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Review Article: The Role of Perception in Loanword Phonology. A review of *Les emprunts linguistiques d'origine européenne en Fon* by Flavien Gbéto, Köln: Rüdiger Köppe Verlag, 2000.*

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1. Introduction

At least three factors have motivated the study of loanword phonology. First, loanwords have been used to test the productivity of phonological rules and constraints. In some cases loans provide crucial evidence to decide the analysis of data that otherwise remain inconclusive from the standpoint of the native L_1 system (Hyman 1970, Shinohara 1997). Second, when borrowing takes place on a massive scale, the donor language may impart aspects of its phonology to the native system that engender distinct sectors of the lexicon with their own mini-phonologies (Fries & Pike 1949, Lees 1961, McCawley 1968). There is debate as to what extent this challenges the notion of a single grammar (Weinreich 1953, Itô & Mester 1995) and represents the intrusion of accidents of history into an otherwise clean, uniform system. Finally and most recently, adaptation patterns have been discovered for which the native system at best provides no guidance or at worst flatly contradicts, posing a learnability puzzle similar to the one Stampe's (1972) natural processes raise for primary language acquisition. Since these modifications typically coincide with cross-linguistically natural and well-

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attested processes and constraints, it is rational to attribute them to Universal Grammar (UG), with the implication that speakers can call on aspects of UG in adulthood (Shinohara 2004). Some researchers (Steriade 2000) have postulated the existence of a special module of phonological perception that plays a major role in loanword adaptation by helping to calculate the minimal modification of the input required to make the foreign lexical item conform to native system phonotactics. When viewed from this broader perspective, loanwords are no longer just a minor phonological curiosity or nuisance and merit the serious attention of theoretical research.

It is in this general context that Flavien Gbéto's (G) recent study is cast and should be judged. Availing himself of the latest tools from Autosegmental Phonology and Optimality Theory (OT), G utilizes data from Fon to address the questions of how loanwords are adapted to conform to regularities of the native system, to what extent the adapted forms are different from the native system and where the differences come from (pp. 13-14). Fon is one of the five subgroups of Gbe (Ewe); it is spoken in Benin and Togo. The study is based on a corpus of loanwords (predominantly from French but also containing items of Portuguese and English origin) that G has collected for almost twenty years and complements his recent description of the phonology of the Maxi dialect (Gbéto 1997). The size and nature of the corpus are not described.

Following Paradis (1996), G distinguishes between *adaptations* (forms used in bilingual conversation) and *loanwords* (lexical items incorporated into the native system to the extent that they can be used by monolinguals). Both adaptations and loanwords are of theoretical interest (the former a type of interlanguage) and are often difficult to distinguish from one another. The corpus for the present study contains loanwords so defined.

The phonetic inventory of Fon appears in (1). The tilde denotes nasality; tonal distinctions comprise high (*á*), mid (*ā*), low (*à*), rising (*ǎ*), and falling (*â*). Fon is an open-syllable language with a *CCV* maximal syllable template.

(1) *consonants*

p	t			k	kp		
b	d	ɖ		g	gb		
			tʃ				
			dʒ				
m		n	ɲ				
f	s					χ	χ^w
v	z					ʁ	$ʁ^w$
		ɾ					
		l / l̃					
			j / j̃		w/w̃		

vowels

i/ĩ		u / ũ
e		o
ɛ / ɛ̃		ɔ / ɔ̃
	a / ã	

Given Fon's relatively rich phonemic inventory, most sounds of the donor language easily find a correspondent. However, there are enough mismatches, particularly when the context is taken into account, to make loanword adaptation into Fon worthy of systematic investigation. In what follows we single out some of the most noteworthy and theoretically challenging cases in Gbéto's study.

2. Liquids

Fon has one liquid phoneme whose principal allophone is a lateral. It is optionally realized as a flap after an apical occlusive: *lĩ̃* 'think', *àlɔ* 'hand', *dʒɾǒ* — *dʒlǒ* 'volonté'. In the adaptation of loanwords, a lateral is realized as /l/. Rhotics have a more complex translation: prevocalically they appear as /l/ with an additional dorsal component word-initially /ʁl/. Preconsonantal and word-final rhotics are realized as zero.[1]

[1] Loanwords from English and Portuguese are labeled E and P. The vast majority of loans are from French.

