sentences (Mahootian, 1993). However, the basic premise here is incorrect. Code switching is not universally stigmatized; indeed, in many cultures it is regarded as a prestigious display of linguistic talent. Moreover, there are individual languages which are extremely stigmatized in some places (indigenous languages in the US and Mexico, for instance), but which linguists have fruitfully studied using traditional elicitation methods for many years. Indeed, elicitation data and naturalistic data should both be examined with the usual caution in monolingual and

https://doi.org/10.1017/S1366728900000122 Published online by Cambridge University Press

bilingual data alike: all linguistic data, being performance data, are subject to extralinguistic interference, and should be scrutinized accordingly (see Shütze, 1996 for discussion).

Thus, while Mahootian's approach again moves us closer to a theory of code switching which does not rely upon resources external to the mixed systems, there are empirical limitations which must be overcome. In addition, unless we assume that branching directionality is encoded by subcategorization, the formal implication of the system will need considerable revision.

Belazi et al. (1994) proposed the Functional Head Constraint (FHC), arguing that it emerges from principles independently motivated in the grammar for other phenomena. According to these researchers, the main finding to be accounted for is:

(23) A code switch may not occur between a functional head and its complement.

To explain the observation in (23), Belazi et al. (1994) appeal to "feature checking", independently motivated to be at work in numerous other phenomena. However, these authors add an additional item to the feature stack. According to them, a *language feature*, such as [+Spanish] or [+English], is checked along with other features such as case and agreement. If the features do not agree (a Spanish functional head with an English complement, or vice versa), then the code switch is blocked. They formulate their constraint as in (24).

(24) *The 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.

Since (24) applies only to f-selected configurations (a complement selected by a functional head, as in Abney, 1987), switches between lexical heads and their complements are not constrained.

There are serious conceptual problems with this approach. First, the operation of (24) requires a language feature such as [+Spanish] or [+Greek]. Since this proposed "language feature" is not independently motivated for any other linguistic phenomenon, it serves only to re-label the descriptive facts, and is therefore tautological. In addition, linguists take particular grammars to be derivative in nature, not primitive constructs, since primitives are by definition part of universal grammar. A particular language is a set of parameter values over the range of variation permitted by UG, so positing a label for a particular language as a primitive in syntactic theory leads to an ordering paradox.

Also, note that features generally have a relatively small set of discrete values, such as [±past] or [±finite]. By contrast, there are many, many particular languages, quite possibly infinitely many, as Keenan & Stabler (1994) have argued, and the dividing lines between them are often quite obscure. Thus, a language feature set to [−Greek] introduces extreme, possibly irresolvable computational complexity. Furthermore, the feature [+Chinese] would presumably include all the mutually unintelligible languages of China, and [+Norwegian] would exclude Swedish even though Swedish and Norwegian speakers generally understand each other. Indeed, as Chomsky (1995a, 11, n.6) has noted in another connection, "what we call 'English', 'French', 'Spanish', and so on, even under idealizations to idiolects in homogeneous speech communities, reflect the Norman Conquest, proximity to Germanic areas, a Basque substratum, and other factors that cannot seriously be regarded as properties of the language faculty."

However, the analysis is greatly improved if we regard [+English] to be a collection of formal features which define "English", as Jacqueline Toribio (personal communication) has suggested. On this view, names for particular languages act as variables for bundles of features which formally characterize them. The ordering paradox disappears, because language features like [+English] or [+Spanish] are no longer taken to be primitives in the theory of grammar. This now gives the Functional Head Constraint (FHC) in (24) new empirical content. In particular, to evaluate the FHC, particular hypotheses are needed regarding which features of English, being distinct from features of Spanish, result in a conflict. However, no such hypotheses are presented or evaluated in Belazi et al. (1994).

In addition, the idea that head–complement configurations are checking domains must also be independently motivated. If current approaches are correct in assuming that only head–head and head–spec configurations are checking domains (Sportiche, 1995; Chomsky, 1995), then the FHC cannot be right, even if "the language feature" is given the empirical content it now lacks. In other work, Rubin & Toribio (1995) argue that checking is instantiated in this configuration as well, but no independent justification is offered for their claim. In the absence of such independent motivation, the FHC becomes a code-switching-specific constraint barring language mixture in functional head–complement configurations identified as distinct languages.

There are also empirical counter-examples to Belazi et al.'s approach, indicating that (23) is not a fact. Examples (12), (13), (14), and (22b), presented above, count as counter-examples to Belazi et al.'s system, given their definition of the set of functional

https://doi.org/10.1017/S1366728900000122 Published online by Cambridge University Press

heads. To these we might add (25), a well-formed construction in which a Nahuatl indefinite article *se* occurs before the Spanish noun *hombre* "man".

(25) Se *hombre* kikoas se kalli
se hombre 0-ki-koa-s se kalli
a man 3S-3Os-buy-FUT a house
"A man will buy a house"

Finally, I will briefly discuss a recent class of proposals made within a speech-planning framework, exemplified in work by Azuma (1991, 1993), de Bot (1992) and Myers-Scotton (1993, 1995). These approaches rely upon work on sentence production by Fromkin (1971) and Garrett (1975) and frequently use Levelt's (1989) *Speaking* model.

According to Azuma (1993) and Myers-Scotton (1993), the matrix language defines the surface structure positions for content words and functional elements. Myers-Scotton (1993) refers to this as the Matrix Language Frame. Azuma (1993) offers, among other data, the examples in (26) as support for this theory. In this framework, we expect (26a) to be well-formed but not (26b) since in (26b) the determiner *the* is not in the surface position of the matrix language (Azuma, 1993).

(26a) Uchi wa *whole chicken* o kau noyo
we TOPIC *whole chicken* ACC buy tag
"We buy a whole chicken"
(26b) *Watashi ga katta *the* hon wa takai
I NOM bought *the* book TOPIC expensive
"The book I bought is expensive"

In many respects, this approach is equivalent to the Equivalence Constraint in (7) and subject to some of the same criticisms. In particular, it is subject to the same counter-examples, such as those presented in (2), repeated here.

(2a) *The students had *visto la película italiana*
"The students had *seen the Italian movie*"
(2b) *Los estudiantes habían *seen the Italian movie*
"The students had *seen the Italian movie*"

Notice that (2a, b) are ill-formed even though the matrix language, whether it is taken to be English or Spanish in this case, has correctly defined the positions of content words and functional categories. Other empirical puzzles for this approach are (7), (8), (21) and (22).

Myers-Scotton's (1993) system allows that the definition of the matrix language may change at any time in production, even mid-sentence; while this may save the analysis of these data, it introduces an intractable weakness and makes the Matrix Language Frame (MLF) Model essentially unfalsifiable.

Furthermore, it is not obvious that code switching has the same character as other processing phenomena, such as limitations on center embedding and lengths of sentences. While speech processing models invariably assume a uniform mechanism across languages, the examples in (2) appear not to differ at the surface from monolingual sentences except with respect to the phonetic shape of some of their constituents. Yet they are ill-formed, a surprising fact if the parser is responsible. In addition, a much more precise way of talking about processing of such constructions, perhaps along lines explored in Stabler (1994) with respect to multiple center-embedding and other phenomena, should be employed if code switching boundaries are to be successfully defined in such terms.

Finally, it should be noted that Myers-Scotton views her MLF Model as a model of both performance and *competence*, seen especially clearly in recent work (Myers-Scotton, 1997). The idea that a "syntactic frame" of some kind is operative at the level of grammar is a traditional one. Indeed, Skinner (1957, 346) considered a sentence to be a "skeletal frame" consisting of key responses (nouns, verbs, adjectives). If grammaticality facts can be accounted for in the absence of such notions, as all standard syntactic theories evidence, then the MLF Model is disfavored on simple grounds of scientific parsimony. If we are to believe that the concept of a "language frame" is necessary to explain the special facts of bilingual code switching, then the proponents of this view carry a particular burden of proof: they must show that the grammaticality facts in code switching cannot be explained unless the notion of a "language frame" is employed. Furthermore, if we are to believe that the "language frame" is a principle of grammar and not a code-switching-specific constraint, then they must further show that it is a well-motivated construct for the analysis of monolingual data as well.

