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EPENTHESIS, DELETION AND THE EMERGENCE OF THE OPTIMAL SYLLABLE IN CREOLE

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Abstract

One of the central problems in creole studies is the nature of the processes that are involved in creolization. This paper investigates this issue with regard to the restructuring of the syllable in the genesis of one English-based creole, Sranan.

In the emergence of Sranan, as in that of many other creoles, we can observe the restructuring of syllables through epenthesis and deletion of segments. These processes are, however, not uniform. For example, in some environments (e.g. certain kinds of complex onsets) deletion is preferred (cf. *strong* > *tranga*), whereas in others epenthesis is preferred (e.g. in word-final position, as in *walk* > *waka*). The paper presents a systematic analysis of the two interrelated processes in optimality theoretic terms, showing that the observed phenomena can be accounted for in a unitary fashion by the complex interaction of violable ranked constraints.

Based on this analysis, we answer the question which principles govern the development of syllable structure in creolization: universal preference laws, transfer from the substrate languages or superstratal influence? We argue that all three elements are important in the creation of the creole, but each of them in a different and very specific way. The superstrate provides the segmental material which the emerging creole tries to preserve faithfully, but universal preference laws disturb faithful copying of the superstrate system. This is possible because the substrate exerts its influence imposing a particular grammar - high ranked structural constraints and low ranked faithfulness constraints - on the creole.

1. INTRODUCTION

One of the central problems in creole studies is the nature of the processes and factors that are involved in creolization. In order to account for the emergence of a particular creole feature, three major approaches have been taken. According to the so-called superstratist view, creole features can be attributed to the properties of the lexifier language. The second approach (the so-called substratist approach) is to adduce the creole features to one or more of the substrate languages involved in the contact situation, whereas the third, universalist, approach stresses the role of universal tendencies of language development and acquisition, which are taken to be more or less directly reflected in the creole structures. This paper investigates the emergence of syllabic structure in one creole language, Sranan, teasing apart the respective contributions of superstrate, substrate and universals in shaping creole syllables. Syllable structure is an ideal testing ground since there are considerable differences in syllabic structure between many creole languages and their respective lexifier languages, which are in need of explanation.

Thus it has frequently been observed that creole languages tend to favor a rather simplex CV syllable structure. Hence, the deletion of segments in words taken from their lexifier language is quite common (e.g. Holm 1989:108-113). At the same time, in many creoles we find non-etymological segments, especially vowels, being epenthesized (see also Holm 1989:108-113), apparently for the same reason, i.e. simplifying syllabic structure. Examples of epenthesis from different creoles are given in (1), examples of deletion in (2) below. The pertinent segments are given in bold capitals for emphasis.

(1) EPENTHESIS IN CREOLES

a.	ál**I**ma	<	Pt. alma	Principe CP[1]
b.	gal**U**fu	<	Pt. garfo	São Tomè CP
c.	lávU**u**	<	Pt. libro	Annobón CP
d.	k**I**ni	<	Dt. knie	Negerhollands CDt
e.	c**A**rabe	<	Fr. crabe	Mauritian CF
f.	wor**O**m	<	E. worm	Jamaican CE
g.	s**I**ton	<	E. stone	Cameroon Pidgin E.

[1] The following abbreviations are used: CDt - Creole Dutch, CE - Creole English, CF - Creole French, CP - Creole Portuguese, CSp - Creole Spanish.

h.	s**U**muk**U**	<	E. smoke	Saramaccan CE
i.	mit**I**	<	E. meet	Vernacular Liberian E.
j.	dios**O**	<	Sp. dios	Palenquero CSp
k.	hop**I**	<	Dt. hoop	Papiamentu CSp/P
k.	tak**I**	<	E. talk	Sranan CE

(2) DELETION IN CREOLES

a.	tomp	<	Dt. **S**tomp	Negerhollands CDt
b.	kupa	<	P. **O**cupa**R**	Principe CP
c.	ris	<	Fr. ris**QUE**	Haitian CF
d.	tan	<	Dt. tan**D**	Negerhollands CDt
e.	merican	<	E. **A**merican	Bahamian CE
f.	tan	<	E. **S**tan**D**	Sranan CE

Although there are some systematic studies available that are concerned with one of the two processes (in particular epenthesis, e.g. Smith 1977, Singh and Muysken 1995, Plag and Uffmann in press), work on the relationship between deletion and epenthesis and their competing roles in shaping creole syllables is rather scarce (Tinelli 1979, Singler 1996a, 1996b, Aceto 1996, Lipski 1999). The latter studies either survey patterns of syllabic restructuring across many different creoles (Tinelli 1979, Lipski 1999) or concentrate on one aspect of a single language (Aceto 1996, Meade 1995, Singler 1996a, 1996b). To our knowledge, the present study is the first attempt to provide a comprehensive account of the emergence of syllable structure in the creolization of one particular language.

The main questions that remain to be answered are the following. Given a particular creole language, when does epenthesis occur, when does deletion? What causes these processes and which factors govern their variability within and across creoles? In other words, why is it that sometimes segments are inserted, while in other cases segments are lost in creolization? Is one of the two, e.g. deletion, the default, unmarked mechanism, the other only occurring under special circumstances? Which structural and historical factors govern the choice of epenthesis as against deletion or vice versa? Which principles govern the development of syllable structure in creolization: universal preference laws, transfer from the substrate languages or superstratal influence?

In this article we will try to answer these questions for one creole language, Sranan. One of the reasons for choosing this particular language for a case study was that, among other things, it is a creole in which both kinds of processes are widely attested. We will systematically compare early Sranan words with their English etyma and present a constraint-based account in the framework of optimality theory. On the basis of this comparison it is argued that three elements are important in the creation of the creole, but each of them in a different and very specific way. The superstrate language provides the base forms which the creole creators are more or less faithful to. On the other hand, universal preference laws - encoded in universal structural constraints against certain types of syllable - disturb completely faithful copying of the superstrate system. This is possible because the substrate exerts its influence in that it imposes a particular grammar on the creole in the form of high ranked structural constraints and low ranked faithfulness constraints. Epenthesis and deletion thus are the result of the substrate ranking imposing a relatively unmarked syllable structure. The non-uniformity of these adjustment processes is due to the interaction of different faithfulness constraints.

The article is structured as follows. In the following section we will give some background on Sranan and present the relevant sets of data. Section 3 presents a detailed optimality theoretic analysis of the data and section 4 discusses the role of language universals and subtrate transfer in the emergence of optimal syllables in creole.

2. DELETION AND EPENTHESIS IN SRANAN

Sranan is an English-based creole language spoken in Surinam, on the Caribbean coast of South America. Surinam was colonized in the middle of the 17th century by British planters from St. Kitts, Nevis, and Barbados, who brought an unknown number of African slaves with them. In 1667 the British exchanged the colony for what later became New York City and the Dutch took over. In 1680 only very few British settlers were left in the colony and the influence of English practically ended, so that we can state that within only three decades a form of an English-based Pidgin or creole had emerged as the main medium of communication in the colony. Today, Sranan is the lingua franca of Surinam, spoken by the vast majority of Surinamese either as a first or as a second language. The total number of speakers (including the large amount of speakers immigrated to the Netherlands) is about 500,000, some 60 % of which are native speakers

(Adamson and Smith 1995). The major substrate languages of Sranan are the West African languages Kikongo (a Bantu language), Gbe and Twi (both Kwa languages).