(2)				
lame	lămū̃	rideau	ʁīdô
dollar E	dălà	bureau	bīlô
flower E	flówà	grève	glĕvù
col	kɔ́lù	gare	gă
vilebrequin	vīblēkẽ̄	torche	tɔ́tʃɪ

G posits loan translation rules effecting these realizations and devotes considerable discussion to the [ʁl] realization of the initial rhotic (additional examples: *radio* > [ʁlādjô], *rayon* > [ʁlɛ̃ɲõ], *raie* > [ʁlɛ̂]). His hypothesis (p. 27) is that "ceux qui ont introduit le français en milieu Fon réalisaient deux constrictions, l'une à l'avant, l'autre à l'arrière de la cavité buccale pour la pronunciation du R français". The idea is that the uvular (dorsal) feature of French /R/ (a trill) is matched by native /ʁ/. But /ʁ/ is an obstruent in Fon and so the [+sonorant] feature of the French source /R/ it is split off as a separate segment and realized as the closest sonorant in the native inventory — the lateral /l/. Such reconfiguration ("unpacking" in the terminology of Paradis & Prunet 2000) is common in second language perception: e.g. Russian palatalized consonants like /p'a/ are interpreted as consonant glide sequences [pya] by English speakers. Being a complex segment, the /ʁl/ sequence is only realized word-initially; medially, it is simplified to [l] and in preconsonantal and word-final position it is deleted.

Following Silverman 1992, G assumes an initial stage in the adaptation process where segments of the source word are matched with corresponding segments of the native inventory in essentially context-free fashion. In a second stage the phonotactic constraints of L_1 are imposed and the input is modified to satisfy these constraints by a combination of loanword specific and native L_1 processes. However, we might well question this two-stage model. There is no evidence that the perception of L_1 segments is free from the influence of context and so there is little reason to suppose that contextual influence is suspended in loanword adaptation.

Instead of seeing the simplification of medial /ʁl/ to /l/ as a matter of articulation, it can equally well be considered in perceptual terms: the dorsal feature is only perceived word-initially (a "prominent" position) and otherwise is suppressed. This interpretation implies that the dorsal component is lexicalized only in initial position. More generally, following in part the model outlined in Pater (2004) for first language acquisition, we might consider that the grammar (both L_1 and UG aspects) can intervene at two different points in the loanword adaptation process, as sketched below in (3): a so-called "perception" grammar and a grammar of "production".

(3)

		Perception		*Production*	
[xxx]	→	[UG+ L_1] →	/ yyy /	→	[UG+ L_1] → [zzz]
loan source			lexical rep.		output

This way of looking at things is helpful in explaining various aspects of the loan phonology in Fon. As we have just seen, French /ʀ/ is mapped to /l/ prevocalically but is deleted in preconsonantal and word-final position. This behavior contrasts sharply with preconsonantal and word-final /l/ which is systematically realized as [l] plus an epenthetic vowel–the general pattern of adaptation for other consonants into Fon.[2]

(4)

Samuel	sāmjɛ̃̀lì	cigarre	sīgâ
tuile	twílù	chaffeur	tʃōfɛ̂
col	kɔ́lù	voiture	vātwǐ
Sylvestre	sīlūvɛ́sì	Bernadette	bɛ̄nɑ̃̄dɛ́tì
Delphine	dɛ̄lūfínɪ̃̄	sardine	sādínɪ̃̄

G accounts for this contrast between the lateral and the rhotic by mapping the latter to /ʁl/ and then positing a loan rule that deletes the latter in preconsonantal and word-final position. There are however other cases in the loanword literature where languages with a single liquid phoneme distinguish between the donor language's lateral and rhotic. For example, in Korean the liquid phoneme is realized as a lateral word-finally and preconsonantally and as a rhotic word-initially and intervocalically. In adaptations from English and other western languages (Kenstowicz and Sohn 2001), a *#ClV* cluster may be rendered more or less faithfully by optionally geminating the liquid. Thus, *glass* is adapted as [kɨrasɨ] or as [kɨllasɨ]. Such gemination never applies to a *#CrV* cluster so that *dry* has just a single option [tɨrai] and never *[tɨllai]. In Mawu (Moussa 1996), a Manding language of Côte d'Ivoire, there is just a single liquid–the lateral /l/. Nevertheless, *Cr* and *Cl* clusters are systematically distinguished in loan adaptation by the type of epenthetic vowel: *Cr* clusters are broken with a copy vowel and *Cl* clusters with a high (default) vowel: *brosse* [bɔ̀lɔ̀sí], *France* [fàlɑ̃̀zí] vs. *bloque* [búlɔ́kí],