All the accounts just reviewed appear to have both conceptual and empirical shortcomings. However, two common threads emerge which should be mentioned. Poplack (1980) and Belazi et al. (1994) share an intuition that a basic conflict in the requirements of the mixed grammars is responsible for ungrammaticality in code switching, an appealing idea, which, as I will try to illustrate below, could prove extremely fruitful in the analysis of code switching data.

Also, Mahootian (1993) and Belazi et al. (1994) have both insisted that there are no constraints which operate on code-switched constructions which do not also operate on monolingual constructions, a suggestion which goes back at least as far as Woolford (1983). Despite this, both frameworks proceed to formulate arbitrary limits on the range of gramma-

https://doi.org/10.1017/S1366728900000122 Published online by Cambridge University Press

tical apparatus relevant to bilingual code switching (namely, the complement relation). In the absence of evidence, there is no reason to limit the range of grammatical relations that interact with code switching. In fact, data considered so far constitutes strong evidence that this relation alone cannot account for all of the facts of language mixture. Making the simplest assumptions, we would posit that all grammatical relations and operations which are relevant to monolingual language are relevant to bilingual language, and only these. This view, understood as a research agenda rather than a principle of grammar, might be formulated as in (27) (following MacSwan, 1997, 175; 1999b, 146).

(27) Nothing constrains code switching apart from the requirements of the mixed grammars.

The agenda in (27) entails that no principle of grammar may refer to code switching, or to separate languages, as is done in the proposals of Poplack (1981); Joshi (1985); Di Sciullo et al. (1986) and Belazi et al. (1994), reviewed above. (Although the question does not arise, Mahootian's (1993) proposal appears to be a theory about which grammatical relations are relevant to code switching, and not a formulation of a syntactic constraint of some sort.)

After briefly outlining some important characteristics of the Minimalist Program, I will present a theory of code switching whose basic mechanisms consist not in the operation of rules of grammar which apply specifically in code switching contexts, but in a principled consideration of ways in which discrete components of the grammar are allowed to interface in bilingualism. In this way we will be able to maintain (27) while allowing that all and only those relations relevant to monolingual language are relevant to bilingual language. In that section, I will also revisit the counter-examples presented here regarding other models of intrasentential code switching.

The Minimalist Program

The promise of a syntactic theory in which parameters are restricted to the lexicon was noted early by Chomsky (1991, 23):

> If there were only one human language, the story would essentially end there. But we know that this is false, a rather surprising fact. The general principles of the initial state evidently allow a range of variation. Associated with many principles there are parameters with a few – perhaps just two – values. Possibly, as proposed by Hagit Borer, the parameters are actually restricted to the lexicon, which would mean that the rest of the Ilanguage is fixed and invariant, a far-reaching idea that has proven quite productive.

Restricting parameters to the lexicon means that linguistic variation falls out of just the morphological properties (abstract and concrete) of the lexicon (Borer, 1984). In this model, there are two central components: C_{HL}, a computational system for human language, which is presumed to be invariant across languages, and a lexicon, to which the idiosyncratic differences observed across languages are attributed. The suggestion that the I-language is fixed and invariant in this way introduces a version of the Universal Base Hypothesis, the idea that phrase structure does not vary across languages; surface differences in word order relate only to the rearrangement of elements in the syntactic tree as the result of movement operations, triggered by lexically encoded morphological features.

Phrase structure is also derived from the lexicon in the Minimalist Program. An operation, which Chomsky (1995) calls *Select*, picks items from the lexicon and introduces them into the numeration, an assembled subset of the lexicon used to construct a derivation. Another operation, *Merge*, takes items from the numeration and forms new, hierarchically arranged syntactic objects (substructures). The operation *Move* applies to syntactic objects formed by *Merge* to build new structures. In the Minimalist Program, then, phrase structure trees are built derivationally by the application of the three operations *Select*, *Merge* and *Move*, constrained only by the condition that lexically encoded features match in the course of a derivation. Phrase structure, along with configurationally defined intermediate and maximal projections, therefore has no independent status in the grammatical system (C_{HL}).

Movements are driven by feature checking, and may be of two types: a head may undergo *head movement* and adjoin another head, or a maximal projection may move to the specific position of a head; in either case, the element moves for the purpose of checking morphological features of case, number, person and gender. In addition, its movement may be *overt* or *covert*. Overt movements are driven by *strong* features and are visible at PF (*phonetic form*, traditionally known as "the surface structure") and LF (*logical form*, the interpretive level). Covert movements, driven by *weak* features, are visible only at LF.

Principles of Economy select among convergent derivations. One such principle, Full Interpretation (FI), requires that no symbol lacking a sensorimotor interpretation be admitted at PF level; applied at LF level, FI entails that "every element of the representation [has] a (language-independent) interpretation" (Chomsky, 1995, 27). Thus, uninterpretable features (denoted [−Interpretable]) must be checked and (in

https://doi.org/10.1017/S1366728900000122 Published online by Cambridge University Press

some proposals) deleted by LF. Such features include case, person, number and gender.

A derivation is said to *converge at an interface level* (PF or LF) if it satisfies FI at that level; it *converges* if FI is satisfied at both levels. A derivation that does not converge is also referred to as one that *crashes*. If features are not checked, the derivation *crashes*; if they *mismatch*, the derivation is canceled (that is, a different convergent derivation may not be constructed). Chomsky (1995) assumes that morphologically complex items such as *walked* are formed internally within the lexicon, with the properties [walk] and [past] already specified. Borrowing, then, may be viewed as an operation whereby a new stem is introduced into a specific lexicon where morphologically complex items are formed before entering the numeration (MacSwan, 1999b, 235).

At some point in the derivation, an operation Spell-Out applies to strip away from the derivation those elements relevant only to PF. What remains is mapped to LF by a subsystem of C_{HL} called the *covert component*. The elements relevant only to PF are mapped to PF by operations unlike the covert component, operations which comprise the *phonological component*. The phonological component is also regarded as a subsystem of C_{HL}. The subsystem of C_{HL} which maps the lexicon to Spell-Out is the *overt component* (often called "overt syntax"). Figure 1 presents these components schematically. Note that the various components (overt, covert, phonological) are all part of C_{HL}, the computational system for human language, as is the operation *Select* which places items into the numeration. (For an overview of the empirical motivation for the Minimalist Program, see Chomsky's (1995) extensive review and discussion.)

In the next section, I will outline a theory of code switching which may be regarded as Minimalist in two respects: (a) it makes use of minimal theoretical assumptions, an important principle of the Minimalist Program, by insisting on a strict interpretation of (27); and (b), to the extent possible, it relies upon concepts and principles of the Minimalist Program (Chomsky, 1995) for an analysis of the data considered.

Particular attention will be given to feature checking as a mechanism for triggering movement. Simply put, elements move within a phrase structure in order to check features (heads move to adjoin with other heads, forming complex heads; or heads move to the specifier position of other heads). Constructions formed in this way converge if and only if features may be *checked* in the new configuration. To be checked, features must match ([+plural] with [+plural], or [+accusative] with [+accusative]). In relation to this, I will make some use of Chomsky's (1995) assumption that features may not "mismatch" in the course of a derivation, and I will introduce a principle of economy developed in Shütze (1997), the Accord Maximization Principle.

