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CODE SWITCHING IN URBAN WOLOF: A CASE FOR VIOLABLE CONSTRAINTS IN SYNTAX*

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ABSTRACT: Urban Wolof (UW) is an instance of Wolof-French code-switching (CS). On the basis of a new corpus of conversations collected in Senegal we present evidence that UW fits nicely into the cross-linguistic CS typology, once syntactic constraints on CS are construed as violable, as proposed in Optimality Theory (Prince & Smolensky [1993]/ 2004). Basically, UW is a striking case of CS in which a single lexical word in one language may occur with a functional category from the other in violation of well-known CS constraints such as the Functional Head Constraint (Belazi et al. 1994), and the Free Morpheme Constraint (Poplack & Meechan 1995). In particular, UW permits DPs consisting of a French lexical noun immediately followed by a Wolof determiner as well as French lexical verbs immediately followed or preceded by Wolof inflection. We argue against an alternative Minimalism-based approach which places CS at the syntax-PF interface (MacSwan, 2009), showing that phonologies of Wolof and French are mixed in UW, contrary to prediction. We also present evidence that the inviolability of relevant CS constraints cannot be saved by reanalyzing the 'exceptional' patterns of UW as borrowings.
KEYWORDS: Urban Wolof; code switching; typology; borrowings.

1. INTRODUCTION

Code switching (CS) is generally defined as the mixing of two languages in a bilingual situation (Poplack 1980), as shown in (1) for English-Spanish CS:

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(1) English-Spanish (Pfaff 1979)

El perro chewed him up.

'The dog chewed him up'

Well-attested cross-linguistically the phenomenon appears to be constrained – not every possible intermixing of a pair of languages is allowed within a sentence. However, a certain amount of variation in CS patterns has already been documented cross-linguistically. A satisfactory account of CS thus raises (at least) the following theoretical questions: First, can an account be provided in terms of general principles of the grammar that are independent of CS, namely the principles of UG known to govern any natural language or does it require principles at work when two languages get mixed? Second, should the principles – be they CS-specific or CS-independent – be construed as violable or not? In this paper, we defend the view that principles governing CS cross-linguistically should be CS-specific and violable (see also Bhatt 1997). We ground our proposal in an analysis of an understudied case of CS -- Urban Wolof -- and we further argue that an optimality-theoretic approach to constraint interaction allows us to characterize CS patterns from a typological perspective.

Urban Wolof (UW) is a mixture of Wolof, a West-Atlantic Niger-Congo language, and French that is spoken in the cities of Senegal. Proficient urban bilinguals code switch unconsciously in everyday speech (Swigart 1993). French is the official language as well as the language of instruction in school, while Wolof is the most prominent national language. UW has two varieties: Wolof-dominant ('Wolof-French') is by far the most prevalent, while French-dominant ('French-Wolof') is spoken far less often and comprised too small of a percentage of the available corpus to be analyzed.[3] This paper is restricted to Wolof-French which is exemplified in (2). Individual morphemes are labeled for language to convey a better sense of the phenomenon under discussion.

(2) a. Hesiter$_F$-wo$_W$-ma$_W$ dee$_W$!
V -neg- 1sg emphatic
"I didn't *hesitate*!"

b. Blaguer$_F$-léén$_W$!
V imp=pl
"Joke!"

[3] Collected by the second author during the summer of 2007, the corpus of UW data comprises recorded conversations of about 1500 utterances between four bilingual speakers in Thies, Senegal (the third largest city in the country). The corpus also includes elicited grammaticality judgments and recordings from a native speaker of UW. All UW examples come from this corpus. The precise characterization of what it means for CS to be dominant in one language is delayed until Section 4.1. For now it suffices to note the contrast between French lexical verbs and Wolof functional morphemes in (2).

The paper is structured as follows. Section 2 introduces the theoretical debate regarding the need to appeal to CS-specific constraints. Section 3 focuses on specific properties of UW and two distinct preparatory steps to its formal optimality-theoretic analysis: i) empirical evidence for CS-specific constraints grounded in the differences between UW patterns and those of other language pairs that appear to follow the universal constraints set forth by other scholars; and ii) distinguishing CS from borrowings, leading to the conclusion that the UW patterns are to be analyzed as genuine instances of CS, not borrowings. It is worth noting that CS in UW has scope over syntax, morphology, and phonology and our discussion will address relevant aspects of all. Section 4 presents our Optimality Theory proposal for UW as well as for the typology of CS more generally. Section 5 offers a brief conclusion.

2. The theoretical debate

Within broadly construed generative approaches of the bilingual phenomenon, CS has traditionally been analyzed in terms of CS-specific constraints in the sense that the constraints explicitly or indirectly refer to the mixing of distinct languages in CS. Consider, for example, three well-known constraints from the CS literature:

(3) a. *Equivalence Constraint* (Poplack 1980): Switching is free to occur only between sentence elements that are normally ordered in the same way by the monolingual grammars in contact.

b. *Free Morpheme Constraint* (Sankoff and Poplack 1981): A switch may not occur between a bound morpheme and a lexical form unless the latter has been phonologically integrated into the language of the bound morpheme.

c. *Functional Head Constraint* (Belazi et. al. 1994): 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.

What these constraints achieve respectively is i) ban CS if surface structures of two languages do not map onto each other, ii) ban CS word-internally between a root and an affix, and iii) ban CS between a functional head and its complement. While ‘language features’ such as [+English], [+Spanish] of the FHC may well be subsumed under formal features e.g. in the Minimalist Program (MacSwan, 1999) and thus need not have the status of primitives in a theory of CS, the EC, the FHC and the FMC are stated as constraints on switching requiring some matching of two languages; presumably these constraints do not apply (or are vacuously satisfied) in monolingual speech. In that general sense they are CS-specific.

In contrast to such an approach, MacSwan (1999, 2005, 2009) argues for the need to derive descriptive CS generalizations from general principles of the grammar that are *independent* of CS. In particular, he claims that bilingual speech is subject to a general ban against CS in head-internal and head movement contexts resulting in the impossibility of attaching inflectional morphemes of one language to a root/stem in another language, and following Chomsky (2000, 2001) assumes that head movement is a phonological operation. Examples in support of the descriptive generalization which underlies his analysis include language pairs such as Spanish-English from MacSwan (1999) and Tunisian Arabic-French from Belazi (1994) in which CS is precluded word-internally and in head movement contexts.