[2] There are two examples where preconsonantal [l] deletes–both after a back vowel: *soldier* (E) → [sɔ́dʒà] and *bolso* (P) → [bŭsù].

plan [pìlã̃].[3] These examples are inconsistent with the model in which loanword adaptation begins with a context-free matching of segments followed by the imposition of phonotactic constraints and raise doubts as to whether the Fon adaptation of the liquid in *cigarre* > [sīgâ] passes through /ʁl/ on its way to zero.

From an OT perspective the contrasting behavior of /l/ and /r/ seen in (4) is also puzzling. The adaptation of the rhotic calls for the constraint ranking of (5a) in which Max-C is demoted. This ranking selects deletion as the solution to the phonotactic violation. But a preconsonantal or word-final lateral engages epenthesis by demoting the Dep-V constraint (5b). As we shall see, epenthesis is the general repair strategy for other consonants in these positions.[4]

(5) a. Dep-V, *r/_#,C >> Max-C
b. Max-C, *C/__ #,C >> Dep-V

It is not clear how to reconcile these inconsistent constraint rankings. Stating the question in more theory-neutral terms, if epenthesis is the general repair strategy to realize consonants not followed by a vowel, and if moreover /r/ can be realized as a lateral, why doesn't Fon employ the same strategy (epenthesis) for word-final and preconsonantal rhotics and realize /gar/ as [gali]? If there is a separate, Perceptual Mapping from the loanword to the lexicon, a different ranking of faithfulness constraints around the same set of markedness constraints could be at play. This hypothesis would be analogous to the one Itô & Mester (1995) adopt for different sectors of the Japanese lexicon, which, according to them, differ solely in the ranking of faithfulness constraints. Hence, our suggestion is that the Dep-V , *r/_#,C, >> Max-C ranking of (5a) holds for the Perception Mapping while Max-C, *C_#,C, >> Dep-V (5b) holds for the Production Mapping.

(6) *Perception Mapping*

	/gar/	*Dep-V*	**r/_ #,C*	*Max-C*
	gar		*!	
	gari	*!		
→	ga			*

[3] Thanks to Shigeko Shinohara for reference to the Mawu data.

[4] In OT a ranked set of UG markedness and faithfulness constraints evaluate candidate input-output pairings. The Dep-V constraint penalizes vowel epenthesis while the Max-C constraint penalizes consonant deletion. The markedness constraint *C/ __ #,C penalizes a consonant that is not prevocalic.

	/kɔl/	*Dep-V*	*r/_ #,C	*Max-C*
→	kɔl			
	kɔlu	*!		
	kɔ			*!

Production Mapping

	/ga/	*Max-C*	*C/__ #,C	*Dep-V*
→	ga			
	gari			*!

	/kɔl/	*Max-C*	*C/__ #,C	*Dep-V*
	kɔl		*!	
→	kɔlu			*
	kɔ	*!		

This analysis implies that the rhotic of French *gare* is not lexicalized in Fon adaptation and should in principle be testable.

There are other cases where Fon deploys both deletion and epenthesis as adaptation strategies. One concerns the treatment of *sC* clusters. Medial and final /s/ goes in the onset of an epenthetic syllable (*whisky* > [wīsīkí], *tournevis* > [tūnɛ̃vísì]) as do word-final stops (*pompe* > [pɔ̌pù], *bic* > [bǐkì]; *bread* > [blɛ̌d̰ì]). These are the expected outcomes under the Max-C, *C/__ #,C >> Dep-V ranking.

(7)	/wiski/	*Max-C*	*C/__ #,C	*Dep-V*
	wiski		*!	
→	wisiki			*
	wiki	*!		

	/bik/	*Max-C*	*C/__ #,C	*Dep-V*
	bik		*!	
→	biki			*
	bi	*!		

According to this analysis word-final consonant clusters should receive a double epenthesis. But in the majority of cases (8), just the first consonant surfaces and the second one is suppressed. Such a pattern was also found by Silverman (1992) for Cantonese loans from English.