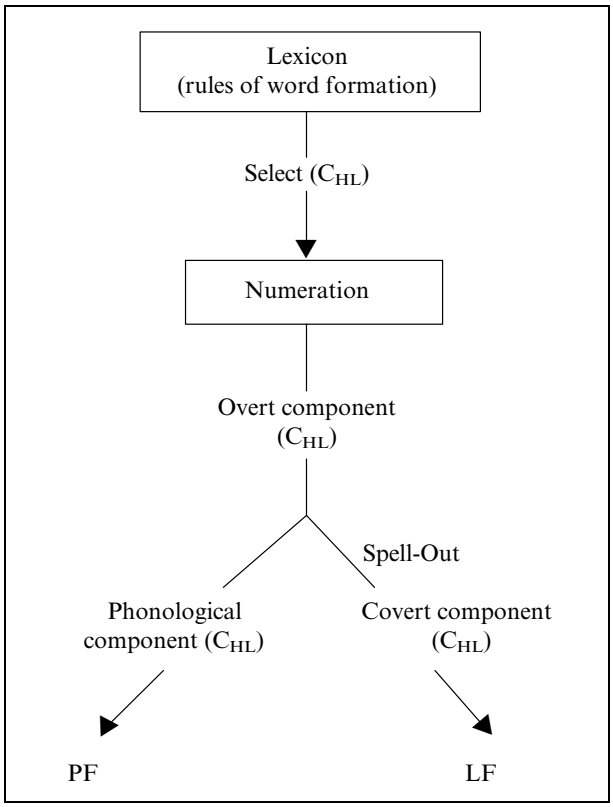


Figure 1. The Minimalist framework

A Minimalist approach to code switching

A very important aspect of the Minimalist Program is that all learning is lexical, and all parameters are micro-parameters associated with individual lexical items. This makes a rather different conception of bilingualism possible, since it is no longer necessary to regard grammars as compartmentalized in some way in the language faculty. In the Minimalist framework, C_{HL} is invariant across languages, and the Lexicon does not need to be privy to sociopolitical distinctions like Spanish, Nahuatl and Chinese. The difference between an SVO language like English and an SOV language like Korean, for instance, is defined in terms of the strength of features in the object DP (determiner phrase) (weak in English, strong in Korean); apart from this sort of parametric variation, there are no differences in the rules of syntax, allowing a great simplification in our conception of bilingualism.

In non-lexicalist models, matters are quite dif-

https://doi.org/10.1017/S1366728900000122 Published online by Cambridge University Press

ferent. Indeed, the interaction of grammars in analyzing code switching data is very problematic in non-lexicalist models, and has generally required the operation of a "control structure" (Joshi, 1985), a sort of "third grammar" which mediates the interaction of the two systems, as discussed earlier. Consider, as one case of a non-lexicalist theory, GB Theory. In early work, it was assumed that branching directionality was determined by a parametric setting within the computational system, not within the lexicon. In this system, Japanese–English code switching has *contradictory requirements* such that a principle responsible for governing the interaction of the grammars is needed. We might expect, in such a system, that code switching would be impossible, since merging the grammatical rule systems would make it impossible to compute the directionality requirement for the branching parameter.

However, if all syntactic variation is associated with the lexicon, as in the Minimalist Program, then code switching may be seen as the simple consequence of mixing two lexicons in the course of a derivation. In MacSwan (1997, 1999b), I develop a model of intrasentential code switching in which items may be drawn from the lexicon of either language to introduce features into the numeration, which must then be checked for convergence in just the same way as monolingual features must be checked (or must not "mismatch"), with no special mechanisms permitted. In this lexicalist approach, no "control structure" is required to mediate contradictory requirements of the mixed systems. The requirements are simply carried along with the lexical items of the respective systems. We may think of the system formally as one in which the grammar used for code switching consists of the union of the two lexicons plus the invariant computational system, with no mediating mechanisms needed.

However, the Phonological Component, responsible for mapping the numeration to PF, is of a very different character from the syntax. Phonological rules build structure in a way that syntax does not, and in doing so they often refer to specific morphological material with its phonetic content. As we shall see, in some respects its rules have the properties of non-lexicalist syntactic frameworks, so that code switching at the level of PF is not possible, a fact which suggests that bilinguals have separate, discrete phonological systems. These points will be addressed in more detail in the context of the discussion below.

Chomsky (1995) and others have pointed out that the computation $N \rightarrow \pi$ (that is, the mapping to phonetic form) is very different from the syntactic component of the grammar (the computation $N \rightarrow \lambda$):

> at the point of Spell-Out, the computation splits into two parts, one forming π and the other forming λ. The simplest assumptions are (1) that there is no further interaction between computations and (2) that computational procedures are uniform throughout: any operation can apply at any point. We adopt (1), and assume (2) for the computation from N to λ, though not for the computation from N to π; the latter modifies structures (including the internal structure of lexical entries) by processes very different from those that take place in the $N \rightarrow \pi$ computation. (229)

Thus, while syntactic operations may apply at any time, operations of the phonological component must apply in a particular order, as Bromberger & Halle (1989) have also pointed out. In more recent work in phonology, constraint ranking (a kind of ordering by importance) has become central to describing cross-linguistic variation (Kager, 1999).

Notice that if we attempt to take the union of two PF components for the purposes of code switching, as we did in the case of the lexicons for mixing in the syntactic component of the grammar, the ordering relations among rules will not be preserved. If, for instance, L_X orders R1 before R2, and L_Y orders R2 before R1, then the resulting system will have no ordering relations on R1 or R2, and it will fail to meet its requirement that rules be (partially) ordered with respect to one another. Rather than invoke a control structure which allows the systems to interface, it may be worthwhile to pursue the hypothesis, as MacSwan (1999b) does, that code switching in the computation $N \rightarrow \pi$ is simply impossible, expressed as in (28).

(28) *PF Disjunction Theorem*
- (i) The PF component consists of rules/constraints which must be (partially) ordered/ranked with respect to each other, and these orders/rankings vary cross-linguistically.
- (ii) Code switching entails the union of at least two (lexically encoded) grammars.
- (iii) Ordering relations are not preserved under union.
- (iv) Therefore, code switching within a PF component is not possible.

We might think of (28) as an instantiation of FI, the requirement that every object have a sensorimotor interpretation to qualify as a legitimate representation, a kind of "interface condition" (Chomsky, 1995). Since phonological systems cannot be mixed, code switching at PF generates "unpronounceable" elements which violate FI. Notice that this system predicts that code switching below X^0 is not permitted, since X^0s are inputs to PF (Chomsky, 1995).

It is important to note, too, that (28) does not have the character of a syntactic constraint on code

https://doi.org/10.1017/S1366728900000122 Published online by Cambridge University Press

switching. The constraints reviewed earlier (in particular, those stated in (3), (4), (10), (16) and (24)) are syntactic theories which pertain to code switching. By contrast, (28) is a theory about the relationship between the phonological components of a bilingual's linguistic system, and is deduced from the nature of the phonological rules. Because (28) is not a rule of grammar, we are consistent with the goal of excluding all code-switching-specific rules, articulated in (27).

Let us consider some empirical consequences of the PF Disjunction Theorem. First, note that (28) avoids classic problems such as the elicited judgments presented in (29), after Poplack (1981), since phonological systems cannot be switched below X^0. Whether we think of morphologically complex elements such as *comie+ndo* ("eat+ing") as created by principles of word formation internal to the lexicon (as Chomsky (1995) does) or by syntactic operations, they constitute X^0-level elements (simple or complex); thus, switching within them is prohibited by (29).