The majority of Caribbean creole languages have been under continuing influence by their lexifier languages, leading to the gradual erosion of basilectal creole features. This does not hold, however, for Sranan and the other Surinamese creoles due to the early removal of speakers of the superstrate language(s). Therefore, the Surinamese varieties have been of central importance for the field of creole studies: they are assumed to have preserved their original properties to a much greater extent than their Caribbean relatives (see, for example, some of the articles in Baker and Bruyn (1999) for recent evidence for this assumption).

In order to reconstruct the phonological development of English words undergoing creolization we have consulted data as attested in the earliest available documents of Sranan dating from the early 18th century to the mid 19th century (Herlein 1718, van Dyk 1765, Nepveu 1770, Stedman 1790 (data from 1773-1777), Schumann 1783, Focke 1855, Wullschlägel 1856)[2]. A large portion of the data presented here are taken from Smith's (1987) pioneering study, to which we refer those readers interested in full philological documentation of individual words.

The decision to use the earliest sources has the advantage that the data deviate from the *status nascendi* as little as possible, so that some later developments which might blur the picture are eliminated from the analysis. As it turned out, this became important for the problem of nasal codas where the earliest sources show indeed significant differences to modern varieties. The sources have been used in a number of large-scale syntactic and phonological studies before (Arends 1989, Bruyn 1995, Plag 1993, Smith 1987) and can be regarded as linguistically reliable (see Arends 1995a, Bruyn 1995, Plag 1993 for more detailed discussion).

For our analysis we adopt a theory of syllabic structure which assumes the existence of at least three sub-syllabic constituents, onset, nucleus and coda. The analysis will be fleshed out in terms optimality theory (Prince & Smolensky 1993 et seq.)

Let us turn to the deletion phenomena first. Deletion can occur in word-initial position as in (3), in word-internal position as in (4), and in word-final position as in (5) and (7) below. We will discuss each in turn.

[2] The forms cited below are usually given in their modern Sranan form if, with respect to epenthesis and deletion, the early Sranan forms do not differ from their Modern descendents. Where there are such differences it has been noted.

(3) WORD-INITIAL DELETION

	ENGLISH		SRANAN
a.	speak	>	piki
	spermaceti	>	pramaseti[3]
	spoil	>	pori
	stand	>	tan
	story	>	tori
	strong	>	tranga
	scrape	>	krebi
	square	>	kweri
	scratch	>	krasi
b.	speak	>	*sipiki, *siki
	strong	>	*sitaranga, *sranga
c.	smoke	>	smoko (*somoko, *moko, *soko)
	snake	>	sneki (*sineki, *neki, *seki)

The data in (3a) show that in a large number of words word-initial [s] is systematically deleted if it occurs as part of a complex onset involving a plosive as its second element. Hence, deletion of initial [s] can be interpreted as a strategy to simplify complex onsets.[4] Two other possible strategies, namely epenthesis (breaking up the cluster), or deletion of the second consonant are not available options, as illustrated in (3b), where the asterisks indicate that these forms are unattested. This is a systematic gap. Interestingly, not all onset clusters involving initial /s/ show deletion. Those involving e.g. nasals as their second element, survive without further manipulation, as exemplified in (3c).

In word-internal position, consonant clusters are often reduced by eliminating one of the two or more consonants. In many cases deletion affects the first consonant of the cluster, as in (4a), in other cases it is the second consonant that vanishes (see (4b)).

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[3] For a discussion of liquid metathesis as attested in *pramaseti* see below. We do not say anything in this paper about processes of adaptation on the segmental level, i.e. the changes individual sounds underwent in creolization. See Smith 1987 for a detailed analysis of this aspect of phonological restructuring in creolization.

[4] There are also a number of forms that have preserved their initial /sC/ clusters. Many of them are later borrowings from Dutch (e.g. *schop* > *skop* , *schrijven* > *skrifi*, *schrik* > *sreki*) and are therefore excluded from the discussion. However, there are also some English-based words that have resisted deletion of /s/, e.g. *skin* > *skin, stone* > *ston,*

(4) WORD-INTERNAL DELETION

	ENGLISH		SRANAN	
a.	curtsey	>	kosi	ts > s
	doctor	>	datra	kt > t
	goodmorrow	>	kumara	dm > m
	goodnight	>	kuneti	dn > n
b.	master	>	masra	st > s
	nasty	>	nasi	st > s
	softly	>	safri	ft > f
	sister	>	sisa	st > s

By way of this cluster simplification obstruent codas (**dak.tra*) and complex onsets consisting of two obstruents (**ma.ster*) are avoided. Only nasals are systematically allowed as codas, as we will shortly see.

In word-final position, we have to disinguish between the behavior of nasals and that of non-nasal consonants. Final nasals are deleted if they occur in unstressed syllables of the English base word but are preserved in stressed syllables. This is illustrated by the data in (5) and (6), respectively:

(5) WORD-FINAL DELETION OF NASALS[5]

ENGLISH		SRANAN
cookroom	>	kúkru
nothing	>	nóti
something	>	sáni
woman	>	úma

spit > *spiti*. Although this kind of variation is interesting in itself, this paper focuses on the question why and where segments were deleted (or epenthesized) and not why single words escaped this process.

[5] Acute accent is used to indicate stressed syllables.

(6) WORD-FINAL PRESERVATION OF NASALS

ENGLISH		SRANAN
begín	>	bigín (*bigi, *bigini)
fall dówn	>	fadón
lie dówn	>	didón
man	>	man
name	>	nen
time	>	ten

Non-nasal consonants in word-final position are deleted if and only if they are part of a consonant cluster. Examples are given in (7):

(7) WORD-FINAL DELETION IN CONSONANT CLUSTERS

ENGLISH		SRANAN
field	>	firi
first	>	fosi
soft	>	safu
trouble	>	trobi

The pattern in (7) can be captured by the generalization that word-final consonant clusters lose their final obstruent and take an epenthetic vowel. As in (4) above, this means that consonants are deleted if of non-deletion would either lead to non-nasal codas (**soft-saf.tu*) or to certain types of onset clusters (**first-fo.sti*). Interestingly, final NC clusters do not behave in this fashion in early Sranan, they preserve the cluster (for example *want* > *wanti*, *wandi*, or *paint* > *pendi*). Only later do these words lose their obstruents (Modern Sranan: *wani, peni*

This brings us finally to cases of insertion of segments. Epenthesis can be found only in one position, that is word-finally. The data in (8) illustrate this phenomenon. The forms in parenthesis (and the patterns they represent, i.e. deletion or toleration) again are unattested.

(8) EPENTHESIS IN WORD-FINAL POSITION ('paragoge')

ENGLISH		SRANAN
afraid	>	frede (*fre, *fred)
because	>	bikasi (*bika, *bikas)
nose	>	noso
top	>	tapu
walk	>	waka

The epenthesis facts boil down to the generalization that (only) English words ending in non-nasal consonants take an epenthetic final vowel, a phenomenon known as (vowel) paragoge. The quality of the paragogic vowel in Modern Sranan is partly lexicalized, partly predictable, but will not be considered any further in the context of this study (see Smith 1977, Plag and Uffmann (in press) for details and historical development).