(8)	poste	pósù	Auguste	ōg^{w}ísù
	Christ	klísù	Ministre	mm̃ǐ̃sì

G cites Côté (1998) (cf. also Côté 2000) who observes that perceptual cues to a word-final stop are diminished after an obstruent in comparison to after a sonorant; hence obstruent clusters are frequently the site of a phonological repair — deletion or epenthesis. If there is a separate Perception Mapping in loanword adaptation, then the Dep and Max constraints can be reranked so as to promote the deletion strategy for the stop consonant in the *sC* cluster.

(9) *Perception Mapping*

	/post/	*Dep-V*	**stop/ obstruent __ #*	*Max-C*
	post		*!	
→	pos			*
	postu	*!		
	posut	*!	*	
	posutu	*!*		

Production Mapping

	/pos/	*Max-C*	**stop/ obstruent __ #*	*Dep-V*
	pos		*!	
→	posu			*
	po	*!		

Once again, this analysis claims that French *poste* has been lexicalized as /pos/ and hence predicts for example that the final stop should not appear under affixation. In principle it should be possible to test this implication.

G's corpus also contains lexical items in which the first consonant in a medial cluster is suppressed: *Nestor* > [nɛ̃̃tɔ̂], *Victor* > [vītɔ̂], *électrique* > [lētríkì]. These data indicate variation in the location of the Max-C constraint that engenders deletion with respect to the prevocalic >> postvocalic positions in Steriade's (1999) cue hierarchy. In many cases the clusters are homorganic, another factor that Côté (1998, 2000) finds to diminish the salience of a consonant.

3. Vowel Epenthesis

There is no indication that epenthesis is an active process in the phonology of Fon (Gbéto 1997). Its systematic appearance in loanword phonology is thus an Emergence of the Unmarked phenomenon (McCarthy & Prince 1994). As observed by Shinohara (1997) and Steriade (2000), the selection of the epenthetic vowel is typically determined by a principle of Minimal Saliency. The goal is to syllabify the consonant so as to satisfy native language phonotactics (for Fon, an open syllable) but in a manner that departs minimally from the input. For an epenthetic vowel, its input correspondent is zero; hence short, unobtrusive vowels such as schwa are favorite choices. Minimal Saliency also explains why epenthetic vowels typically shun accent, and tend to assimilate to the surrounding context–another strategy that minimizes their saliency. All these factors are active in Fon adaptation. G provides a thorough and insightful analysis of the phenomenon.

If epenthetic vowels are optimally the shortest ones that the phonemic system allows then we expect high vowel vowels to be chosen in Fon adaptation. And that is precisely what is found. The prominence of the epenthetic vowel is further diminished by coarticulation: [u] appears in the context of a labial and otherwise [i] is chosen to break up a consonant cluster (10a). After word-final labial consonants, [u] appears (10b). If the final consonant is dental or velar then the choice between [i] and [u] is determined by the preceding vowel, with a round vowel requiring [u] (10c). But this choice is overruled if the final consonant is palatal, which demands [i] (10d).

(10)	a.	parfum	pālūfɛ̃ — pāfɛ̃	Egypte	ēdʒ́ipùtì
		échappement	tʃāpūmɑ̃	whisky	wīsīkî
	b.	pompe	pɔ̌pù	limbe	lɛ̃̌bù
		lame	lămũ̌	grève	glɛ̆vù
	c.	col	kɔ́lù	poste	pósù
		cook E	kúkù	bonne	bŏnũ̌
		essence	sɑ̌sì	bread	blɛ̆dı̰
		brique	bĺíkì	pan E	kpáñ̃
	d.	torche	tɔ́tʃì	Georges	dʒɔ̆dʒ̀ì

G sees the palatal consonants as blocking labial harmony. Hence [i] is present in *torche* > [tɔ́tʃi] by default. But it is also possible that postpalatal [i] is the product of active coarticulation between the consonant and the following epenthetic vowel. (See Shinohara 1997 and Kim 1999 for examples of palatal coarticulation from Japanese and Korean loanword phonology). This question could be decided if a word like *cauchemar* were borrowed into Fon. Palatal coarticulation predicts epenthetic [i] (assuming that CV coarticulation dominates VC coarticulation). G's analysis predicts epenthetic [u] in virtue of [m].