(29a) *Juan está *eat*-iendo
Juan be/1Ss eat-DUR
"Juan is eating"
(29b) *Juan *eat*-ó
Juan eat-PAST/3Ss
"Juan ate"
(29c) *Juan *com*-ed
Juan eat-PAST
"Juan ate"
(29d) *Juan eat-*ará*
Juan be/1Ss eat-FUT/3Ss
"Juan will eat"

However, notice that if an English lexical stem is treated with both Spanish phonology and morphology, as in the case of borrowing, no ill-formed constructions result:

(30a) Juan está parqueando su coche
Juan be/1Ss park-DUR his car
"Juan is parking his car"
(30b) Juan parqueó su coche
Juan park-PAST/3Ss his car
"Juan parked his car"
(30c) Juan parqueará su coche
Juan be/1Ss park-FUT/3Ss
"Juan will park his car"

As mentioned, Chomsky (1995) regards items such as *walked* to be formed internally within the lexicon, with the properties [walk] and [past] already specified. Cases of borrowing, then, as in (30), may be viewed as an operation whereby a new stem is introduced into a specific lexicon where morphologically complex items are formed before entering the numeration, where feature checking begins.

Consider once again the Spanish–Nahuatl examples in (9), presented earlier as a counter-example to Poplack's Free Morpheme Constraint:

(9a) Ne nik*amar*oa in Maria
ne ni-k-amar-oa in Maria
I 1S-3Os-love-VSF in Maria
"I love Maria"
(9b) Mo*tratar*oa de nin ki*rescatar*oa n Pocajontas
mo-tratar-oa de nin 0-ki-rescatar-oa in Pocajontas
REF-treat-VSF about this 3S-3Os-rescue-VSF IN Pocahontas
"It deals with the one who rescues Pocahontas"

Given our theory of borrowing, we may regard these verbs as Spanish lexical items which have been introduced into the Nahuatl lexicon where rules of word formation, internal to the Nahuatl lexicon, add appropriate feature-bearing inflectional morphology. On this analysis, the cases in (9) are parallel to those in (30), and do not violate (28).

There are, of course, well-known counter-examples to Poplack's Free Morpheme Constraint published elsewhere (see Mahootian, 1993; Belazi et al. 1994; MacSwan, 1999b). It is important in evaluating counter-examples of the Free Morpheme Constraint to present along with them grammatical evidence which tells us that the lexical units under analysis are indeed linguistic, and not simply orthographic units. A thorough empirical test of (28) will necessarily turn to a careful analysis of word boundaries. For now, I will assume that the Free Morpheme Constraint is essentially descriptively correct, taking it to bar word-internal switches where such switches violate the integrity of legitimate X^0-level elements.

On the PF Disjunction Theorem, code switching cannot occur within a single lexical item, or a single X^0, because X^0s are inputs to PF. Let us assume that all X^0s are inputs to PF, whether they are simple or complex, so that no code switching below X^0 is allowed due to the nature of the phonological rule system. The PF Disjunction Theorem will therefore predict that code switches involving head movement should be ruled out, since head movement results in the formation of complex X^0s. In connection with this, recall the examples in (2b) and (13), both involving a code switch between an aspectual and a verb, repeated below.

(2b) *The student had *visto la pelicula italiana*
"The student had seen the Italian movie"
(13) No, *parce que* hanno *donné des cours*
no, because have given of the lectures
"No, because they have given the lectures"

https://doi.org/10.1017/S1366728900000122 Published online by Cambridge University Press

Belazi et al. (1994) offered the Spanish–English example in (2b) as an instantiation of their Functional Head Constraint, and Mahootian & Santorini (1996) gave (13), a French–Italian construction taken from Di Scuillo et al. (1986), as a counter-example in their critique of the FHC.

A system which relies strictly upon phrase structure configurations, and upon head–complement relations in particular, will have no hope of explaining the apparent contradiction between (2b) and (13), since these constructions do not differ from one another with respect to phrase structure. However, in a Minimalist analysis of code switching data, in which language-particular differences are lexically encoded, the particular languages used in each construction take on great significance.

Rizzi (1982) analyzed Italian modals,[5] aspectuals and motion verbs as restructuring verbs as a way of accounting for (among some other peculiarities) the contrasts in (31) and (32).

(31a) Finalmente si comincerà a costruire le nuove case popolari
Finally *si* begin/FUT to build the new houses people/GEN
''Finally we'll begin to build the new houses for the poor''

(31b) Finalmente le nuove case popolari si cominceranno a costruire
(Same as (31a).)

(32a) Finalmente si otterrà di costruire le nuove case popolari
Finally *si* get.permission/FUT to build the new houses people/GEN
''Finally we'll get permission to build the new houses for the poor''

(32b) *Finalmente le nuove case popolari si otterranno di costruire
(Same as (32a).)

In Rizzi's (1982) analysis, *comincerà* ''will begin'', but not *otterrà* ''will get permission'', triggers an optional reanalysis of the form V*x* (P) $V_2 \Rightarrow$ V, where Vx is a verb of the restructuring class, (P) an optional intervening preposition, and V_2 is the verb of the embedded sentence. This restructuring process is a type of compounding. In (31) a reanalysis of the constituents allows the object of the embedded clause in an impersonal *si* construction to move to the subject position of the matrix clause; in (32) this promotion is barred because reanalysis cannot apply for *otterrà*. It is important to emphasize for our purposes that reanalysis in Rizzi's system is optional: in (31), the embedded subject may occur in either position because the verb allows (but does not require) reanalysis; in (32), however, it may occur in only one position because the verb does not permit reanalysis.

Aspectual *essere* is used with a past participle in Italian passive impersonal *si* constructions. In constructions such as (33a), *essere* too may be viewed as a restructuring verb, allowing promotion of the embedded object to matrix subject position, shown in (33b).[6]

(33a) Si è dato un regalo
si essere given a gift
''A gift is given''

(33b) Un regalo si è dato
a gift *si* essere given
''A gift is given''

On Rizzi's (1982) analysis, restructuring has applied to (33b) but not to (33a), forcing the promotion of [$_{NP}$ *un regalo*] in the former.

However, note that a very different pattern of judgments emerges when code switching is involved in (33). Consider the French–Italian facts in (34).

(34a) Si è *donné un cadeau*
si essere given a gift

(34b) **Un cadeau* si è *donné*
a gift *si* essere given

The movement of [$_{NP}$ *un cadeau*] suggests that reanalysis has occurred in (34b), just as it did in (33b). The verbal complexes are identical in (34a) and (34b): a mixture of the Italian aspectual auxiliary *è* immediately adjacent to the French past participle *donné*. Thus, the unacceptability of (34b) indicates that restructuring correlates with the ban on language mixture in V–V sequences.

Baker (1988) analyzes certain causatives, and Li (1990) certain ''serial verb'' constructions, on the assumption that V–V compounding is obligatory for the language data of concern in their respective analyses. Pollock (1994) analyzes English motion verbs *come* and *go*, as well as English causatives, as involving verb incorporation too, with still other morphological reanalysis available for idiolectic variation in these constructions. Accordingly, I will assume that verb incorporation (VI) is sometimes optional, sometimes obligatory, and sometimes unavailable, accounting for a range of linguistic variation.

A new analysis of (2b) and (13) which permits the apparent conflict in basic findings to be resolved is

[5] Rizzi (1982, 41, n.5) uses the term *modal* ''as a simple mnemonic label for a homogeneous, small class of main verbs'', regarding them (in Italian) to be of the same lexical category as other Vs.

[6] The elicited judgments in (34) and (35) are due to a native French–Italian bilingual.

https://doi.org/10.1017/S1366728900000122 Published online by Cambridge University Press

now available. In (2b), English *had* triggers obligatory reanalysis with the Spanish participle *visto* "seen", forming a complex X^0 which, like all X^0s, is an input to PF. Because switching is not allowed in the phonological system, (2b) crashes at PF. However, in (13) the Italian auxiliary *hanno* "had" permits but does not require reanalysis, as per Rizzi's (1982) formulation. A convergent derivation for (13) is therefore available – specifically, the one in which restructuring does not occur.