(4)	a. Spanish-English	b. Tunisian Arabic-French
	*Juan está *eat*- iendo.	*Ana ma *l'aime*- š.
	N 3sg V- DUR	1sg neg 3sg-V- neg
	'Juan is *eat*ing'	'I don't *like it*'

MacSwan proposes to derive this descriptive generalization from design constraints imposed by the phonological system itself. Once phonological systems are construed as strict hierarchies of conflicting constraints (as in OT, Prince & Smolensky [1993]/2004), MacSwan reasons, bilingual speakers must have separately encapsulated phonological systems to avoid ranking paradoxes. This, in turn, entails that phonological systems may not mix head-internally or in head movements contexts. The relevant properties of the phonological system he assumes are spelled out as the PF Interface Condition in (5).

(5) *PF Interface Condition* (MacSwan, 2009)

i. Phonological input is mapped to the output in one step with no intermediate representations.

ii. Each set of internally ranked constraints is a constraint dominance hierarchy, and a language-particular phonology is a set of constraint dominance hierarchies.

iii. Bilinguals have a separately encapsulated phonological system for each language in their repertoire in order to avoid ranking paradoxes, which result from the availability of distinct constraint dominance hierarchies with conflicting priorities.

iv. Every syntactic head must be phonologically parsed at Spell Out. Therefore, the boundary between heads (words) represents the minimal opportunity for code switching.

Crucial to MacSwan's analysis is his Lexicalist approach to the lexicon-syntax interface, as formulated within the Minimalist Program (Chomsky 1995). Word Formation of complex heads (e.g. a verb and its inflectional morphology) takes place in the Lexicon pre-syntactically; syntax manipulates the 'opaque' outcome of Word Formation under Checking Theory. At Spell-Out, the complex head is sent to the Phonological Component for phonological interpretation. The Lexicon is the repository of the language specification for each word entering the computation along with parameters relevant to the computation.[4] For CS, this means that each word comes 'pre-labeled' as belonging to Language X or Y, which determines its formal feature strength and therefore its syntactic properties. Because the Lexicon is the traditional repository of 'arbitrariness', adding a language specification to lexical items is not equivalent to imposing a CS-specific constraint or principle.[5]

To the extent that it is successful, MacSwan's proposal offers an elegant account of CS without appealing to CS-specific constraints, contra Sankoff and Poplack 1981, Belazi et al. 1994, and others. Moreover, MacSwan characterizes CS fully in the phonological component without recourse to syntactic constraints proper, leaving invariant the computational component of the grammar. However, this paper will present CS data from UW that challenges the PFIC-based account on several grounds. First, the ban on CS in head movement contexts is descriptively invalidated by UW: Examples in which a root from one language (French) is combined with an affix from another language (Wolof), are grammatical and highly common in spontaneous UW speech. Second, the claim that phonologies cannot be mixed in a head-movement context is also invalidated. We show, in particular, that a French root vowel can trigger ATR vowel harmony on a vowel in a Wolof suffix. Third, unlike some other apparent counter-examples discussed in MacSwan (2005), the UW affixes are word-level rather than phrasal (the latter status would exempt them from the PFIC restriction on

[4] MacSwan (2009) explicitly rejects post-syntactic lexical insertion on grounds that 'The structure could not be sensitive to which language contributed a specific lexical item until the end, when lexical insertion occurred, but the language contributing the lexical item appeared to have strong consequences for the syntactic structure at the onset'.

[5] Although we do not pursue the idea further here, we note that Lexicalism has been declared 'dead, deceased, demised, no more, passed on…' by Alec Marantz on solid grounds pertinent to monolingual grammars and hence all grammars (Marantz 1997:202). Rather, we make the same assumption as MacSwan in our presentation of the UW data.

CS). Finally, we present data that show violations of the PFIC in UW cannot be analyzed as borrowings rather than examples of genuine CS.

This is not to say that we can simply adopt the 'traditional' approach grounded in CS-specific syntactic constraints like (3a)- (3c). UW violates all three constraints! This will lead us to formulate a number of novel constraints and adopt an optimality-theoretic perspective with regard to their interaction.

3. Why CS-specific constraints are needed

3.1 CS in head movement contexts in UW

The structures of particular interest in UW are definite DPs on the one hand and the syntactic expression of aspect on the other. In both instances Wolof and French display reverse patterns. In Wolof DPs, the D head (a free morpheme) follows its complement NP, whereas in French D precedes NP. This is shown in (5). Both languages convey aspect by means of either a synthetic structure (aspectual inflection is affixed to V) or a periphrastic structure using an auxiliary (*d-* in Wolof, *être/avoir* 'be/have' in French) to which verbal inflection is attached. However, Wolof uses a synthetic structure to express perfective aspect (6a) and a periphrastic structure to express imperfective aspect (6c). French does exactly the opposite (6b) vs. (6d). Finally, both French and Wolof show overt V→I movement (Pollock 1989, Torrence 2003), and we assume that the two languages have the same strong feature specification triggering movement.

		Wolof		French
(5)	a.	Jigeen ji	b.	La femme
		N det		det N
		'the woman'		'the woman'
(6)	a.	Dem- oon naa.	b.	Je suis allé.
		V past 1sg		1sg aux V
		'I went'		'I went'
	c.	D- oon- naa- dem.	d.	J'all- ais.
		imp past 1sg V		1sg/V 1sg/imp
		'I was going.'		'I was going.'

The first problem that UW data poses to MacSwan's theory is that CS may occur in a head-movement context, in violation of the descriptive generalization underlying (5). It is common for a Wolof inflectional affix, such as tense, negation, or subject agreement, to attach to a French verb root in the infinitive form, as in (7):

(7) a. *Developper*- wu- ñu- ko.
V neg 3pl 3sgO
'They do not *develop* it'

b. *Monter*- woon- naa.
V past 1sg
'They do not *develop* it'

c. Kenn du- *comprendre.*
N neg V
'No one *understands*'

The (grammatical) examples in (7) are identical to the ungrammatical Spanish-English examples in MacSwan's work (2000, 2005) that involve pre-syntactic affixation. In the Wolof literature (Torrence 2003, Zribi-Hertz & Diagne 2002, Diouf 1985) the inflectional markers for tense, negation, finiteness,[6] and subject agreement are uncontroversially described as word-level affixes. In (7) they are bound to the French infinitive root and therefore contained in the same head.