There is another phenomenon which is not as clearly an instance of syllabic optimization, metathesis. Metathesis frequently occurs with items that feature tautosyllabic post-vocalic /r/ and /l/ in English etyma. The behavior of stems with post-vocalic liquids is not uniform in Sranan. Thus there are many items where no trace of the liquid is left, as in (9a), another set of English words show metathesis, as in (9b), some words from earlier sources seem to feature epenthesis, see (9c), and one group of words have even preserved their coda liquid, as in (9d). Some of the items in (9c) are variants of items in (9b):

(9)	a.	first	>	fosi
		ginger	>	gindja
		heart	>	hati
		horse	>	hasi
		river	>	liba
		sister	>	sisa
	b.	burn	>	bron
		court	>	krutu
		datra	>	doctor
		help	>	repi, jrepi
		kiver	>	kibri

	master	>	masra
	over	>	abra
	remember	>	memre
	turn	>	tron
	sharp	>	srapu
	silver	>	sriba
	work	>	wroko
c.	help	>	jerepi
	other	>	atara
	over	>	abere
	kiver	>	kiepere
	master	>	massera
	remember	>	memere
	silver	>	siliba
	warm	>	waran
	work	>	woroko
	worm	>	woron
d.	hark	>	arki
	mark	>	marki
	shark	>	sharki

The variability in the preservation vs. deletion of coda /r/ has been attributed to the variability already present in English. Speakers of both rhotic and non-rhotic dialects of English must have been contributing words in the formation period of Sranan, hence the apparent cases of deletion are straightforwardly accounted for by the non-presence of post-vocalic /r/ already in the varieties on which Sranan words were modeled (e.g. Smith 1987:341, Plag 1999a:181-183). Those words that have preserved coda liquids fall into two groups. The minority of forms show no phonotactic manipulations, see (9d), whereas a clear majority of forms show what is commonly referred to as liquid metathesis: the liquid has swapped positions with its tautosyllabic neighboring vowel. How can these phenomena be analyzed?

For the cases of metathesis as given in (9b) Smith (1987:345ff) proposes that, historically, this is in fact epenthesis followed by deletion of the (later unstressed) etymological vowel, as exemplified in (10):

(10) work > wóroko > woróko > wroko

Indeed, for many of the forms in (9b) epenthesized variants are attested in the early sources (and given in (9c)), so that an account of metathesis along these lines is conceivable. But why does it happen?

Metathesis may appear as another instance of phonotactic optimization, since the resulting structure has lost its coda consonant(s). This raises the question, however, why the offending coda liquid was not simply deleted. We argue that Sranan liquid metathesis may be a case of perceptual methatesis as discussed in Blevins and Garrett (1998). Perceptual metathesis is a historical process which only affects consonants that have an acoustic or perceptual feature of relatively long duration. This property leads to some ambiguity as to the linear or segmental cause or origin of the feature in question. Thus perceptual metathesis originates "when features extending across a CV or VC domain, or perceived as extending across such a domain, are reinterpreted as originating in nonhistorical position" (Blevins and Garrett 1998:510). Among the consonant types that are attested in perceptual metathesis we find liquids, laryngeals, pharyngeals and glides (Blevins and Garrett 1998:513). Perceptual metathesis proceeds in three historical stages. In the first, original stage, a string of segments is analyzed into a discrete VC or CV sequence. In the following stage, the features of the consonant shift or spread across an adjacent vowel leading to multiple linking: VC, CV > VCV. In the final stage the consonant is analyzed as belonging to the other (nonhistorical) side of the vowel. Cases of CV metathesis that have formerly been argued to be epenthesis followed by deletion can thus be subsumed under perceptual metathesis.

Under the perceptual metathesis analysis the restriction of metathesis to liquids in Sranan is not surprising because liquids belong to the set of segments that are prone to perceptual metathesis. Thus, the perceptual metathesis analysis can explain the fact that only one type of consonant is affected. Furthermore, given that stage 2 with multiple and variable linking is typical of perceptual metathesis, data like those in (9c) are to be predicted.

Perceptual metathesis even offers a possible (though tentative) explanation of the forms in (9d), which all violate the generalization that Sranan only allows nasal codas. Notably, preservation of liquids in coda position only occurs with English words ending in /ɑrk/ (see also Smith 1987:343). In the light of perceptual metathesis it can be argued that the perceptual interpretation of the liquid differs according to context. Thus, /r/ might be more clearly associable with a neighboring /k/ than with other neighboring consonants. Effects of this kind are described by Blevins and Garret (1998) for example for Latin and Le Havre French.

In sum, the perceptual metathesis analysis can account for certain problems that cannot be solved by an analysis that exclusively rests on phonotactic optimization. Given the equivocality (or complementarity) of the two explanations we will restrict ourselves in the following section to those cases that we think are unequivocally analyzable as driven by requirements concerning syllabic structure.

3. ANALYSIS

3.1. Theoretical preliminaries

The phonological restructuring involved in creolization necessitates some mapping of phonetic/phonological representations of the lexifier language onto the phonetic/phonological representations of the emerging creole. We propose that this mapping can be modeled as a two-level process involving the English and the Sranan output forms.[6] The relationship between the two outputs is similar to the one between underlying representation (UR) and phonetic realization in a single language, the difference being that in our case two output forms of two different languages are targeted[7].

[6] This is similar in spirit to Yip's (1996) analysis of loan word adaptation, OT analyses of interlanguage phonology (Hancin-Bhatt/Bhatt 1997, Broselow et al. 1998), and Singler's (1996a, 1996b) and Lipski's (1999) treatment of creolized forms in Liberian English and Portuguese based creoles. See Silverman (1992) for a model involving more than two levels of analysis.

[7] It is an interesting question what role the input of the superstrate language plays in creolization: when is it reconstructed faithfully, i.e., in the same way as in the superstrate itself, when is it changed and why? Unfortunately the phenomena we are dealing with here, epenthesis and deletion in Sranan, cannot give us any answers to this problem. The processes we are concerned with do not show any alternations at the level of the superstrate language. Thus, for example the first segment in *strong,* which is deleted in the creolization process leading to Sranan *tranga*, is a faithful output representation of input /s/, as far as English is concerned. We will therefore limit our attention to

(11)

UR		UR
|		|
[English output]	←faithfulness→	[Sranan output]

In both cases we are dealing with a relationship of faithfulness (in OT terms): the creole output strives to represent the English output as it is. Of course, if faithfulness was the only active principle, this would be the end of the story, the creole would be identical to the superstrate. This is not the case, since structural constraints can disturb the relationship pictured above, as we will see in detail throughout the analysis.

The proposal to extend faithfulness-relations to output-output relationships has been a major topic in recent OT literature. Thus, it has been proposed to analyse the relationship between a reduplicant and its base in reduplication with the same faithfulness constraints as the relation between an underlying representation and its output (McCarthy&Prince 1995). Similar approaches have been extended to truncation, cyclic affixation and paradigmatic relationships in general (cf. Benua 1995, 1997, McCarthy 1995, Kenstowicz 1996, Kager forthcoming a, Alber 1998, Plag 1998, 1999b, among others). Following the above literature on reduplication we will use the term 'base' for the English superstrate word and the term 'output' for the Sranan word derived from this base.

Although we try to present the process of creolization, in an idealized way, as a snapshot mapping base to output, we cannot exclude later influences, e.g. from other languages such as Dutch, which might disturb the mapping we are describing. In fact, the phonological changes we observe in the following sections, are not without exceptions, but the tendencies are clear and worth of an analysis.