The ban on switching below X^0 may also be employed to explain the ill-formedness in the constructions in (5) in which a Spanish clitic has been adjoined to an English verb, since clitics form units with V^0s (Zagona, 1988). Also consider once again the ban on switching after negation, discussed earlier in relation to Mahootian's (1993) theory:

(21a) *El no *wants to go*
he not want to go
"He doesn't want to go"
(21b) *He doesn't *quiere ir*
He doesn't want/3Ss go/INF
"He doesn't want to go"
(22a) *No *nitekititoc*
no ni-tekiti-toc
not 1S-work-DUR
"I'm not working"
(22b) Amo *estoy trabajando*
amo estoy trabaja-ndo
not be/PRES/1Ss work-DUR
"I'm not working"

In French, *ne* "not" is generally assumed to be a clitic element in constructions like (35) (see Kayne, 1975).

(35) N'avait-il pas mangé?
not have-he PAST eaten
"Didn't he eat?"

There is evidence that Spanish *no* is also a clitic, even though there are no phonological reflexes of its cliticization as in (35) for French. Zagona (1988) argues precisely this, claiming that Spanish *no* is part of the Spanish verbal complex, a clitic on V. To make a case for this analysis, Zagona points out that Spanish *no* must be fronted with the verb in (36), unlike the adverbs in (37).

(36) ¿Qué no dijo Juan?
what not say/1Ss/PAST Juan
"What didn't Juan say?"
(37a) *¿Qué sólo leyó Juan?
what only read/1Ss/PAST Juan
"What did Juan only read?"
(37b) *¿Qué meramente leyó Juan?
what merely read/1Ss/PAST Juan
"What did Juan merely read?"

Also, Zagona (1988) points out that Spanish *no* cannot be contrastively stressed in (38a) as its English counterpart in (38b) can be, owing to the fact that "clitics are inherently unstressable" (p. 156). Zagona (1988) argues that the example in (38b) shows that in English, in contrast to Spanish, the negative element is not required to be a clitic.[7]

(38a) *Juan no ha <u>no</u> hecho la tarea
Juan not has not done the task
"Juan hasn't <u>not</u> done the task"
(38b) Juan hasn't <u>not</u> done the task

These facts suggest that in Spanish, as in French, the verb is a host for a cliticized negation. For concreteness, I will assume that some property of Neg in French and Spanish attracts V, just as T attracts V.

Nahuatl behaves differently from French and Spanish with regard to negation. A test similar to the one Zagona uses in (38) shows that Nahuatl patterns with English:

(39) Amo nio <u>amo</u> niktati nowelti
amo ni-o amo ni-k-tati no-welti
not 1S-go amo 1S-3Os-see my-sister
"I'm not going to <u>not</u> see my sister"

Since clitics are inherently unstressable, we may conclude from (39) that *amo* is not a clitic in Nahuatl.

An account of the code switches involving negation is now available. Switching between Spanish *no* "not" and an English verb in (21a) results in an ill-formed construction because Spanish *no* cliticizes with its verb, and switching may not occur within complex X^0s. The same analysis holds for (22a), where Spanish *no* occurs before a Nahuatl verb. However, in (22b), an ill-formed construction does not result because Nahuatl *amo* "not" does not cliticize with its verb. In (21b), English *doesn't* occurs before an inflected Spanish verb. Here we might conjecture that the verb is unable to discharge its tense feature, since tense is already represented in *doesn't*. In other words, (21b) is ill-formed for the same reason that (41) is ill-formed:

(40) *He doesn't wants to go

Finally, let us turn to an analysis of the data in (7)–(8), presented earlier as a counter-example to Poplack's Equivalence Constraint and Myers-Scotton's MLF Model. The examples presented there illustrate that, in Spanish–Nahuatl code switching, an asymmetry emerges: a code switch between a Spanish pronoun and a Nahuatl verb may not occur for first or second person, but third person switches are well-formed:

[7] I have used underline to represent stress in (39)–(40) rather than *italics*.

https://doi.org/10.1017/S1366728900000122 Published online by Cambridge University Press

(41) *Yo *nikoas tlakemetl*
yo ni-k-koa-s tlake-me-tl
I 1S-3Os-buy-FUT garment-pl-NSF
"I will buy clothes"
(42) *Tú *tikoas tlakemetl*
tú ti-k-koa-s tlake-me-tl
you/SING 2S-3Os-buy-FUT garment-pl-NSF
"You will buy clothes"
(43) Él *kikoas tlakemetl*
él 0-ki-koa-s tlak-eme-tl
he 3S-3Os-buy-FUT garment-pl-NSF
"He will buy clothes"
(44) Ella *kikoas tlakemetl*
ella 0-ki-koa-s tlake-me-tl
she 3S-3Os-buy-FUT garment-pl-NSF
"She will buy clothes"

Notice that the subject agreement morpheme is null for the third person in Nahuatl, but is *ni-* for first person and *ti-* for second person, as may be observed in the examples given. This asymmetry in agreement affixes is parallel to what one finds in English, where *-s* marks third person agreement but the first and second person are null.

Pollock (1994) suggests, following Kayne (1989), that there is no null person suffix *-ø* which contrasts with *-s* in English; that is, rather than claiming that English bare verbs have phonetically empty agreement affixes, Pollock argues that they have no agreement affixes at all. This morphological asymmetry is used to account for two interesting syntactic puzzles of English, the inflection puzzle in (45), first noted by Jaeggli & Hyams (1993), and the causative puzzle in (46).

(45a) John goes to talk to his advisor every day
(45b) *John goes talk to his advisor every day
(45c) I/you go to see a movie every Tuesday
(45d) I/you go see a movie every Tuesday
(46a) John made Mary leave
(46b) Mary was made to leave
(46c) *Mary was made leave

The details of Pollock's (1994) account of the contrasts in (45) and (46) are not relevant to our discussion, except to note that a crucial role is played by the assumption that English verbs undergo feature checking only if they are marked with an agreement morpheme whose features require checking; otherwise the element remains in situ. In this respect, uninflected verbs in English are like infinitivals.

The approach which Pollock develops, however, leaves an important question unanswered. Specifically, on Poplack's account, there is no obvious way to bar (47b).

(47a) He likes Mary
(47b) *He like Mary

The subject in both examples checks its case and φ-features in [Spec, TP], but the bare verb *like* in (47b) does not raise to check its features; hence, no conflict in features should be detected and the construction should be well-formed, contrary to the facts. Jean-Yves Pollock (personal communication) has suggested that this relationship is perhaps mediated in the VP shell before subject or verb extraction, perhaps involving some condition on lexical insertion. Indeed, with respect to similar issues in other data, Shütze (1997) posits the Accord Maximization Principle (AMP), an economy principle which privileges derivations which have a maximal number of agreement and case features.

(48) *The Accord Maximization Principle*
Among a set of convergent derivations *S* that result from numerations that are identical except for uninterpretable φ- and case-features, such that the members of *S* satisfy other relevant constraints, those members of *S* where the greatest number of Accord relations are established block all other derivations in *S*.

Thus, while both examples in (47) are convergent derivations, (48) makes it possible for (47b) to be blocked by the availability of (47a), identical in all respects to (47b) except that it has the maximal number of accord morphemes.

Let us assume that the Nahuatl "null" third-person affix, like English *-s*, also does not exist, following Pollock's (1994) analysis. The same mechanism which bars (47b) then extends to the Nahuatl expressions in (49), barring (49a) due to the availability of (49b).

(49a) *Ne kikoas tlakemetl
ne ki-koa-s tlake-me-tl
I 3Os-buy-FUT garment-PL-NSF
"I will buy some clothes"
(49b) Ne nikoas tlakemetl
ne ni-k-koa-s tlake-me-tl
I 1S-3Os-buy-FUT garment-PL-NSF
"I will buy some clothes"

This analysis now allows us to distinguish between (41)–(42), which are inflected for subject agreement, and (43)–(44), which are not. If no checking takes place for the verbs in the acceptable constructions in (43)–(44), then this may suggest that the ungrammaticality in (41)–(42) relates to a conflict in the feature matrices of the Spanish subjects and the Nahuatl verbs.