Wolof is a null subject language, with subject agreement obligatorily indicated by verbal inflection. In the presence of a full DP a subject agreement affix, such as *–ñu* in (7a), must occur (Torrence 2003), indicating that the affix is an inflectional marker and the lexical subject is not a dislocated topic. This confirms that these affixes are person and number markers which are left-attached to the verb.

(8) Xale- yi lekk- oon- na- ñu ceeb- bi. (Zribi-Hertz & Diagne 2002)
N det=pl V past finite 3pl N det=sg
'The children had eaten the rice'

The order of word-level affixes in a particular aspectual context is fixed. In particular, the subject agreement affix is the last affix in the cluster consisting of tense-finiteness-subject agreement (in independent, affirmative clauses). There is general agreement in the Wolof literature that the subject agreement affix is strictly a word-level affix (Diouf 1985, Zribi-Hertz & Diagne 2002, Torrence 2003). This entails that any affix preceding it must also be a

[6] Zribi-Hertz & Diagne (2002:829) analyze *-na* in (8) as an inflectional affix hosting a person marker typically occurring in independent affirmative clauses and label it as [+finite].

word-level affix. In particular, the tense marker -(w)*oon* is a word-level affix, appearing immediately following the verbal root (this bound morpheme will become particularly relevant to the discussion of vowel harmony in Section 3). In non-lexicalist accounts of pure Wolof such as Zribi-Hertz & Diagne (2002) and Torrence (2003), -(w)*oon* is the head of TP, confirming its participation in successive head movement. Similarly, the negative affix –*(w)u(l)* in (7a) is placed between the verb and the subject agreement in perfective clauses. In imperfective clauses, it is found between the imperfective marker *d(i)-* and the subject agreement. The negative affix is classified as head-internal in both types of clauses, and undergoes head movement along with the subject agreement and tense markers (Torrence 2003).[7]

The distribution of the tense morpheme *woon* turns out to be a bit more complex than described above and at first glance might even provide a solution to the problem for the PFIC. In perfective negative contexts such as (9b) the negative affix has the effect of 'displacing' –*(w)oon* which then surfaces as a free morpheme appearing outside the word-level affix cluster.

(9)	a. Dem- oon- naa. V past 1sg 'I went'	b. Dem- u- ma woon. V neg 1sg past 'I did not leave'

According to Zribi-Hertz & Diagne (2002) the 'free' *woon* may be analyzed as a phrasal affix, placed in specTP, and uninvolved in head movement. If affixal –*(w)oon* were to be also analyzed as a phrasal affix in (9a) then the PFIC would be saved because it constrains word-level affixation but not phrasal affixation. (See MacSwan (2005) for discussion of the phrase- vs. word- level distinction.)

There are several reasons to reject a universal phrasal affix analysis for –*(w)oon* and its quasi-homophonous *woon*: (i) –*(w)oon* precedes other affixes that are uncontroversially head-internal, as discussed above; (ii) Unlike its 'displaced' counterpart, affixal –*(w)oon* loses its initial glide [w] when preceded by a consonant, providing phonological evidence for two distinct affixes or two distinct structural positions; (iii) It is even possible for both forms to be

[7] Wolof has another class of affixes that includes object clitics (*ko*, as in (7a)) and locative clitics (*ci*). Torrence (2003) characterizes them as clitics because, unlike subject agreement word-level affixes, object clitics are in complementary distribution with overt (object) DPs. Zribi-Hertz & Diagne (2002) suggest that they may be analyzable as phrasal affixes. Note that these phrasal affixes form a cluster with a strict internal order that excludes subject markers, and have a different distribution than subject or tense markers.

used in the same phrase to emphasize the past tense. This shows that the two quasi-homophonous elements can appear at once in two distinct structural positions: head-internal vs. specifier position.

(10) Xale- yi d- **oon-** u ñu **woon** lekk ceeb- bi. (Zribi-Hertz & Diagne 2002)
N det=pl imp past neg F/3pl past V N det=sg
'The children would not have eaten the rice in the past'

All evidence thus points to the conclusion that Wolof has two types of *woon,* identifiable both syntactically and phonologically.[8] Only the word-level affix *–(w)oon* is relevant to the ban on head-internal CS. Because the Wolof subject agreement, negative, and tense affixes are pre-syntactic and are contained in the same head as the French verb root, we conclude that the ban on head-internal CS underlying the PFIC is violated by UW data.

3.2 VOWEL HARMONY IN CS AND THE MIXING OF PHONOLOGIES

The second problem that UW poses for the PFIC is that two separate phonologies co-exist in UW, as shown by (i) the preservation of segmental properties in the French root combined with the segmental properties of Wolof in inflectional morphemes; and (ii) the presence of vowel harmony between French and Wolof components. Discussion of the preservation of both sets of segmental properties is postponed until Section 3.3 where the question of an alternative analysis of UW forms as instances of borrowing is taken up.

One of the many phonological differences between French and Wolof is that Wolof displays a system of vowel harmony. Vowel harmony is a type of assimilation in which vowels come to agree on a phonological feature (e.g. backness or height) within the word or (phonological) phrase. Wolof harmony is based on the ATR (advanced tongue root) feature. The vowel system of the language, including specifications for ATR, are given in Table 1 (based on Ka 1994).[9]

[8] The dual status of an affix is attested in other languages. As discussed in Legendre (2000), the monosyllabic Romanian adverb *mai* 'again' behaves like a word-level affix in some contexts, e.g. sandwiched between the negative prefix *ne-* and the verbal root in (i) but like a phrasal affix (or clitic) in other contexts, e.g. in the presence of other proclitics forming a cluster: *să – nu – o – mai - fi in* (ii).
(i) Ne-mai-văzîndu-l (ii) Să nu o mai fi văzut
Neg-**adv**-seeing-him SUBJ neg her-ACC **adv** be seen
'Not seeing him again' 'that (I) should not have seen her again'

[9] Note that although Wolof orthography can reflect the ATR value of a vowel by placing an acute accent over [+ATR] vowels, this does not always occur (see (11a).