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just one dimension of the faithfulness relation between the English superstrate and the Creole, namely the relationship between the two output forms.

3.2 Word-final epenthesis

The first syllable adjustment process we will be looking at is paragoge. The motivation for this process, we will argue, is that Sranan has severe restrictions on possible coda consonants. To repair word-final English consonants Sranan chooses to insert an epenthetic vowel.[8]

(12) because > bikasI

Sranan syllables almost never end in a consonant other than a nasal, neither word-internally, nor at the word edge.[9] Nasals can be codas, although they often delete word-finally (see the examples in (5)). We interpret these facts as the result of a dominant constraint against non-nasal codas:

(13) **CODACOND**: only nasals are possible codas
cf. Itô (1986)[10]

While word-internally potential coda consonants delete (see discussion in next section), word-finally epenthesis takes place. In our approach the reason for epenthesis is that DEP, the faithfulness constraint bannning insertion, is lower ranked than MAX, the constraint militating against deletion.[11]

(14) **MAX**: no deletion
Every segment of the base has a correspondent in the output

(15) **DEP**: no epenthesis
Every segment of the output has a correspondent in the base

[8] In what follows we will illustrate the various processes only with one example of each of the patterns given in section 2.

[9] There are some cases where liquids appear in the coda (see section 2. above). The only clear cases of obstruent codas we found are *jacket - djákti* and *crooked - krúktu*

[10] cf. Itô & Mester (1994) for a redefinition of coda conditions in terms of alignment. According to their proposal segments banned from coda position are under the influence of an alignment constraint ALIGN (SEG, L, σ, L) requiring them to align to an onset position. In our case all segments except nasals would be under the influence of alignment constraints of this type. In this view, our CODACOND is shorthand for a much more complex state of affairs.

[11] We follow correspondence theory as outlined in McCarthy & Prince (1995)

McCarthy & Prince (1995) use these constraints for correspondence relations between input and output as well as for the relation between base and reduplicant in reduplication. In our case faithfulness targets the relationship between the English base and the creole output.
The proposed partial ranking to account for word-final epenthesis is as follows:

(16) Partial hierarchy for word-final epenthesis

CODACOND MAX
\ /
DEP

The following tableau illustrates how the constraints decide on the winning candidate:

Tableau 1

Base:*because*	CODACOND	MAX	DEP
☞ (a) bikasI			*
(b) bikas	*!		
(c) bika		*!	

Candidate (b) would be faithful to the English base. But it violates the high ranked constraint CODACOND and hence is ruled out. Candidate (c) repairs an offending coda through deletion but violates MAX, the faithfulness constraint banning deletion. Finally, the winning candidate (a), avoiding a coda through epenthesis, only violates lowest ranked DEP and thus turns out to be the winner.

3.3 Cluster simplification through deletion

Sranan faces yet another problem concerning the English base: while English allows for complex onsets and complex codas consisting of a fricative and a plosive such as [st], Sranan has no complex syllable margins of this type. Instead, potential complex onsets are resolved through deletion. In the following examples, the first consonant of a cluster is lost word-initially, while the second consonant is lost word-finally:

(17) (a) s t rong > t ranga deletion of C_1

C_1 C_2	C_2

(b) lo s t > la s i deletion of C_2

C_1 C_2	C_1

It is not the case that Sranan prohibits complex onsets in general, as can be seen from the name of the language itself.

(18) s r anan

C_1 C_2

So what is it that makes a syllable initial [st] cluster bad for the creator of Sranan? We claim that what is active here is the well known principle that the sonority of syllables has to increase towards the peak. We rephrase this principle, taken from Clements (1990), as a constraint:

(19) Sonority sequencing principle (SSP): sonority must increase towards the peak.
(following Clements 1990)

We assume the following sonority hierarchy:

(20) Sonority hierarchy (< = less sonorous):
plosives < fricatives < nasals < liquids < vowels
(cf. Blevins 1995 for a similar scale)

This means that the complex onset [st] creates a sonority decrease towards the syllable peak, thus violating the SSP. In what follows we will see in detail how this constraint triggers deletion in various contexts.

3.3.1 Word-initial cluster simplification

In principle, there are several possibilities to avoid a word-initial sonority decrease: the first or the second consonant of the offending cluster could be deleted, or epenthesis could be used to resolve the cluster:

(21) Possible repair strategies for clusters violating the SSP:

☞	(a) Deletion of C1:	strong > tranga
	(b) Deletion of C2:	strong > srang
	(c) Epenthesis:	strong > sItranga

Sranan chooses the first possibility and we might ask what favors (a) over (b) and (c). We want to propose that (a) is better than (b) and (c) in that it copies faithfully the linear sequence of segments in the base: segments that are contiguous in the base are also contiguous in the output. In (b), on the other hand, two segments, [s] and [r], meet in the output which were not neighbors in the input, while in (c) the base sequence [st] is interrupted by the epenthetic vowel.

A faithfulness constraint requiring contiguity has been proposed e.g. by Kenstowicz (1994), Bakovic (1995), McCarthy & Prince (1995) and Lamontagne (1996). In our definition of the constraint we follow McCarthy & Prince (1995) and, specifically, their suggestion that contiguity be split into two constraints: one evaluating whether elements that are contiguous in the base are also contiguous in the output and a mirror constraint making sure that elements contiguous in the output are also contiguous in the base. This differentiation of the two constraints will be important for our discussion of the repair of word-internal clusters.

(22) B-CONTIGUITY[12] = NO SKIP: "no internal deletion!"
The portion of the base standing in correspondence forms a contiguous string.

O-CONTIGUITY = NO INTRUDE: "no internal epenthesis!"
The portion of the output standing in correspondence forms a contiguous string.

Like MAX and DEP, contiguity constraints are part of the family of faithfulness constraints. They require base and output to be identical. They are special faithfulness constraints in that they do not require segments to be identical, but their relationship of adjacency to be the same in the base as in the output.

Both contiguity constraints defined above allow that elements be deleted or inserted at the margins. They make different evaluations regarding the disturbance of a sequence in the middle of a string. B-CONTIGUITY (which we will call NO SKIP for mnemonic reasons) works against internal deletion while O-CONTIGUITY (NO INTRUDE) rules out internal epenthesis.
We will illustrate this with the following example, where vertical bars "|" indicate the portion of the string standing in correspondence:

(23)	initial deletion	medial epenthesis	medial deletion
base:	s_1 t_2 r_3 ...	s_1 t_2 r_3 ...	s_1 t_2 r_3 ....
	| |	| | |	| |
output:	∅ t_2 r_3	s_1 I t_2 r_3	s_1 ∅ r_3 ....
	√NO INTRUDE	* NO INTRUDE	√NO INTRUDE
	√ NO SKIP	√ NO SKIP	*NO SKIP

In the case of initial deletion both contiguity constraints are observed: t_2 and r_3 are contiguous in the base as well as in the output. The segment s_1 is not part of the "portion standing in correspondence" since s_1 has no correspondent in the output and therefore the contiguity requirement is fulfilled vacuously. Medial epenthesis leads to a violation of O-Contiguity: s_1 and t_2, though contiguous in the base are not contiguous in the output because they are separated by

[12] What we call B-CONTIGUITY is labeled I-CONTIGUITY in McCarthy & Prince, who define the constraint for the relationship between input and output while in our case it is defined for the correspondence relation between the (English) base and the (Sranan) output.

the epenthetic element. Medial deletion, on the other hand, violates NO SKIP since s_1 and r_3, the portion of the string standing in a correspondence relation, do not form a contiguous string in the base because of intervening $t_{3,}$ which does not have a correspondent in the output.