An interesting contrast between Spanish and

https://doi.org/10.1017/S1366728900000122 Published online by Cambridge University Press

Nahuatl pronominals, manifested in their overt morphology, is their respective gender systems. Spanish pronouns and Spanish DPs are marked for feminine or masculine gender, while Nahuatl pronouns and DPs have no such marking. Indeed, in Nahuatl, the same pronoun *ye* is used for *he* or *she* (accusative or nominative case). Let us assume that Spanish and Nahuatl actually differ in their feature matrices with respect to gender. This is a natural idea; its alternative, that languages like Nahuatl have covert gender markings, is highly implausible because it is unlearnable: there are no gender markings on Nahuatl DPs, so there is no way to know which DP is masculine and which feminine. I will assume, then, that Nahuatl gender is null, or one-valued, and that Spanish gender is two-valued (masculine, feminine). Formally, this difference may be attributed to values of φ: for Spanish, φ = {person, number, gender}, but Nahuatl either has no gender feature or has a null gender feature (that is, Øgender).

Finally, let us assume that gender, like other features, may "mismatch" in the course of a derivation, causing the derivation to be canceled, following a position Chomsky (1995a, 309) adopts in order to account for a range of other data. A canceled derivation is one for which a more optimal convergent derivation may not be considered: if features mismatch, further derivations are barred.[8] We thus assume (50).

(50) Mismatch of features cancels the derivation.

Now an account of (41)–(44) may be constructed in terms of a mismatch in the Spanish and Nahuatl gender feature in φ. T in these constructions may only select a Spanish DP as its specifier if the φ-features of T match D's values for φ; thus, the presence of the Spanish pronouns in (41)–(44) indicates that T in these constructions has the Spanish values for φ, including [±gender]. In (41)–(42), a subject prefix in the verb causes V to adjoin to T for feature checking. However, Nahuatl φ in V mismatches Spanish φ in T (more specifically, ±gender mismatches Øgender) and the derivations are canceled, on (49). Once again, in the case of (43)–(44), Nahuatl V does not undergo LF checking since it has no subject agreement morpheme. Since V does not enter into a checking relation with T in these constructions, (43)–(44) converge.

The analysis presented here holds strong predictions for code switching in other language pairs. Specifically, other factors being equal, code switching between pronouns (or lexical DPs) and a verb should be tolerated if and only if the gender systems are compatible.[9] Consider the judgments in (51) and (52), reported by a Spanish–Catalan–Greek trilingual. This speaker indicated that the switches in (51), involving Spanish and Catalan, both two-valued systems, are relatively well-formed; however, when Greek, a three-valued system, is mixed with either Spanish or Catalan, the constructions are severely degraded.

(51a) Yo *vull mengar el dinar* (Spanish–Catalan)
I want eat/INF the dinner
"I want to eat dinner"

(51b) El *vol mengar el dinar* (Spanish–Catalan)
he wants eat/INF the dinner
"He wants to eat dinner"

(51c) Jo *quiero comer la cena* (Catalan–Spanish)
I want eat/INF the dinner
"I want to eat dinner"

(52a) *Ego *vull mengar el dinar* (Greek–Catalan)
I want eat/INF the dinner
"I want to eat dinner"

(52b) *Ego *quiero comer la cena* (Greek–Spanish)
I want eat/INF the dinner
"I want to eat dinner"

(52c) *Aftos *vol mengar el dinar* (Greek–Catalan)
he wants eat/INF the dinner
"He wants to eat dinner"

(52d) *Aftos *quiere comer la cena* (Greek–Spanish)
he wants eat/INF the dinner
"He wants to eat dinner"

The data and analyses considered in this section suggest that, while there are numerous counter-examples to the general constraints on code switching reviewed earlier in this article, taking seriously the supposition that there are no code-switching-specific constraints can lead to new insights both in bilingualism and in the theory of grammar generally.

Several advantages of a Minimalist approach to code switching over previous theories have also emerged. Some of the more salient advantages are listed in (53).

(53) *Some advantages of a Minimalist approach to code switching*
(a) Because linguistic differences are encoded in particular lexical items, the grammatical contribution of each language in a code switched sentence can be clearly identified.

[8] "Mismatch" is distinguished from "nonmatch". Nominative and accusative case mismatch, barring further derivations, but accusative case and categorial I "fail to match" so that further derivations may be considered (Chomsky, 1995, 309).

[9] This analysis suggests some problems for well-formed examples of code switching after lexical subjects. Ultimately, the correct analysis may fall out of an understanding of the special characteristics of pronouns (Chomsky, 1981, 330; Everett, 1996).

https://doi.org/10.1017/S1366728900000122 Published online by Cambridge University Press

(b) Because the syntactic component of the computational system (C_{HL}) may be assumed to be invariant cross-linguistically, no "control structure" or "third grammar" is required to mediate between contradictory requirements.
(c) Because Minimalism focuses on *minimal* use of theoretical assumptions (allowing only those suppositions which correspond to "virtual conceptual necessity"), it is a natural framework in which to take seriously the view that there are no code-switching-specific constraints. This forces us to examine the data more rigorously, and may often lead to new insights in bilingualism and the theory of grammar.
(d) Because the Minimalist Program is motivated by many theoretical and empirical considerations in the context of monolingual data (Chomsky, 1995), pursuing a Minimalist approach to code switching allows us to remain consistent with current work in syntactic theory as it relates to monolingual language.
(e) Because the phonological component of the computational system (C_{HL}) is assumed to be different in nature from the syntactic component, and because rules/constraints of the phonological system are ordered/ranked with respect to each other, we may disallow code switching in phonology but still permit it in syntax in a natural way.

Some of the points mentioned in (53) have implications for our theory about the organization of the bilingual language faculty. The approach used here has made considerable use of a principle, deduced from the nature of the phonological rule system and stated in (28), which prohibits X^0-internal switching. The fact that language switching is available in the syntax but not in the phonology suggests a number of interesting facts about the architecture of the language faculty for bilingual speakers. These will be spelled out below.

Conclusions

The data and discussion presented in this article appear to justify several assumptions about the architecture of the language faculty for bilingual speakers. Chomsky (1995) is largely devoted to constructing a theory which makes use of a minimal theoretical apparatus in accounting for the data of cross-linguistic variation. In this sense, it rather directly addresses our question (1b), repeated here.

(1b) What are the components of the human language faculty?

The language faculty has a Lexicon, which includes internal morphological rules of word formation. The operation Select of the computational system C_{HL} places items formed within the Lexicon into a numeration, a subset of lexical items for which operations of C_{HL} will attempt to form a convergent derivation by checking lexically encoded features. Because the numeration is built by the operation Select, it does not need to be independently specified as a component of the language faculty.

As mentioned, other components of C_{HL} (overt, covert, phonological) derive two representations, PF and LF, which diverge at the point of Spell-Out in the course of the derivation. Like the numeration, PF and LF are derived by operations of C_{HL}. The operation Spell-Out, which strips away from the derivation those elements relevant only to PF, is also a part of C_{HL}. In the Minimalist Program, then, two components, a Lexicon and a Computational System for Human Language (C_{HL}), relate sound and meaning. In answer to (1b), then, we list the components of the language faculty in (54). (Compare Figure 1.)

(54) *Components of the language faculty*
Lexicon (with internal rules of word formation)
Computational System for Human Language (C_{HL})
Select
Overt component
Covert component
Phonological component

Of course, there are other important aspects of the linguistic system that are not mentioned here only because they go beyond the scope of the present work. For instance, the phonological system may be presumed to contain some basic stock of elements (phonemes), a matter I have not discussed. In addition, language use also involves systems of discourse, pragmatics, speech perception, and parsing/production, but those are not relevant to the discussion pursued here.