[+ATR]	[-ATR]
i	-
i:	-
u	-
u:	-
e	ɛ
e:	ɛ:
ə	ɑ
-	ɑ:
o	ɔ
o:	ɔ:

Table 1: Wolof Vowels and Allophones

Wolof roots harmonize according to the ATR distinction: putting aside systematic effects of transparency and opacity[10], all vowels in a root will come from one of the columns, as illustrated in (11). Wolof vowel harmony is progressive: The ATR value of the initial vowel determines the ATR value of all subsequent vowels.

(11) a. beeco 'small skirt' b. foxoj 'to sprain'
[be:dʒo] [+ATR] [fɔxɔj] [-ATR]

Wolof vowel harmony is not restricted to roots. When a suffix with a mid vowel is added to a root, the ATR value of the root determines the ATR value of the suffix vowel. For example, the post-verbal past tense marker *woon* has the forms [wɔ:n] and [wo:n]; the post-verbal plural imperative marker *leen* may appear as [lɛ:n] or[le:n], and the demonstrative *boobu* has the forms[bɔ:bu] and [bo:bu]. While the tense and aspect markers are considered attached to the verb, it is difficult to posit the same analysis for the demonstrative marker, since it can be separated from the noun by an adjective or a relative clause. Therefore, Ka

[10] Not all vowels participate fully in this process. the [+ATR] high vowels [i] and [u] are 'transparent'; they trigger harmony when in the first vowel position of the word, but otherwise do not undergo or block harmony. The low [-ATR] vowel [ɑ] is opaque; it does not undergo [+ATR] harmony from the left and triggers rightward [-ATR] harmony (Ka 1994).

(1994) has identified the domain of Wolof vowel harmony to be the *phonological phrase* rather than the word.

If vowel harmony were present between French and Wolof elements in UW, it would mean that CS is taking place within a phonological phrase—and, in the case of IPs, within a word. UW data include many examples of switching between a French root and Wolof alternating suffixes, as in (12). Evidence that the suffixes are harmonizing to the root would be a violation of the PFIC.

(12) a. *pomme* boobu — 'that *apple*'
b. *faire*-leen — '*make*!'
c. *peser*-woon — '*weigh*ed'

While vowel harmony between the French root and Wolof suffix is audible in most cases quantitative evidence was obtained to preclude objections to our methodology. One acoustic correlate of ATR specification is the value of the first vowel formant (F1). We first determined an F1 range for each vowel. As shown in Table 2, the [+ATR] vowels are usually distinguished from their [-ATR] counterparts by at least 100Hz (consistent with the data reviewed in Hayward 2000).

[+ATR]	F1 range (Hz)	[-ATR]	F1 range (Hz)
i	250-450	-	-
u	250-450 (550)*	-	-
e	400-550	ɛ	500-650
ə	350-600	ɑ	(insufficient data)
o	400-550	ɔ	700-900

Table 2: F1 Ranges of Wolof Vowels

The approximate F1 values in Table 2 were taken from pure Wolof recordings of a native speaker of UW and Wolof. It is clear that the [+ATR] vowels generally have lower F1 values than the [-ATR] vowels; however, as in the case of [□] and [ə], it is possible for the F1 value of the [-ATR] allophone of one vowel to be lower than the value of the [+ATR] allophone of another vowel because it is only necessary that a [+ATR] F1 value be lower than its own [-ATR] counterpart. It is important to determine the F1 range for each vowel so that an accurate ATR value can be given to the vowels in the UW data. Note that [e] and [□] appear to overlap in their F1 range. In unclear cases, some judgment has been used to differentiate between the

+/- ATR vowels, relying on the value of the other vowels and the other sample of the same word.

With some exceptions, most likely attributable to experimental error, most of the data showed clear vowel harmony between the French root and the Wolof suffix. Table 3 gives several examples of +/- ATR vowel harmony.

Wolof	*Translation*	*V1: F_1*	*V2: F_1*	*V3: F_1*	*Vowel Harmony*
a. **pomme boo**bu [pɔm bɔ:bu]	'that apple'	717.76	661.87	-	-ATR
b. **faire-leen** [fɛr le:n]	'make!'	674.41	711.57	-	-ATR
c. **peser-woon** [pəse wo:n]	'weighed'	436.81	546.24	616.93	+ATR
d. **peser-leen** [pəse le:n]	'weigh!'	420.92	424.61	465.94	+ATR

Table 3: Vowel Harmony in UW

Table 4 gives a summary of the results for the three types of phrases that were measured. Error was recorded when the data showed an extreme inconsistency between one vowel and the vowel in the other sample of the same word.

%	*Pure Wolof DPs (28)*	*UW IPs (62)*	*UW DPs (32)*
[+ATR]	28. 6	87.1	68.7
[-ATR]	35.7	3.2	18.7
no harmony	28.6	3.2	6.3
error	7.1	6.5	6.3

Table 4: Vowel Harmony Summary

Note that the UW IP data include only one example of [-ATR] harmony because the French infinitive endings *-er* [e], *-ir* [i], and *–re* [ə] are always [+ATR]. Because French does not have vowel harmony and the French words have not been phonologically integrated into Wolof, the French roots do not always show harmony within the word. Instead, the Wolof vowel takes its ATR feature from the final French vowel. The only verbs that would trigger [-ATR] harmony are [-ATR] irregular verbs such as *faire*.

Although there are some exceptions in the data, it is apparent that vowel harmony is present between Wolof and French components as often as it is present in pure Wolof words.

In UW, CS exists within a phonological phrase: the Wolof affixes must look to the French roots in order to determine their own ATR value, implying that a single phonological system must have simultaneous access to vowels in morphemes from two different languages. This is a clear violation of the PFIC.