Finally, G's corpus contains a few cases of apparent long distance labialization such as *pince* > [pɛ̃́sì] — [pɛ̃́sù] and *bobin* > [bōbíní] — [bōbínṹ]. Just as epenthesis is not an active process in Fon L_1 phonology, neither is the labialization of vowels: [i] freely appears in the context of labial consonants: [àfí] 'pleurs', [wìlí] 'attraper', [bĩ] 'moi'. The labial harmony seen in adaptation is thus another UG-emergent phenomenon–one governed by the principle of Minimal Saliency.[5]

4. Nasality

Fon contrasts oral versus nasal vowels. Moreover, the consonants [b, ɖ, l, w, j] and [m, n, l̃, w̃, ɲ] are in complementary distribution: the former appear before oral vowels and the latter before nasal vowels. Fon has a nasal-vowel harmony system and the [nasal] feature survives in vowel truncation/coalescence supporting its analysis as an autosegment (Gbéto 1997). In loanword adaptation it is thus no surprise that French nasal vowels are mapped to corresponding nasal vowels in Fon and oral vowels are paired with oral vowels. But G finds that there is only limited nasal harmony–just when the vowels are identical. As explained below, vowels are adapted nasalized after a nasal consonant. Thus Portuguese *cama* > [àkɑ̃́mɑ̃̀] 'bed' and English *German* > [dʒɑ̃́mɑ̃̀] 'German' show right-to-left nasal vowel harmony (cf. *bonne* > [bɔ̃́nṹ] where the identical vowel condition is not

[5] There are well-known cases such as Spanish *estop* 'stop' in which the epenthetic vowel is not high and hence an apparent exception to the Minimal Saliency principle. But such examples cannot necessarily be taken at face value. Suzanne Assadi (personal communication) points out that in Farsi, where the epenthetic vowel is also /e/ (cf. *esport* 'sport', *estudyo* 'studio', *eskelet* 'skeleton), /e/ (along with /o/ and /a/) belongs to a series of unstable vowels that are opposed to the stable series /i,u,ɑ/. The former are of variable duration and timbre in contrast to the /i,u,ɑ/ series and are the ones utilized in the adaptation of initial clusters: *club* > [kolub], *France* > [feranse], [faranse].

satisfied and hence there is no nasal harmony). And *chemise* > [tʃẽmĩzĩ] (cf. *Samuel* > [sãmjɛ̃lì]) shows left-to-right nasal harmony.

More interesting is the behavior of the two sets of consonants [b, d, l, w, j] and [m, n, l̃, w̃, ɲ] that are in complementary distribution in Fon grammar. Given a nasal consonant plus oral vowel, as in *ministre* 'minister', three adaptations are possible: [mi] with no change in nasality and thus contradicting the native constraint/pattern; nasalization of the vowel [mĩ]; or denasalization of the consonant [bi]. Fon systematically takes the second path [mĩ]. From a purely formal standpoint, the adaptations of [mi] as [mĩ] or as [bi] seem equivalent: a single change in the feature [nasal]. If nasality is privative then the adaptation of [mi] as [bi] would involve deletion of a feature while the adaptation of [mi] as [mĩ] would involve addition of an autosegmental link. The latter might be favored under a principle of conservation of information. From a perceptual point of view, we are led to ask if [mi] is closer to [bi] or to [mĩ]. Intuitively, it seems that a change of nasality in the consonant is more noticeable than a change in the vowel. Consequently, adaptation of [mi] as [mĩ] would correctly be predicted as the perceptually minimal change.[6]

The adaptational response to an incompatible sequence of oral consonant plus nasal vowel such as [bã] can also be tested for Fon. Once again there are three possibilities: no change, nasalization of the consonant [mã], or denasalization of the vowel [ba]. Given the conjecture that the contrast between [b] and [m] is relatively more salient than the contrast between [a] and [ã], we do not expect nasalization of [b]. In fact, Fon selects the first option: *bandit* > [bãdĭ], *banc* > [bãˇ]. The result is a violation of the native phonotactic and an extension the oral-nasal contrast to the voiced consonants.

The general pattern thus seems to be that the oral-nasal contrast in vowels is preserved when contrast in the consonants is not at stake (*pain* → [pɛ̃]). But when the contrast between [m, n] vs. [b, d] is in play then preservation of the consonantal opposition takes precedence (*chemise* > [tʃẽmĩzĩ], *bandit* > [bãdĭ]). This raises the question whether general UG asymmetries of phonological perception can override language particular contrasts and constraints. Clearly, much more study of this question is needed.