Let us now return to the problem of initial clusters that do not respect the sonority hierarchy. We propose the following constraint hierarchy to analyse the problem of cluster simplification:

(24) SSP CODACOND NO INTRUDE
\ | /
MAX, NO SKIP
|
DEP

= SSP, CODACOND, NO INTRUDE >> MAX, NO SKIP >> DEP

The details of the hierarchy will become clear as we move on in our dicussion of cluster simplification, but some general idea can already be gleaned from its overall structure. First of all, the hierarchy has integrated the partial hierarchy we used for the analysis of word-final epenthesis and thus is compatible with it. The high ranking of structural constraints such as the principle requiring a certain sonority profile (SSP) and a constraint militating against syllables with non-nasal codas (CODACOND) indicates that structural constraints are very important in this corner of Sranan phonology. The low ranked faithfulness constraints, on the other hand, show that it is at their cost that structural constraints are observed. DEP is lowest, hence epenthesis will take place, but MAX, too, is dominated, by a contiguity constraint, and this will lead to deletion. The ranking of NO INTRUDE over NO SKIP won't be important for initial clusters, but it will be for medial ones.

The following tableau illustrates how the proposed hierarchy evaluates the base *strong* and selects as the winning candidate [tranga]:[13]

[13] Those DEP-violations that are triggered by the word-final epenthetic vowel are ignored here and in the following tableaux.

Tableau 2

Base: *strong*	SSP	CODACOND	NO INTRUDE	NO SKIP	MAX	DEP
☞ (a) tranga					*	
(b) sranga				*!	*	
(c) sItranga			*!			*
(d) stranga	*!					
(e) i.stranga	*!					*
(f) is.tranga		*!				*

The high ranking of the sonority sequencing principle makes sure that the initial [st] cluster cannot survive. Thus, although perfectly faithful, [strong] cannot surface as [stranga], candidate (d) must fail. Candidates (a), (b) and (c) would obey the SSP, but two of them violate a contiguity constraint. Candidate (b) deletes a word-medial consonant violating NO SKIP. In candidate (c), on the other hand, the epenthetic vowel disrupts the sequence of segments in the output violating NO INTRUDE. Candidates (e) and (f) show that epenthesis, although helpful in avoiding CODACOND violations, is not a possible strategy here. No matter how deep DEP is ranked, its violations cannot rescue the last two candidates of the tableau: candidate (e) is ruled out through an SSP violation, candidate (f) because the first syllable has a coda which is not a nasal.

So far we have seen one context in which Sranan uses epenthesis and another one in which it uses deletion to accomodate segment strings to the SSP. If no higher constraints intervene, epenthesis is chosen to repair word-final codas. But epenthesis is blocked by high-ranked contiguity constraints that prohibit deletion or epenthesis inside a root. Hence, the best repair of offending clusters is to cut material at the edges.

We have illustrated what happened to clusters with a bad sonority profile at the left edge of the word. In the next subsection we will see that the hierarchy in (18) makes also the right predictions for clusters at the right edge.

3.3.2. Word-final cluster simplification

Word-final clusters present us with the mirror image of initial ones. Take for example

(25) haste > hesi

The base *haste* cannot surface as [hesti], since this would mean either a violation of the SSP, in the syllabification [he.sti], or a violation of CODACOND, if *haste* is syllabified as [hes.ti]. Again, the same repair strategies can be thought of as in the case of initial clusters. One of the two consonants can be deleted or an epenthetic consonant could be inserted:

(26) Possible repair strategies for final clusters:

(a) Deletion of C1: haste > heti
☞ (b) Deletion of C2: haste > hesi
(c) Epenthesis: haste > hesIti

In this case, Sranan chooses to repair the cluster by deleting the second consonant of the cluster. Why the second? The reason is clear if we take into account the contiguity constraints discussed above. Deleting segments at the edge of the word does not cause any contiguity violations and therefore in this case C2 and not C1 is the target of deletion. Note that deleting the consonant before the epenthetic vowel does not constitute a violation of NO SKIP, even though it might seem that something has been deleted in the middle of the word. The reason for this is that the epenthetic vowel is not present in the base and therefore does not fall under the requirement to be contiguous to some other segment in the base. Technically speaking, the epenthetic vowel does not stand in correspondence. Below, we illustrate how the proposed constraint hierarchy leads to deletion of C2 in the case of final clusters:

Tableau 3

Base: *haste*	SSP	CODACOND	NO INTRUDE	NO SKIP	MAX	DEP
☞ (a) hesi					*	
(b) heti				*!	*	
(c) hesIti			*!			*
(d) he.sti	*!					
(e) hes.ti		*!				

As in the case of initial clusters, the cluster cannot be preserved, since this leads either to a violation of the SSP (candidate (d)) or to a violation of the coda condition (candidate (e)). Internal epenthesis as in (c) or deletion as in (b) are no solution either, since both violate the strong contiguity requirements. The only possibility to satisfy all high ranked constraints is to delete the base-final consonant, as in (a).

3.3.3 Word-internal cluster simplification

When clusters appear word-medially, in most cases one of the two consonants is deleted, as e.g. in

(27) nasty > nasi

Tableau 4

Base: *nasty*	SSP	CODACOND	NO INTRUDE	NO SKIP	MAX	DEP
☞ (a) nasi				*	*	
(b) nasIti			*!			*
(c) na.sti	*!					
(d) nas.ti		*!				
☞ (e) na.ti				*	*	

In the tableaux illustrating initial and final deletion we have seen that it is neither possible to parse a cluster as a complex onset with decreasing sonority, as in (c), nor to parse the first

consonant as a coda, as in (d). But differently from the cases discussed above, the winning candidate does not observe both contiguity constraints, but only one of them. This provides us with a ranking argument for them. Candidate (a) obeys the requirement that segments standing in correspondence be contiguous in the output. It violates the contiguity constraint requiring that corresponding segments be neighbors in the base : [s] and [i] are adjacent in the output, but not in the base, where the deleted segment [t] intervenes. Candidate (b) shows exactly the opposite type of violations. Thus, it is the ranking between these two constraints that decides between candidate (a) and (b).

The cases of internal cluster simplification pose the problem that the hierarchy we have established so far does not tell us which of the two consonants must be deleted. In other words, why is the attested output *nasi* (candidate a.) and not *nati* (candidate e.)? According to the tableau both candidates do equally well on the given constraint hierarchy, but only *nasi* is attested. However, as exemplified in (4), sect. 2, there are a number of words where the second consonant survives. One might speculate that it is always the less sonorous element that is deleted. This would work for most cases of internal cluster simplification we have found. But since the reason for this preference of deleting less sonorous segments over deleting more sonorous ones is not clear to us we prefer to leave open this problem rather than introducing an *ad hoc* constraint deciding between the deletion of C_1 and C_2.[14]

3.4 Stress and final nasal deletion

In this section we will turn to one last case of deletion, the deletion of word-final nasals in unstressed syllables. This case is more complicated than the previous ones because of the interaction of deletion with stress. Sranan has developed a stress system which is somehow reminiscent of the English stress system but doesn't coincide with it in every detail. We can describe the system as follows:

[14] It could be tempting to extend an explanation in terms of sonority to all cases of cluster simplification. Could the contiguity account be completely replaced by an analysis where generally less sonorous elements are deleted? It seems that it cannot, because such an analysis would run into problems with word-initial clusters where it is more often the more sonorous element that is deleted.