3.3 BORROWINGS VS. CS

A pervasive issue in the study of bilingual speech concerns the necessity of distinguishing true CS, by definition restricted to bilinguals, from borrowings which are not (Swigart 1993). Borrowings are sometimes defined as fully *phonologically* and *morphologically integrated* into the source (dominant) language (MacSwan, 2009; Poplack 1980). Expanding the definition to include morphological integration, such as the addition of a source language affix, effectively makes these researchers' bans on word-internal CS *unfalsifiable*, if every word-internal switch must be considered a borrowing. In fact, Poplack & Meechan (1995) use this strategy to reign in UW by arguing that multi word fragments like *même*$_F$ *âge*$_F$ *bi*$_W$ 'the same age' are instances of borrowings, based solely on their own Equivalence Constraint (1980).

Taking the position that borrowings are characteristic of monolingual speech (Pfaff 1979), and that monolinguals would be unable to pronounce words in a foreign language, this paper defines borrowings as phonologically integrated into the source language (see also Di Sciullo et al. (1986), Stenson (1990), Halmari (1997)[6], Bhatt (1997), Bolonyai (2005)).

The phonological differences between French and Wolof, shown in Table 5, help to distinguish between borrowings and true code switches in UW.

Trait	***Wolof***	***French***
Vowel harmony	√ [ATR]	*
Consonant clusters	*	√
Nasal vowels	*	√
Post-alveolar fricatives	*	√
Front rounded vowels	*	√

Table 5: Wolof vs. French Phonologies

Because of the extensive historical contact between France and Senegal, French has loaned many words to Wolof. These borrowings have been systematically 'wolofized' (McLaughlin 2001): they are phonologically indistinguishable from Wolof words, monolingual speakers do not identify them as French words, and they are listed in dictionaries as Wolof words (Diouf 2003). Table 6 shows a list of the phonological characteristics of French borrowings into Wolof in the two left-hand columns. Borrowings show evidence of de-nasalization, vowel epenthesis, and other segmental processes indicative of phonological integration into Wolof. By contrast, the right-hand column shows a sample of UW words characteristically lacking such integration. Contra Poplack & Meechan (1995), this means that the UW examples above are valid examples of head-internal switches and cannot be dismissed as instances of borrowings.

Senegalese French[11]	*Wolof*	*English*	*UW (French phonology)*
[pɔmdətɛɾ]	[pɔmbıtɛɾ]	"potato"	du-*comprendre* 'does not understand'
[ʃəmiz]	[simis]	"shirt"	*engager*-wu 'not interested'
[ʒœn]	[sən]	"youth"	*jeune* yi 'the youth'
[byɾo]	[biɾo]	"office"	*bureau* bi 'the office'
[militɑ̃]	[militaŋ]	'militant'	*commencer*-guma 'I did not start'
[pɾogɾese]	[poɾogeɾeze] (+ATR vowel harmony)	'make progress'	moom-dafa-*progresser* 'she progressed'

Table 6. UW Borrowings vs. Code Switches

The French roots described show no evidence of phonological integration into Wolof, and therefore must be considered true code switches rather than borrowings. This means that the UW examples above are valid examples of head-internal switches, violating the PFIC.

3.4 SUMMARY: WHAT NEEDS TO BE EXPLAINED

What is striking about UW is that, in contrast with several other language pairs, it allows CS between bound morphemes and after functional heads. Table 7 displays the different types of switching that are allowed in UW. In particular, UW allows switching

[11] We are abstracting away from the fact that most speakers of Senegalese French do not have the voiceless uvular fricative [ʁ] in their register, and instead use the alveolar flap [ɾ]. See Swigart (1993) for a full description of Senegalese French.

between functional heads (D, I, C, Neg) and their complement, NP, VP, IP, and VP, respectively.

Type of CS	*Wolof-French*	*Example*
D#NP	√	**Am na *affaires* yi. 'There are the *affairs*.'**
I#VP	√	**Mo-ko-*arranger*. 'He *arranges* it.'**
Neg#VP	√	*Developper*-wu-ñu-ko 'They do not *develop* it.'
C#IP	√	*Le garçon veut que* mu and ak moom. 'The boy wants *her to go with him*.'
NP_S#I	*	
V#NP_O	*	
Neg#I	*	

Table 7: Wolof-French CS Possibilities

The highly frequent occurrence of head-internal CS in UW thus violates (at least) three well-known constraints stated as universal in scope and designed to prohibit exactly such switching: the Equivalence Constraint (3a, Poplack 1980), the Free Morpheme Constraint (3b, Sankoff & Poplack 1980), the Functional Head Constraint (3c, Belazi et al. 1994), as well as MacSwan's PF Interface Condition (2009) whereby the boundary between heads (words) represents the minimal opportunity for CS. UW is not alone in allowing head-internal switching, however. Many other language pairs, including Finnish-English (Halmari 1997), Ewe-Kabiye (Essizewa 2007), Lingala-French (Bokamba 1988), Moroccan Arabic-French (Bentahila & Davies 1983), and Hungarian-English (Bolonyai 2005), permit the type of CS explicitly prohibited by one or more of the putatively universal constraints in (3). Either we must reject the view that there are universal constraints governing CS or a new perspective on *constraint interaction* is needed to account for conflicting data between language pairs. Below we argue for the second approach and make a specific proposal relying on universal but *violable* constraints that is implemented in OT (Prince & Smolensky [1993]/2004; Legendre et al. 2001).

4. AN OT ACCOUNT

If intra-sentential code switching were truly unconstrained, then we would expect to see random switching resulting in a tremendous amount of variation. This is not the case. What we find instead is that native code switchers have strong intuitions as to what are and are not grammatical patterns of CS in their bilingual speech. Yet UW (and a number of other language-pairs which behave alike) is relatively *un*constrained compared to some other language pairs which allow switching in fewer places.

We propose that CS is governed by a small set of universal but highly conflicting constraints. Each language pair potentially ranks these constraints differently, accounting for cross-linguistic variation, so that a constraint that is violated by one language pair is simply ranked lower than it is in the other language pairs that it governs. See Bhatt (1997) for an independently motivated proposal along similar lines.

Specifically, CS *emerges* from the resolution of conflicting constraints. For example, one constraint may favor expressing functional categories in the source language of a phrase, while another favors lexical categories in the non-dominant language, thereby achieving maximal CS. Because CS is only an option for bilinguals—they are never forced to use both languages in a particular phrase—there must also be a constraint favoring the expression of every category in a single language.