Given the theory of code switching presented here, how does a bilingual's language faculty differ from a monolingual's? This was the question presented in (1a):

(1a) Which components internal to the language faculty may be shared by both languages, and which components must be independent (duplicated)?

Since all cross-linguistic variation is lexically encoded, syntactic operations of the computational

https://doi.org/10.1017/S1366728900000122 Published online by Cambridge University Press

system may be assumed to be invariant. Thus, a bilingual may be assumed to have a unitary system of syntactic operations responsible for mapping the numeration to LF (the computation $N \rightarrow \lambda$). However, because each lexicon must have distinct internal operations for forming morphologically complex lexical items (like *walked* and *caminó* "he walked"), it appears reasonable to assume that bilinguals have distinct lexicons, each with their own internal morphological principles of word formation.[10] Because the computation $N \rightarrow \lambda$ does not need to discriminate among lexicons, the operation Select may draw items from either lexicon and introduce them into the derivation where they will be checked for convergence.

However, since operations associated with the computation which maps the numeration to PF (the computation $N \rightarrow \pi$) are ordered with respect to one another, no merging of the phonological systems is allowed. A bilingual speaker must therefore have separate and discrete phonological systems for each language, as discussed above in relation to the PF Disjunction Theorem of (28). (This fact may relate in some principled way to the oft-observed persistence of L1 phonological interference in the L2 of sequential bilinguals.)

Thus, the facts considered here appear to suggest that only the computation $N \rightarrow \lambda$ is common to the two linguistic systems. In contrast to the picture in Figure 1, a bilingual has two distinct lexicons, each with its own internal rules of word formation. The computation $N \rightarrow \lambda$ consists in the operation of the overt component and (after Spell-Out) the covert component, both of which may be shared by the bilingual's lexical repertoires. However, the phonological component of C_{HL} cannot be shared due to its highly language-specific character and, in particular, the nature of its rule system.

The components relevant to bilingual speech are therefore those outlined in (55) and presented graphically in Figure 2. (The notations L_x and L_y refer to the two languages represented in the bilingual's mind.) In this system, code switching within the syntactic component is possible because *Select* may draw items from either lexicon, effectively forming the union of the two for the purposes of the derivation. While both phonological systems are involved in deriving PF, each is compartmentalized and restricted to the terms of its respective lexicon. This is illustrated in Figure 2 by the expression $Phonology(L_x) \cup Phonology(L_y)$.

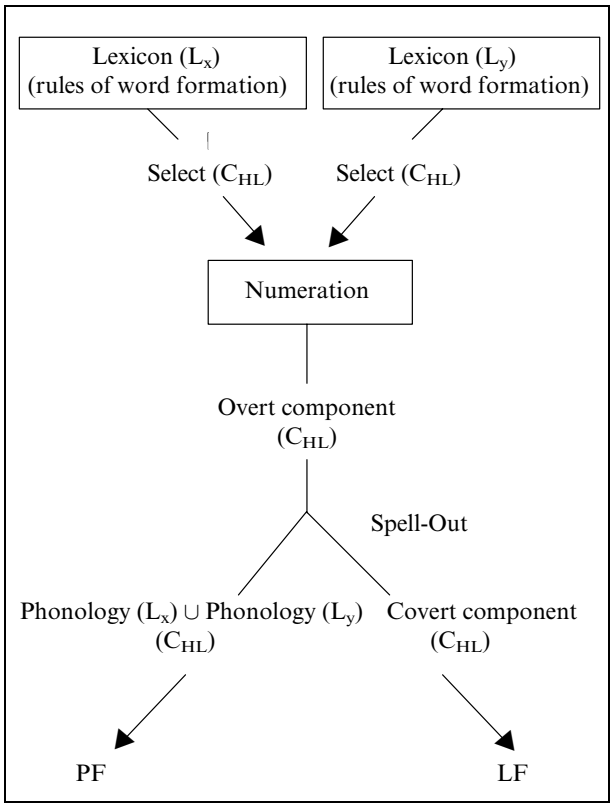


Figure 2. A Minimalist view of the bilingual language faculty

(55) *Components of the bilingual language faculty*
Lexicon (L_x) (with internal rules of word formation)
Lexicon (L_y) (with internal rules of word formation)
Computational System for Human Language (C_{HL})
Select
Overt component
Covert component
Phonological component (L_x)
Phonological component (L_y)

[10] Cook (1992) has argued that bilinguals share a common lexicon for their two languages, contrary to conclusions reached here. However, the line of research Cook reviews conceives of lexica as essentially mental dictionaries which store semantic and a very small amount of idiosyncratic information, but not morphological information (crucially, in Cook's line of thought, affixation does not take place internally in the lexicon, as it does in the Minimalist Program). The conception proposed here is thus consistent with Kirsner's (1986) experimental results which found lexical representation to be language-specific "as an artifact of morphological independence" (p. 39). Also see Costa, Miozzo, & Caramazza's (1999) interesting paper.

References

Abney, J. P. (1987). The English noun phrase in its sentential aspect. Ph.D. dissertation, MIT.

Azuma, S. (1991). Processing and intrasentential code-switching. Ph.D. dissertation, University of Texas, Austin.

https://doi.org/10.1017/S1366728900000122 Published online by Cambridge University Press

Azuma, S. (1993). The frame–content hypothesis in speech production: evidence from intrasentential code switching. *Linguistics* 31, 1071–1093.

Baker, M. C. (1988). *Incorporation: a theory of grammatical function changing*. Chicago: University of Chicago Press.

Belazi, H. M., Rubin, E. J. & Toribio, A. J. (1994). Code switching and X-Bar Theory: the Functional Head Constraint. *Linguistic Inquiry* 25 (2), 221–237.

Bley-Vroman, R. (1989). The logical problem of second language learning. In S. Gass & J. Schachter (eds.), *Linguistic perspectives on second language acquisition*, pp. 41–68. Cambridge: Cambridge University Press.

Borer, H. (1984). *Parametric syntax: case studies in Semitic and Romance languages*. Dordrecht: Foris.

Bromberger, S. & Halle, M. (1989). Why phonology is different. *Linguistic Inquiry* 20, 35–67. Reprinted in A. Kasher (ed.), (1991). *The Chomskyan turn*, pp. 56–77. Cambridge: Blackwell.

Chomsky, N. (1981). *Lectures on government and binding*. New York: Mouton de Gruyter.

Chomsky, N. (1991). Linguistics and cognitive science: problems and mysteries. In A. Kasher (ed.), *The Chomskyan turn*, pp. 26–54. Cambridge: Blackwell.

Chomsky, N. (1995). *The Minimalist Program*. Cambridge, MA: MIT Press.

Clahsen, H. & Muysken, P. (1986). The availability of Universal Grammar to adult and child learners: a study of the acquisition of German word order. *Second Language Research* 2, 93–119.

Cook, V. (1992). Evidence for multicompetence. *Language Learning* 42, 557–591.

Costa, A., Miozzo, M. & Caramazza, A. (1999). Do words in the bilingual's two lexicons compete for selection? *Journal of Memory and Language* 41 (3), 365–397.

de Bot, K. (1992). A bilingual production model: Levelt's "speaking" model adapted. *Applied Linguistics* 13 (1), 1–24.

Di Sciullo, A.-M., Muysken, P. & Singh, R. (1986). Government and code-switching. *Journal of Linguistics* 22, 1–24.

Dulay, H. & Burt, M. (1974). A new perspective on the creative construction processes in child second language acquisition. *Language Learning* 24, 253–258.

Everett, D. (1996). *Why there are no clitics: an alternative perspective on pronominal allomorphy*. Dallas: Summer Institute of Linguistics and University of Texas, Arlington.

Fromkin, V. A. (1971). The non-anomalous nature of anomalous utterances. *Language* 47, 27–52.

Garrett, M. (1975). The analysis of sentence production. In G. Bower (ed.), *Psychology of learning and motivation*, pp. 133–177, Vol. IX. New York: Academic Press.