(28) Sranan stress:

Main stress falls on the penultimate syllable unless the final syllable is heavy. In that case the final syllable bears main stress. [15]

Syllables containing a diphtong or closed in a consonant count as heavy, other syllables are light.

This stress pattern is found in a large number of other languages[16]. The following examples show penultimate stress. All examples are cases where the stressed syllable is a different one than in the superstrate. Thus, they give us clear evidence for the fact that Sranan has developed a stress system of its own:

[15] There is one systematic exception to this generalization: words from the African substrate languages often have final stress, even if the final syllable is light.

i. final stress with items derived from the substrate languages:

avìtì (Gbe)	>	abití	'trap'
jovó (Gbe)	>	jobó	'white man'
zegé (Gbe)	>	(a)segé	'beetle species'
logbózò (Gbe)	>	lobosó	'rheumatism'
vodu (Gbe)	>	fodú	'magic'
mbanza (Kimbundu)	>	banjá	'a dance'
adru (Ewe)	>	adrú	'cyperus rotundus'

(accent marks in the substrate example indicate tone)

Words derived from the substrate languages thus form a subsystem of their own, with respect to the stress system. There are some rare cases of English (and Portuguese) based words where stress is shifted to the final syllable as well, for example *party-partí*.
Some English-based items do not conform to the described stress pattern and instead maintain stress on the same syllable as the English base. Their number, however, is small with respect to the cases respecting the pattern outlined above. We found:

ii. Preservation of English stress:

belów	>	biló
todáy	>	tidé
yésterday	>	ésrede
cábbage	>	kábisi
ányone	>	íniwan
throw awáy	>	trowé

[16] cf. Hayes (1995: 181) for a list of languages with Sranan-like stress. The pattern is essentially the same as in classical Latin, if we abstract away from the fact that in Latin the final syllable is extrametrical.

(29) Stress on light or heavy penultimate syllable:

búcket	>	bokíti
prómise	>	pramísi
róundabout	>	lombóto
párasol	>	prasóro
áshes	>	asísi
yéllowback	>	jarabáka
básket	>	baskíta
dífferent	>	difrénti
dámbord (Dutch)	>	dambórtu
lánding place	>	lanprési
no móre	>	nómo

The following examples show that final syllables can bear stress if they are heavy, i.e., if they are closed in a consonant or contain a diphtong:

(30) Stress on final heavy syllable

shear	>	siséj
scíssors	>	seséi
páppegaai(Dutch)	>	popokái
goodbýe	>	krobój
stand by	>	stanbáj

Since syllables in Sranan - except for some rare case of liquids - can be closed only in nasals, most cases of final stress involve stress on a syllable with a final nasal:

(31) Final stress on syllable closed in a nasal

babóon	>	babún
begín	>	bigín
lie dówn	>	lidón
sit dówn	>	sidón

rótten	>	ratín
hérring	>	elén
páyment	>	pajmán

There is an interesting twist in the development of words where the English base has a final nasal. Note that in the first four cases in (30), stress in the English base is final as it is in the Sranan derivative. With *herring*, *rotten* and *payment* stress has shifted to the last syllable. This is exceptional. The vast majority of nasal-final bases with unstressed final syllable behave like the following words:

(32) Non final stress in the English base:

wóman	>	úma
fáshion	>	fási
fásten	>	fási
gárden	>	djári
bárgain	>	bárki
cóokroom	>	kúkru
séven	>	séjbi
nóthing	>	nóti
dúmpling	>	adómpri
cúnning	>	kóni

We see that if the final syllable in the English word is unstressed, stress is not shifted and the final nasal is lost in the Sranan derivative. *Rótten-ratín, hérring-elén* and *payment-pajmán* are the only examples we could find where stress has shifted in this case.[17]

There are several questions that the paradigm cited above poses. First, if it is true that final heavy syllables do attract stress, why doesn't the same thing happen with unstressed final syllables closed in a nasal? In other words, why don't we have **umán*, instead of *úma*? We do have stress shift in the case of *prómise-pramísi,* so why shouldn't the same be possible with *wóman-*umán*? Second, what is the trigger for nasal deletion? Why does the final nasal only delete in unstressed syllables and not in stressed syllables?

We believe that the answer to these questions lies in the sequencing of the different diachronic developments involved. Deletion of the final nasal of an unstressed syllable seems to be a relatively late phenomenon, historically speaking. Consider the following examples, none of which bears final stress in the English base and all of which are attested with a final nasal at some earlier historical stage (data is quoted from Smith 1987 and Focke 1855):

(33)

English	1718[18]	1765[19]	1783[20]	1798[21]	1855[22]	1856[23]	Modern Sranan
hándsome	hansum, hantsum,						
cóokroom		koekrom, koekeroe		koekroe	kóekroe		kukru
Índian			indjin		Iéngi		ingi
wóman			uman	oema	óeman, hóeman		úma
púdding						poedoen	
shílling			shelling, sjelling		sren		sren
éveryone			ebriwan				ebriwan
ányone			iniwan				íniwan
					bóenboen		

[17] There is one exception where stress has *not* shifted, but the nasal is preserved all the same: *ányone > íniwan*
[18] Herlein (1718)
[19] van Dyk (1765)
[20] Schumann (1783)
[21] Weygandt (1798)
[22] Focke (1855)
[23] Wullschlaegel (1856)

It is thus plausible to assume that there was an intermediate historical stage at which the final nasal was still present as the coda of an unstressed syllable:

(34) wóman > úman > úman, úma > úma

We will now analyse how the result of this earlier stage of Sranan came about and offer some proposals as to why - in a second step - the final nasal was lost, starting with an analysis of the Sranan stress pattern. The following constraints are pertinent:

(35) FT-BIN: "feet consist of either two syllables or two moras"
Feet must be binary at some level of analysis (μ, σ)
(Prince 1980; McCarthy & Prince 1986; Prince & Smolensky 1993)

TROCH = Align (Ft, L, Head(Ft), L): "feet are trochaic"
∀ foot ∃ head of the foot such that the left edge of the foot and the left edge of the head of the foot coincide.
(cf. RHTYPE=T in Prince & Smolensky 1993; McCarthy & Prince 1993)

ALIGN-R = ALIGN (PRWD, R, FT', R): "the foot bearing main stress is rightmost"
∀ prosodic word ∃ head foot of the prosodic word such that the right edge of the prosodic word and the right edge of the head foot coincide.