Formally, the conflict amongst universal constraints is resolved by different constraint rankings in different language pairings. This means that constraints are violable (and ranked differently) as proposed in Optimality Theory (Prince & Smolensky [1993]/2004; Legendre 2001).

In an OT analysis, it is necessary to specify an Input, a Candidate Set of possible Outputs or structural realizations of that Input, and a set of Constraints against which each candidate Output is evaluated on a pair-wise basis.[12] For CS, the input must specify the source language (which we assume is the language of I(nflection), following Myers-Scotton 1993), and the language of all lexical items (akin to MacSwan's numeration). The candidate set consists of all possible permutations of a phrase between the two languages. For CS within an IP, for example, a candidate set includes all permutations of word order, verbal structure, and language label. The set of constraints needed to account for CS is motivated in the next section. The crucial point here is that the burden of explaining cross-linguistic variation in CS lies in *constraint interaction*, not in the constraints themselves. This goes against the standard view that constraints to CS are universal and inviolable (Belazi et al. 1994; Poplack 1980; etc.).

[12] The crucial step of any OT analysis specifying the Input and the Candidate Set is missing in Bhatt (1997). As a consequence his analysis does not exploit Input-Output faithfulness constraints.

4.1 CONSTRAINTS ON CS

A review of existing case studies reveals strong asymmetries between any two languages entering CS cross-linguistically, which in turn enables us to formulate a small set of universal but re-rankable constraints on CS. We discuss each asymmetry in turn.

The first one is that there is a fundamental difference between the two languages in a code switched phrase: there is a 'source' language (SL) and an 'other' language (OL). The SL is the language with the greatest number of morphemes, the source language in a phrase (cf. Myers-Scotton 1993). In Wolof-French, Wolof is the SL. The SL can be clearly identified in most CS phrases across language pairings.

This basic asymmetry is a cross-linguistic phenomenon. In documenting the pairing of two African languages, Ewe and Kabiye, Essizewa (2007) differentiates between the Kabiye-dominant and Ewe-dominant forms. The morphemes of the OL are specified in (13a-b).

(13) a. Kabiye-Ewe (Essizewa 2007)

Tási$_E$ héyi-m se e-*tʃi*$_E$-u bée sɔnɔ́.

sister.in.law tell-me that she-stay-IMPERF there today

'Sister in law told me that she will stay there today.'

b. Ewe-Kabiye (Essizewa 2007)

Ke é-le po nu na mi-a, *wɪ́sɪ*$_K$ *káŋ*$_K$*-ta*$_K$, gake e-tɔte ɖe ŋdɔ kusugbe.

when he-be say word to us-DEF *sun very-in* but he-stand in sun very

'When he was speaking to us, it was very sunny, but he was in it.'

The SL frequently changes within a conversation, but may only change between IPs, indicating the need to specify the SL at the clausal level only.

(14) UW :

Wolof$_{SL}$-French , French$_{SL}$-Wolof

Defuma-wat *cassette* bi, mais j'ai pris le temps encore de réflechir *tuti bal*.

"I didn't reset the *tape*, but I still took the time to think *a little*."

Different constraints appear to be high-ranked in a language pairing depending on which language is the SL. For example, Wolof-French appears to allow different types of code switching than French-Wolof. The SL must therefore be specified in the input to optimization, and instances of CS must be analyzed at the clausal level.

The second asymmetry is that there is a tendency for functional categories to be in the SL, while lexical categories tend to appear in the OL. This ensures maximal code switching in a bilingual situation. We have therefore identified two constraints which are formulated as Input-Output faithfulness constraints.

(15) Input-Output faithfulness constraints

a. FAITHFUNC: Functional categories belong to the language specified as SL in the input.

b. FAITHLEX: Lexical categories belong to the other language.

In Wolof-French, FAITHFUNC is satisfied but FAITHLEX may be violated, as shown in the examples below:

DP 'The affairs'	**IP** 'They crossed it'	**FAITHFUNC**	**FAITHLEX**
(16a) *Affaires* yi N D	(16b) *Traverser*-nañ-ko V I	√	√
(17a) Afeer yi N D	(17b) Galan-añ-ko V I	√	*

Wolof-French speakers have two options in any particular phrase: they can either code switch, as in (16), or they can speak in Wolof only, as in (17). While FAITHFUNC is satisfied either way, FAITHLEX is violated when speakers use only Wolof in a phrase. We return to the optionality of CS below (Section 4.2.1).

The third asymmetry is that CS within IP and DP may not be identical for a given language pair. In some language pairs, CS is possible within DP but not within IP. Table 8 provides a sample of variation between language pairs involving a Romance language. CS is possible within DP in every language pair, but impossible within IP in Spanish-Hebrew and Spanish-English.

Language Pair	CS within DP	CS within IP
Wolof-French (Schindler corpus 2007)	√	√
Italian-French (DiSciullo et.al 1986)	√	√
Lingala-French (Bokamba 1988)	√	√
Spanish-Hebrew (Berk-Seligson 1986)	√	*
Spanish-English (Pfaff 1979)	√	*
Moroccan Arabic-French (Bentahila & Davies 1983)	√	√

Table 8: Sample of Romance-based CS variation within DP vs. IP

If CS may vary across DP and IP within a language pair, separate constraints are needed. DP and IP are related in that they comprise the extended projection of a lexical category, which Grimshaw (1991) and Abney (1987) have defined as a collection of functional heads that dominates that category. Using the concept of extended projection, we propose two domain-specific markedness constraints which favor not switching. This sets up a conflict with the previous two constraints, FAITHFUNC and FAITHLEX.

(18) Markedness constraints

a. PUREEXTPROJ$_V$: The extended projection of V (V and I) belongs to a single language.

b. PUREEXTPROJ$_N$: The extended projection of N (D and N) belongs to a single language.

Wolof-French violates both PUREEXTPROJ constraints because it allows CS between V and I and between D and NP. Spanish-Hebrew, on the other hand, violates only PUREEXTPROJ$_N$ because CS is prohibited between V and I.