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[6] But in the Eastern Tukanoan language Barasana (Gomez-Imbert 1997), which is also a nasal harmony system in which nasal consonants and voiced stops are in complementary distribution, Spanish *Miguel* is adapted as [bigel] with denasalization.

5. Breaking of /y/

As the examples in (11) show, the high front rounded vowel /y/ of French is adapted as a labial-palatal sequence.

(11)	ludo	lwīdô
	culasse	kwīlásì
	juif	dʒwǐfû
	Auguste	ōgwísù
	tuile	twílù

G treats this adaptation as the "scission" of the Place node's Labial and Coronal components; the /ui/ sequence is realized as [wi] via a general devocalization process operating in Fon phonology. He also reports that the labial component is suppressed when preceded by a labial consonant, as seen in (12).

(12)	bureau	bīlô
	but	bǐ
	deputé	dēpītê

The delabialization in (12) is attributed to Leben's (1973) Obligatory Contour Principle (OCP) barring adjacent identical elements. It is another emergent phenomenon unknown to the native system. Fon has an active process of devocalization in hiatus that produces consonant-glide sequences (Gbéto 1997). There appears to be no prohibition of the process in the context of labial consonants: /bɔ̃ ɛ̀/ > [mw̃ɛ̃] 'art de voyance', /à ˋ vũ étɔ̃ / > [àfw̃ĭtɔ̃] 'son chien'. It might make sense to assign suppression of the labial element to the Perceptual Mapping: in effect, the labial component of the [y] is not lexicalized after a labial consonant in virtue of the OCP.

Fon adaptation thus presents us with another puzzle. The epenthetic vowel is [u] after a labial consonant, showing a preference for [bu] over [bi]. But the breaking of [y] to [ui] is disrupted after labials, showing a dispreference for [bu] as opposed to [bi]. Once again the difference makes sense in perceptual terms. In the first case the epenthetic vowel substitutes for zero and so coarticulation is optimal in minimizing the salience of the vowel and thus maximizing its similarity to its zero input correspondent. In the second case mapping [by] to [bui] is avoided because the [u] masks and equivocates the CV F2 transitional cues for [b]. In effect, the listener does not know if the labialization in [bui] is to be traced

back to the preceding consonant or to the following vowel. The solution is to delete the [u] fragment of [y]. Here again the consonantal cues dominate the vocalic ones.

The breaking of [y] (and of [ʀ] discussed earlier) in Fon loanword adaptation constitute rather clear counterexamples to the Isomorphism hypothesis of Paradis & Prunet (2000:332) according to which "a one-root-node segment in L2 is adapted as a one-root-node segment in L1 and a two-root-node segment in L2 is adapted with two root nodes in L1". On this hypothesis, all cases of breaking must arise from independent processes active in the native system. But there is no evidence for the breaking of [y] and [ʀ] internal to the grammar of Fon.

Paradis and Prunet (2000) present extensive evidence that nasal vowels are adapted as oral vowel plus nasal consonant sequences in languages that lack an oral-nasal vowel contrast. For example, in Fula French *ingénieur* [ɛ̃ʒenjœʀ] is adapted as [ɛnsɛnjɔr]. Given their hypothesis of isomorphism, Paradis and Prunet conclude from such data that the loanword phonology is telling us that contrastive nasal vowels are best analyzed as *VN* sequences universally. An alternative scission analysis of the $\tilde{V} > VN$ adaptation along the lines of G's treatment of the Fon adaptation of French [ʀ] and [y] faces the question of why the vowel and nasal consonant segments are ordered as *VN* rather than *NV*. Here once again perceptual factors may be at play. We can pose the question as follows. Given French [ɛ̃], does [ɛn] or [nɛ] sound closer? It seems that the answer is clearly in favor of the former option. Place of articulation cues to postvocalic nasals are much weaker than the cues to prevocalic ones; this helps to explain the ubiquity of regressive nasal assimilation. Thus, [ɛn] is a more minimal deformation of [ɛ̃] than is [nɛ].

Since vowel nasality is contrastive in Fon, the $\tilde{V} > VN$ translation does not apply and hence the single root-node clause of Paradis and Prunet's Isomorphism hypothesis cannot be tested. The two-root-node clause of the hypothesis does not seem to hold, however. While final nasals are preserved by epenthesis (13), preconsonantal nasals are suppressed with the nasal feature appearing in the preceding vowel. G posits loan rules spreading [+nasal] from a preconsonantal nasal to the preceding vowel and then deleting the nasal consonant.