The constraint FT-BIN requires feet to consist either of two syllables or of two moras, a requirement that is fulfilled in the foot-inventory of most languages (cf. Hayes 1995 for a representative overview). Thus, according to this constraint, feet can consist either of a single bimoraic heavy syllable (H), or of two syllables, regardless of their weight, i.e. two light syllables (LL), two heavy syllables (HH) or a light and a heavy syllable, (HL) and (LH). TROCH asks for feet to be left-headed, stress must fall on the first element of the foot, in contrast to an iambic pattern, where stress falls on the second element. Finally, ALIGN (PRWD, R, FT', R) (ALIGN-R, for short) expresses the fact that main stress is assigned to a foot which is aligned to the right edge of the prosodic word. These three constraints are not in conflict with each other, it is possible to satisfy all three of them in an example like

(36) bo(kí.ti) 'bucket'
L ('LL)

where main stress falls on the head of a trochee consisting of two syllables and aligned to the right edge of the word. However, a pattern like

(37) *(bó.ki)ti
('L L) L

is not a possible output because the head foot is not at the right edge. The stress shift in *bokíti* shows that the stress pattern constraints presented above are stronger than the tendency to preserve the stress of the English base. Stress preservation and resistance to stress shift are well-known from cyclicity effects in lexical phonology. Drawing on earlier proposals in the literature, we want to express this kind of faithfulness with the following constraint:

(38) MAX-STRESS: "no stress shift from the base to the output!"
If a segment bears stress in the base, then its correspondent in the output bears stress as well.
(cf. among others McCarthy 1995, Alderete 1996, Kager forthcoming, Alber 1998, Plag 1998, 1999 for similar constraints)

Examples like *bo(kí.ti)* show us that the stress pattern constraints must dominate faithfulness to base stress:

(39) FT-BIN TROCH[24] ALIGN-R
\ /
MAX-STRESS

[24] To be precise, it is not possible to show whether the constraint TROCH dominates MAX-STRESS since the two constraints do not interact. English itself is a trochaic language (cf. Pater 1995) and there is no way that violating TROCH could improve MAX-STRESS or vice versa.

Tableau 5

Base: *búcket*	FT-BIN	TROCH	ALIGN-R	MAX-STRESS
☞ (a) bo(kí.ti)				*
(b) (bó.ki)ti			σ!	
(c) (bó.ki.ti)	*!			

In the tableau we see that a violation of MAX-STRESS, i.e. stress shift, is preferred to a bad stress pattern with a misaligned main stress foot (candidate (b)) or a foot-structure violating the binarity requirement (candidate (c)).

The same hierarchy can account for words with final nasals like *bigín:*

Tableau 6

Base: *begín*	FT-BIN	TROCH	ALIGN-R	MAX-STRESS
☞ (a) bi(gín)				
(b) (bí.gin)				*!
(c) (bí)gin	*!		σ	

There is simply no reason to shift stress, in this case, since the final heavy syllable allows to parse a right-aligned trochee consisting of two moras without changing the position of the base stress. The same is true for English words with a final nasal closing an unstressed syllable, if we consider the outcome of the attested earlier historical stage:

(40) (úman)
('LH)

Again the main stress foot is a right-aligned binary trochee and the position of the English stress in *wóman* is preserved. However, the foot parsed in this case is a rather unsual one: an uneven trochee, with stress falling on the light element, a foot usually considered to be highly marked (cf. Hayes 1995) across the stress patterns of the world's languages. One reason for this foot to be marked is that it contains an unstressed heavy syllable violating thus the principle that a heavy syllable should bear stress. This principle has been stated in the literature as the *weight-to-stress principle:*

(41) WSP (weight-to-stress principle): heavy syllables are prominent
(cf. Prince 1990; Prince & Smolensky 1993)

In the foot parsing of *(úman)* this principle has been violated and the WSP must therefore rank below MAX-STRESS:

Tableau 7

Base: *wóman*	FT-BIN	TROCH	ALIGN-R	MAX-STRESS	WSP
☞ (a) (ú.man)					*
(b) u(mán)				*!	
(c) (ú)man	*!		σ		

In contrast to the case of *begín-bigín*, stress shift in *wóman-úman* could actually lead to an improvement of the stress pattern. Thus, in candidate (b) of the tableau the main stress foot is a right-aligned trochee and in addition the heavy syllable does bear stress. The fact that this candidate is not chosen shows us that although stress shift is a possibility, as e.g. in *prómise-pramísi* it is only chosen when the higher ranked stress pattern constraints are in danger of being violated. But stress is not shifted if lower constraints, such as the WSP are at stake. A violation of the WSP is tolerated if stress can be preserved on the same syllable where it is in the English base. The WSP might however have had a role to play in the subsequent historical process of nasal deletion. Thus, there is a way to circumvent the violation of either the WSP or MAX-STRESS. If the final nasal is deleted, both constraints can be observed:

(42) úma 'woman'
('LL)

Tableau 8

	FT-BIN	TROCH	ALIGN-R	MAX-STRESS	WSP	MAX
☞ (a) (ú.ma)						*
(b) (ú.man)					*!	
(c) u.(mán)				*!		

The tableau shows what might have happened when final nasal deletion took place. Candidate (b) loses here against candidate (a) because the former violates the WSP while the latter escapes it through violation of MAX. Stress shift, as in (c), again is no option, although it would observe both of the lowest ranked constraints. We have ranked MAX below the WSP, since deletion is better than an unstressed heavy syllable, but note that this ranking could only be active at a later historical stage. In other words, a reranking of the anti-deletion constraint MAX has taken place. If MAX was lowest ranked also at earlier stages this would have changed the Sranan output quite dramatically. Deletion would then always have been the best option to guarantee a good stress pattern leading to a truncated *prámi* instead of epenthetic *pramísi* with stress shift. At a historical stage where final epenthesis had already taken place the only final consonants are nasals and those are in fact the only ones that are deleted. Hence our analysis can explain the otherwise strange variability in the treatment of nasal as against non-nasal final consonants.

We have indicated the WSP as the reason for final nasal deletion. There is another possible reason for this phenomenon which we do not want to exclude *a priori*. It might simply be the case that the nasal codas of unstressed syllables are weaker positions than other positions in the word and thus more prone to deletion. Beckman (1998) claims that what distinguishes "strong" and "weak" positions is faithfulness. She develops a theory of positional faithfulness and shows that strong positions such as first syllables of words, stressed syllables or onsets are often more faithful than weak positions such as non-initial or unstressed syllables and syllable codas. For instance, strong positions typically exhibit a larger segmental inventory than weak positions. This fits well with our case, where nasal codas of stressed syllables would be protected from deletion by a special "stressed syllable-faithfulness", while coda consonants of unstressed syllables are not and thus may be deleted (see Lipski 1999 for a similar proposal concerning related phenomena in Romance-based creoles).

Let us try to sum up the patterns of epenthesis and deletion that we have found in Sranan. It is by no means the case that one of the two strategies is preferred, *per se*. Epenthesis is a good

way to solve problems with a word-final coda, a fact that we have expressed with the ranking CODACOND, MAX >> DEP. But epenthesis cannot be used to deal with other problems, as e.g. clusters with a bad sonority profile, or internal clusters in general. In this latter case strong contiguity restrictions forbid a disruption of the base sequence and trigger deletion instead. Deletion is not completely arbitrary either. It is better to cut disturbing segments at the edge, with the result that e.g. in [st] clusters the first segment is cut if the cluster appears at the left edge while the second one is deleted if we have a word-final cluster. Finally, if cutting segments at the edge is no solution either, as in the case of internal clusters, deletion is chosen over epenthesis. Thus, the contiguity relation of the base segments is disturbed, but at least contiguity of the output string is observed. Finally, we have seen that while word-final obstruent codas of the base trigger epenthesis, word-final nasal codas may remain, because they do not violate CODACOND or any of the high-ranking stress pattern constraints of the language. They disappear at a later historical stage, if the vowel preceding them does not bear stress. The reason for their deletion might be that this way a better stress pattern is generated which respects the principle that heavy syllables should be stressed. It could also be that – being part of an unstressed syllable – they are in a weak position which tends to be less faithful.