A fourth and final asymmetry characteristic of intra-sentential CS cross-linguistically is that word order has a strong tendency to follow the language of the functional head. UW presents an interesting case for this because French and Wolof have reverse word order patterns for both DPs and IPs.

(19) Definite DPs

a. *Wolof:* jigeen ji
N det
"the woman"

b. *French:* la femme
det N
"the woman"

In definite DPs, the Wolof determiner follows the noun (19a), while the French determiner precedes it (19b). More interesting still is the expression of aspect in the two languages. The French perfective aspect makes use of a periphrastic structure composed of an auxiliary followed by the verb (20b), while the Wolof perfective is synthetic (20a). In the imperfective aspect, however, the pattern is reversed: Wolof uses a periphrastic structure (20c) while the French structure is synthetic.

(20) Aspect in VPs: Synthetic vs. Periphrastic Structure

Perfective: "I went"

a. *Wolof:* Dem-oon-naa	b. *French:* Je suis allé
V -past -1sg	1sg AUX V
(*Synthetic*)	(*Periphrastic*)

Imperfective: "I was going"

c. *Wolof:* D-oon-naa dem	d. *French:* J'all-ais
AUX-pst-1sg V	1sg V imp+1sg
(*Periphrastic*)	(*Synthetic*)

With such strong differences in structure, it is clear that UW is predicted impossible by the Equivalence Constraint (Poplack 1980), which states that CS will occur only at sites where the surface structure is the same in both languages.

From the examples in (16)-(17), we can see that UW word order follows the language of the functional head, D and I, respectively. This motivates one other structural constraint, related to one proposed in Bhatt (1997).

(21) Markedness constraints (cont'd)

HEAD-SYNTAX: Word order follows that of the language of the head.

(22) a. *affaires* yi b. *yi *affaires* "the affairs"

(23) a. *monter*-woon-naa b. *woon-naa-*monter* "I set it up"

In summary, our analysis relies on two Input-Output faithfulness constraints (a unique feature of OT), one word order constraint, and a constraint on the language of extended projections relativized to particular domains such as DP and IP. What remains to be shown in how these constraints interact to predict observable patterns cross-linguistically, starting with UW.

4.2 OPTIMIZATION

The left hand column of table 9 below lists the set of Output candidates for a DP, consisting of all possible realizations of an Input: the DPs vary in word order and source language. The right hand column shows which constraints are violated by each candidate.

Candidates	Violates
a. D_{SL} NP_{OL}	FAITHLEX, PUREEXTPROJ$_N$
b. D_{OL} NP_{OL}	FAITHFUNC
c. D_{SL} NP_{SL}	HDSYNTAX, FAITHLEX
d. D_{OL} NP_{SL}	FAITHFUNC, FAITHLEX, PUREEXTPROJ$_N$
e. NP_{OL} D_{SL}	PUREEXTPROJ$_N$
f. NP_{OL} D_{OL}	FAITHFUNC, HDSYNTAX
g. NP_{SL} D_{OL}	FAITHFUNC, HDSYNTAX, FAITHLEX, PUREEXTPROJ$_N$
h. NP_{SL} D_{SL}	FAITHLEX

Table 9: Universal candidate set for CS in [$_{DP}$D-NP]

In Table 9 three candidate outputs (b, e, h) each violate one constraint only; these are the only CS patterns predicted to occur cross-linguistically. The remaining five candidates violate *two or more* constraints, meaning that they are universally dispreferred (they are *harmonically bounded* by the three best candidates). The ranking of each constraint violated by one of the three possible optimal candidates determines which of these candidates will win in a given language pair. For example, if FAITHFUNC is the lowest-ranked constraint, candidate b will win. If FAITHFUNC is highly ranked, candidates e or h will win instead.

4.2.1 URBAN WOLOF

UW displays two acceptable DP patterns, CS or no CS (pure Wolof):

(24) e. NP_{OL} $D_{SL:}$ *feuille*$_{OL}$ bi_{SL} 'the paper'

violates PUREEXTPROJ$_N$ => CS

h. NP_{SL} $D_{SL:}$ ñaar dëk yi 'the two villages'

violates FAITHLEX => NO CS

In UW, PUREEXTPROJ$_N$ and FAITHLEX must be low-ranked since they are violated by the two acceptable DP outputs. FAITHFUNC and HDSYNTAX, however, are satisfied and are therefore higher ranked. The resulting constraint ranking can be stated as in (25).

(25) UW constraint ranking: {FAITHFUNC, HDSYNTAX}

>> { FAITHLEX, PUREEXTPROJ$_N$, PUREEXTPROJ$_V$}

Note that the ranking is both *strict* – { } **>>** { } – as originally formulated in Prince & Smolensky ([1993]/2004) and *partial* – {Constraint$_x$, Constraint$_y$} – as proposed in e.g. Antilla (1997), Legendre et al. (2002) to account for variation in contexts of diachronic change and first language acquisition, respectively. This implements the optional character of CS: CS is only one option to bilingual speakers. In other words, a speaker of UW exploits (at least) two grammars resulting from alternative constraint rankings.[13] In Tableaux 1-2, partial ranking is represented by a dotted line between the two rightmost columns. This results in two optimal output candidates in each optimization. The Input specification of source and other languages is given in the top leftmost cell. Harmonically bounded or universally dispreferred candidates are identified with #.

Input: D=W; N=F	FAITHFUNC	HDSYNT	FAITHLEX	PUREEXTPROJ$_N$
#a. D_W NP_F		*!		*
b. D_F NP_F	*!			
# c. D_W NP_W		*!	*	
# d. D_F NP_W	*!		*	*
+ e. NP_F D_W				*****
# f. NP_F D_F	*!	*		
# g. NP_W D_F	*!	*	*	*
+ h. NP_W D_W			*****	

Tableau 1: UW definite DPs

[13] Rankings should not be confused with grammars. (25) corresponds to more than two rankings but they result only in two grammars (yielding *distinct* patterns). See Legendre (2001) for further discussion.

The UW constraint ranking in Tableau 1 proposed on the basis of CS within DP extends to IPs for both perfective and imperfective structures. When speakers choose to use only Wolof in a phrase, they violate FAITHLEX. When they code switch by adding a French verb, they violate PUREEXTPROJ_V. Based on evidence from CS in DP and IP, both of these constraints must be low-ranked in UW. Tableau 2 illustrates the perfective aspect optimization. FAITHFUNC is violated whenever Aux or bound I on V is in French (OL).