Halmari, H. (1997). *Government and code switching: explaining American Finnish*. New York: John Benjamins.

Jaeggli, O. & Hyams, N. (1993). On the independence and interdependence of syntactic and morphological properties: English aspectual come and go. *Natural Language and Linguistic Theory* 11, 313–346.

Joshi, A. (1985). Processing of sentences with intrasentential code switching. In D. R. Dowty, L. Kattunen, & A. M. Zwicky (eds.), *Natural language parsing: psychological, computational and theoretical perspectives*, pp. 190–205. Cambridge: Cambridge University Press.

Kager, R. (1999). *Optimality Theory*. Cambridge: Cambridge University Press.

Kayne, R. S. (1989). Notes on English agreement. CIEFL (Central Institute of English as a Foreign Language, Hyderabad) Bulletin 1, 41–67.

Kayne, R. S. (1975). *French syntax: the transformational cycle*. Cambridge: MIT Press.

Kayne, R. S. (1995). *The antisymmetry of syntax*. Cambridge: MIT Press.

Keenan, E. L. & Stabler, E. P., Jr. (1994). There is more than one language. Proceedings of Langues et Grammaire-I, Université Paris-8.

Kirsner, K. (1986). Lexical function: is a bilingual account necessary? In J. Vaid (ed.), *Language processing in bilinguals: psycholinguistic and neurophysiological perspectives*, pp. 21–45. Hillsdale, NY: Lawrence Erlbaum.

Krashen, S. (1981). *Second language acquisition and second language learning*. Oxford: Pergamon.

Levelt, W. J. M. (1989). *Speaking: from intention to articulation*. Cambridge, MA: MIT Press.

Li, Y. (1990). On V–V compounds in Chinese. *Natural Language and Linguistic Theory* 8, 177–207.

MacSwan, J. (1997). A minimalist approach to intrasentential code switching: Spanish–Nahuatl bilingualism in Central Mexico. Ph.D. dissertation, UCLA. Electronic version available at <http://www.public.asu.edu/~macswan/diss.html>.

MacSwan, J. (1999a). The argument status of NPs in Southeast Puebla Nahuatl: comments on the polysynthesis parameter. *Southwest Journal of Linguistics* 17(2), 101–114. Electronic version available at <http://www.public.asu.edu/~macswan/swjl.pdf>.

MacSwan, J. (1999b). *A minimalist approach to intrasentential code switching*. New York: Garland.

Mahootian, S. (1993). A null theory of codeswitching. Ph.D. dissertation, Northwestern University.

Mahootian, S. & Santorini, B. (1996). Codeswitching and the complement/adjunct distinction: a reply to Belazi, Rubin and Toribio. *Linguistic Inquiry* 27 (3), 464–479.

Myers-Scotton, C. (1993). *Duelling languages: grammatical structure in codeswitching*, pp. 233–256. Oxford: Clarendon.

Myers-Scotton, C. (1995). A lexically based model of codeswitching. In L. Milroy & P. Muysken (ed.). *One speaker, two languages: cross-disciplinary perspectives on code-switching*, pp. 233–256. Cambridge: Cambridge University Press.

Myers-Scotton, C. (1997). Code-switching. In F. Coulmas (ed.), *The handbook of sociolinguistics*, pp. 217–237. Oxford: Blackwell.

Nishimura, M. (1997). *Japanese/English code-switching: syntax and pragmatics*. New York: Peter Lang.

Pandit, I. (1990). Grammaticality in code switching. In R.

https://doi.org/10.1017/S1366728900000122 Published online by Cambridge University Press

Jacobson (ed.), *Codeswitching as a worldwide phenomenon*, pp. 33–69. New York: Peter Lang.
Pollock, J-Y. (1994). Checking theory and bare verbs. In G. Cinque, J. Koster, J.-Y. Pollock, L. Rizzi & R. Zanuttini (eds.), *Paths towards Universal Grammar: studies in honor of Richard S. Kayne*. Washington, DC: Georgetown University Press.
Poplack, S. (1980). "Sometimes I'll start a sentence in Spanish y termino en Español": toward a typology of code-switching. *Linguistics* 18, 581–618.
Poplack, S. (1981). The syntactic structure and social function of code-switching. In R. Durán (ed.), *Latino language and communicative behavior*, pp. 169–184. Norwood, NJ: Ablex.
Rizzi, L. (1982). Issues in Italian syntax. Dordrecht: Foris.
Rubin, E. & Toribio, A. (1995). Feature-checking and the syntax of language contact. In J. Amastae, G. Goodall, M. Montalbetti & M. Phinney (eds.), *Contemporary research in Romance linguistics*. Philadelphia: John Benjamins.
Sankoff, D. & Poplack, S. (1981). A formal grammar for code-switching. *Papers in Linguistics* 14, 3–46.
Santorini, B. & Mahootian, S. (1995). Codeswitching and the syntactic status of adnominal adjectives. *Lingua* 96, 1–27.
Schachter, J. (1988). Second language acquisition and its relationship to Universal Grammar. *Applied Linguistics* 9, 219–235.
Shütze, C. T. (1996). *The empirical base of linguistics: grammaticality judgments and linguistic methodology*. Chicago: University of Chicago Press.
Shütze, C. T. (1997). Infl in child and adult language: agreement, case and licensing. Ph.D. dissertation, MIT.
Skinner, B. F. (1957). *Verbal behavior*. Englewood Cliffs, NJ: Prentice-Hall.
Sportiche, D. (1995). Sketch of a reductionist approach to syntactic variation and dependencies. In H. Campos & P. Kempchinsky (eds.), *Evolution and revolution in linguistic theory: essays in honor of Carlos Otero*, pp. 356–398. Washington, DC: Georgetown University Press. Reprinted in D. Sportiche
Sportiche, D. (1998). *Partitions and atoms of clause structure*, pp. 379–419. New York: Routledge.
Stabler, E. P., Jr. (1994). The finite connectivity of linguistic structure. In C. Clifton, L. Frazier & K. Rayner (eds.), *Perspectives on sentence processing*, pp. 303–336. New York: Erlbaum.
Stowell, T. (1981). Origins of phrase structure. Ph.D. dissertation, MIT.
Timm, L. A. (1975). Spanish–English code-switching: el porqué and how-not-to. *Romance Philology* 28, 473–482.
Toribio, A. & Rubin, E. (1996). Code-switching in Generative Grammar. In A. Roca & J. Jensen (eds.), *Spanish in contact: issues in bilingualism*, pp. 203–226. Somerville, MA: Cascadilla.
White, L. (1989). *Universal Grammar and second language acquisition*. Philadelphia: John Benjamins.
Woolford, E. (1983). Bilingual code-switching and syntactic theory. *Linguistic Inquiry*, 14, 520–536.
Zagona, K. (1988). *Verb phrase syntax: a parametric study of English and Spanish*. Boston: Kluwer Academic.

Appendix: abbreviations used in glosses

1S	first person subject agreement (unspecified for number)
1Ss	first person singular subject agreement
2S	second person subject agreement (unspecified for number)
3Os	third person singular object agreement
3S	third person subject agreement (unspecified for number)
3Ss	third person singular subject agreement
ACC	accusative clitic
DUR	durative morpheme (like Spanish *-ando* or Nahuatl *-toc*)
FUT	future tense
IN	Nahuatl determiner *in*, similar to English *the* or *a*
INF	infinitive marker
NOM	nominative clitic
NSF	noun suffix (sometimes called absolutive)
PAST	past tense
PL	plural marking (on nouns or verbs)
POSS	possessive
REF	reflexive clitic or pronoun
SING	singular
TAG	tag element
TOPIC	topic marker
VSF	verb suffix

Received September 23, 1998 Revision accepted September 9, 1999

https://doi.org/10.1017/S1366728900000122 Published online by Cambridge University Press