(13)	pan E	kpáñ̃	bonne	bɔ̌nṹ
	lame	lǎmṹ	change E	tʃɛ̃̌dʒì
	pound E	kpɔ̌wṹ	accounter E	àkɔ̌tà

For the reasons mentioned above, the *VNC* > *ṼC* mapping seen in (13) is a natural one in perceptual terms. It is another emergent phenomenon of Fon loanword adaptation.

6. Tone

Fon distinguishes three tonal levels as well as rising and falling tones. There is also a general rule realizing high tone as rising after a voiced consonant. Since Fon is a tone language some decision must be made as to which tones to assign to a loanword. Similar to Cantonese (Silverman 1992) and many other systems, the accented syllable of the source is identified with a high tone in Fon. Pretonic syllables take a mid tone while posttonic syllables are low. A word-final tonic syllable is realized with a fall. Lastly, word-initial accented syllables with a voiced onset have a rising tone.

(14)	saˈlada (P)	sāládà	ˈsoldier (E)	sɔ́dʒà
	ˈgoma (P)	gɔ̌mā̃	ciˈgarre	sīgâ
	batteˈrie	bātēlî	cheˈmise	tʃēmī̌zī̃
	Eˈgypte	ēdʒípùtì	bonne	bɔ̌nū̃
	ˈdollar (E)	ɖǎlà	lame	lǎmū̃
	miˈnistre	mī̃nī̌sì		

G posits a LH*L tonal melody in which the H is mapped to the accented syllable of the source word and the low tones to syllables on either side of the accented one. Final accented syllables are realized with a fall (e.g. *briquet* > [bɪ̂kê]) and so another rule links the right-hand floating low of the LH*L melody to the final vowel. Additional rules not discussed raise pretonic low to mid and spread a low tone from a word-initial voiced consonant to the following high creating a rising tone.

In languages such as English the primary stressed syllable can be associated with a variety of tonal pitch accents (Beckman & Pierrehumbert 1986) and so the uniform association with a high tone in loanword adaptation cannot be taken for granted and requires some explanation. Perhaps the equation of stress with high tone can be explained if loanword adaptation takes place via a citation form (see Kenstowicz & Sohn 2001) which typically has a H*L pitch accent. This would also account for the obligatory final fall. However, it is likely that there is a more inherent connection between a peak of prominence and a pitch peak. In many pitch-accent languages accent is realized as a HL tonal sequence. HL is also

a common realization of focal accent. It is interesting that pretonic syllables are assigned a mid-tone in Fon adaptation. The same pattern occurs in Cantonese adaptations (Silverman 1992) and seems plausible in perceptual terms, choosing the least distinct tone for the syllables of weakest prominence.

7. Other Patterns

There are a couple of other Fon adaptations worth mentioning. In the native lexicon the bilabial voiceless stop is restricted to ideophones. Older loans from Portuguese and English adapted [p] as the labio-velar [kp]: *padre* (P) > [kpádrì], *pan* (E) > [kpáñ̃]. But with the more recent influx of borrowings from French, [p] has been imported into Fon: *pain* > [pɛ̃̂], *poste* > [pósù].

The Fon obstruent system lacks the palatal fricatives [ʃ] and [ʒ]. But it possesses [s] and [z] as well as the affricates [tʃ] and [dʒ]. In terms of features [ʃ] and [ʒ] stand equidistant between the alveolar fricatives [s] and [z] and the palatal affricates [tʃ] and [dʒ]. Yet they are systematically adapted as affricates.

(15)	chaffeur	tʃōfɛ̃̂	shale (E)	tʃélù
	torche	tótʃɪ	chemise	tʃɛ̄mǐzì
	gendarme	dʒɑ̃̄dámũ̌	Georges	dzɔ̌dʒì

This leads us to ask if [ʃ] and [ʒ] are closer in perceptual space to the affricates than to the alveolar fricatives. This question, like many others raised in this essay, requires further study.

8. Conclusion

It is clear that Flavien Gbéto's study of loanword adaptation in Fon sets a high standard for further investigation of this intriguing phenomenon. There is much to be gained by exploiting this line of research in a systematic fashion in the hopes of ultimately reconciling it with experimental results in speech perception (e.g. Dupoux et al. 1999).

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