(26) [$_{IP}$M*onter*-woon-naa] 'I set it up'

violates PUREEXTPROJ_V => CS

[$_{IP}$ Xam-o-na-ne] 'I knew'

violates FAITHLEX => NO CS

[$_{IP}$ D-u-ma-leen *informer*] 'I am not informing them.'

violates PUREEXTPROJ_V => CS

[$_{IP}$ Ma-ko gise] $_{IP}$ 'I see it'

violates FAITHLEX => NO CS

Input: I=W; V=F	FAITHFUNC	HDSYNT	FAITHLEX	PUREEXTPROJ_V
# a. Aux_{SL} V_{OL}		*!		*
+ b. V_{OL}-I_{SL}				*
# c. Aux_{SL} V_{SL}		*!	*	
d. V_{OL}-I_{OL}	*!			
# e. Aux_{OL} V_{OL}	*!	*		
# f. V_{SL}-I_{OL}	*!		*	*
# g. Aux_{OL} V_{SL}	*!	*	*	
+ h. V_{SL}-I_{SL}			*	

Tableau 2: UW perfective IPs

4.2.2 A TYPOLOGY OF CS

Recall that Table 9 provides three possible optimal candidates for a DP (and similarly for an IP) cross-linguistically. UW exemplifies two of each (one type of CS, no CS). We consider the remaining predicted patterns and note that the corresponding candidate outputs match up to existing constraints identified by other scholars, including predicting patterns that have been treated as *exceptions* in previous proposals.

If FAITHLEX is the only constraint violated by a language pair it must be low-ranked and the optimal outcome is candidate h in Table 9 or DP/IP in SL. Under this ranking, CS is predicted impossible within DP and IP, as is the case with Tunisian Arabic-French and Spanish-English IPs, repeated from (4).

(27)	a. Spanish-English	b. Tunisian Arabic-French
	*Juan está *eat*- iendo.	*Ana ma *l'aime*- š.
	N 3sg V- DUR	1sg neg 3sg-V- neg
	'Juan is *eat*ing'	'I don't *like it*'

This result accords well with several universal constraints previously identified by researchers who only studied CS within IP. The Functional Head Constraint (Belazi et.al. 1994) prohibits CS between a functional head and its complement; the Free Morpheme Constraint (Poplack 1980) bans CS between any bound morphemes; and the PF Interface Condition (MacSwan 1999, 2009), although it is not a constraint specific to code switching, effectively prohibits CS within a PF component without phonological integration. More research on CS within DP is needed to confirm the prediction regarding CS within DP.

If, on the other hand, FAITHFUNC is low-ranked then candidate b (DP/IP in the OL) is predicted optimal. Nahuatl-Spanish and Moroccan-Arabic French display this pattern (see (29) and (32) below).

This predicted pattern is particularly interesting because it corresponds to the 'embedded language islands' that Myers-Scotton (1993) identifies as exceptions to her two constraints. The System Morpheme Principle mandates that all system morphemes (functional categories) belong to the matrix (or SL) language; the Morpheme Order Principle states that the order of morphemes will follow that of the matrix language. The optimal pattern corresponding to candidate b, however, is in the OL, in violation of Myers-Scotton's constraints. They must be treated as exceptions in her system because they are found in a number of language pairs.

4.2.3 FURTHER PREDICTIONS

The constraints listed above do not restrict the lexical head-complement relation, hence CS is predicted to be possible between V and its complement DP. Cross-linguistic examples have found this to be true:

(28) Wolof-French

Am -u-woxone *arguments*
have neg arguments
'You don't have arguments'

(29) Nahuatl-Spanish (MacSwan 1997)
Okipipitzo *al hermano de Maria*
he kissed the brother of Maria

(30) Spanish-English (Belazi et. al. 1994)
They used to serve *bebidas alcoholicas en ese restaurante.*
beverages alcoholic in that restaurant

Neither do the constraints discussed restrict the spec-head relation, hence CS is predicted to be also possible between subject DP and I as well. This has been found to be true, although another constraint may be needed to account for the prohibition in some language pairs of a switch between a subject pronoun and I/V (see van Gelderen & MacSwan 2008 for some relevant discussion).

(31) French-Wolof
Si ça ne marche pas, *nge* retournes.
2sg
'If that doesn't work, you come back.'

(32) Moroccan Arabic-French (Redouane 2005)
Les cours taykunu mʕatlin felli:l
'The classes run late at night'

(33) Italian-French (Di Sciullo et. al. 1985)
La plupart des canadiens scrivono 'c'.
'Most Canadians write 'c''

(34) English-Spanish (Pfaff 1979)
El perro chewed him up.

The dog

5. Conclusion

Variation in code switching patterns exists cross-linguistically: Some language pairs allow switching within a head or in a head movement context between a functional category and its complement; some language pairs don't. An account of such irreducible variation cannot simply rely on universal, inviolable syntactic constraints as suggested for example by analyses relying on the Equivalence Constraint, the Functional Head Constraint, or the PF Interface Condition. A restrictive theory of CS that accounts for syntactic variation between language pairs is therefore necessary. We propose that such universal constraints must be allowed to come into conflict, the resolution of which results in alternative CS patterns, depending on the constraint ranking and on which language is assigned the status of SL at the clausal node.

With respect to the restrictiveness of the approach to CS advocated here, we offer the following food for thought. The theoretical appeal of a particular analysis can only be measured in terms of both the overall grammar and its descriptive adequacy. Keeping the computational component or syntax inviolable represents one kind of restrictiveness but at a double cost: descriptive adequacy (many instances of CS are simply not accounted for) and theoretically, a lexicon which allows anything to be stipulated, including the possibility of marking UW morphemes as 'special' (plausibly: they are not phrasal affixes but they behave as such in the sense that they violate the PFIC; they are not borrowings but they could be called 'special borrowings'). We favor a descriptively adequate account free of such exceptions which predicts a certain amount of variation of the very same sort we find in the grammars of monolinguals (Legendre, Grimshaw, & Vikner 2001).

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