4. SUPERSTRATE, SUBSTRATE AND UNIVERSALS IN PHONOLOGICAL RESTRUCTURING

Let us now consider our analysis of deletion and epenthesis in the light of the three major approaches to creole genesis outlined in section 1, the superstratist, substratist, and universalist view. In terms of these approaches the following picture emerges with regard to the problem of syllable optimization in the genesis of Sranan.

First of all, a strictly superstratist account of the emergence of the Sranan syllable is unconvincing because of the massive restructuring that English syllable structure underwent in the creolization process. However, the stress pattern of the English base words plays a role in certain environments and the Sranan stress pattern itself seems to be modeled on the English one, though with a considerable degree of regularization. In view of the restructuring going on, the role of the superstrate seems to be limited to providing output representations to which

faithfulness constraints can refer and on which structural constraints operate to derive a new prosodic structure.

Let us turn to the other possible factors, the substrate and universals. CV is the universally unmarked syllable structure (e.g. Blevins 1995), which seems to speak for a universalist explanation of the phenomena under discussion. However, CV is also prominent in many of the creole's substrate languages, which suggests that the processes leading to this kind of syllabic structure might well be a transfer phenomenon, perhaps supported by universal preference laws à la Vennemann (1988). What speaks against the universalist explanantion, however, is that epenthesis as a diachronic phonological rule has been claimed to be universally marked, whereas deletion is said to be universally unmarked (e.g. Vennemann 1988, Singh/Muysken 1995). Hence, the universalist approach would predict deletion in all environments and not deletion in certain environments and epenthesis in others. This is Singh/Muysken's central argument for their claim that paragoge must be substratum-induced. Hence, a substratum transfer approach seems preferable.

In order to solve the problem of seemingly contradictory theoretical arguments pro and contra substratum or universal influence, we want to draw attention to the decisive fact that in loan word adaptation and second language acquisition massive and systematic restructuring of the syllable only occurs if the native language has tighter restrictions on syllable structure than the target language. For instance, German learners of English generally do not simplify complex onsets or delete codas since these particular syllabic structures are also allowed in their mother tongue (minor differences not counted). The same holds for English learners of German. Only in those cases where the phonotactic restrictions of the target language are indeed tighter than in L1 do we find epenthesis or deletion. Consider, for example, the pronunciation of the name *Knivel* by many speakers of English as *K*[ə]*nivel*. In German this onset cluster is legal, hence German speakers do neither epenthesize nor delete when they pronounce this name. Similar cases from a wide variety of language pairs are documented in the loan word and second language acquisition literature (e.g. Silverman 1992, Yip 1993, Itô und Mester 1995a, 1995b, Paradis 1996, Paradis & Lacharité 1997, Uffmann 1997 on loan words, Eckman 1981, Hancin-Bhatt/Bhatt 1997, Broselow et. al 1998 on second language acquisition).

Let us consider why loan word adaptation, second language acquisition and creolization should display similar patterns. Roughly speaking, loan word adaptation involves the imposition of native phonological rules and restrictions on new words, as unisono argued by the above-

mentioned authors. If the phonological effects of loan word adaptation are very similar to the phonological effects that can be observed in second language acquisition, one can assume that the same kind of imposition of native phonology on non-native word material is at work. In other words, in both cases we are confronted with transfer effects. We hypothesize that the difference between loan word adaptation and second language acquisition is that in second language acquisition the interlanguage system may start out with more or less complete transfer (of the native language constraint ranking) and then gradually moves towards the target language by reranking the constraints (e.g. Broselow et al. 1998). In loan word adaptation, the imposition of native phonological constraints (perhaps with some institutionalized peculiarities, see Itô und Mester 1995a, 1995b) is more or less static, so that even advanced second language speakers of the donor language adapt loan words by imposing native phonology on them.

We claim that in creolization we see the same transfer mechanisms at work, with the additional complication that we are dealing with a process that works not only on the level of the individual but also on the level of speech community. That is, we have numerous speakers with sometimes different native languages that might impose slightly different constraints on the English base words. The eventual emergence of a given Sranan form, for example, must therefore be accompanied by a process that levels out possibly different variants. This process is usually referred to as dialect leveling and has been shown to operate on all levels of grammar in creolization (e.g. Siegel 1997a, Siegel 1997b, Lefebvre 1999, Plag and Uffmann in press).

We hypothesize that the observed effects of syllable optimization must be a transfer effect: the substrate languages must have had tighter syllable constraints than English, which were then imposed on the English base words. In the following we will take a look at the pertinent West African languages Kikongo, Gbe and Twi to see whether this hypothesis is born out by the facts.

According to the most accurate account of the early Surinamese demographic development, Arends (1995b), Kikongo and Gbe influence must have been the most important, because Twi speakers only occurred in significant numbers after c. 1720, whereas Kikongo and Gbe speakers were predominant among the slaves during the first century of the colony (roughly 1650-1740). Unfortunately, we do not know exactly how these languages looked like in the 17th and 18th century, but in order to accumulate the most relevant and accurate information about their syllabic structure we have used the earliest sources available to us, the oldest of which dates back to 1875 (Christaller on Twi).

The Kikongo sources (Bal 1964, Bentley 1887, Bontinck 1978, Chatelain 1888-89, Daeleman 1966, Laman 1936, Seidel/Struyf 1910, Spa 1994, Wing/Penders 1928) tell us that this language exclusively allows open syllables, with no violations of the SSP in the onset. In Gbe (see Abaglo/Archangeli 1989, Bole-Richard 1983, Capo 1991, Da Cruz/Avolonto 1993, Henrici 1891, Lafage 1985, Westermann 1930, 1961), we find again only vowel-final syllables and no violations of the SSP. The Twi sources we consulted (Christaller 1875, Hess 1992, Schachter/Fromkin 1968, Warren 1976) draw a picture that is somewhat different from that of the other two substrate languages. In Twi it is possible to have consonants in the coda, provided that they are nasal. Violations of the SSP do not occur. All three languages employ rather consistently paragoge with consonant-final loan words, but the loan word data that can be gleaned from the above-mentioned sources are too scarce for a systematic investigation of epenthesis and deletion as interrelated processes. A comparison of the Sranan syllable and the syllable as found in the substrate languages reveals however their close similarity. The SSP is unviolated in all four languages, with Early Sranan obviously having adopted the coda condition from Twi, which is less restrictive than that of Kikongo and Bantu.

Independent evidence for phonological transfer in the emergence of Sranan is presented in Plag and Uffmann (in press). The quality of the paragogic vowel, the kind of variation it shows in the early sources, and the integration of angma into Sranan all point towards transfer as the major driving force in shaping the Sranan syllable.

Needless to say, substrate transfer does not solve all problems. For example, it is unclear why Sranan permits nasal codas at all, since such codas are only allowed in one out of three substrate languages, Twi. Above all, this is the language whose influence has been considered as least important, because its speakers arrived rather late on the scene (e.g. Arends 1995b). Furthermore, final /n/ must have still been preserved by the time of the majority of Twi speakers' arrival, because the English superstrate had already been removed and there was little or no access to the English base words any more. This can only mean that the earliest creators of Sranan (i.e. Kikongo and Gbe speakers) must have been able to preserve final /n/ inspite of the fact that their native language did not allow it. In other words, in this case the speakers were able to rerank the relevant constraints in such a way that syllables with final /n/ (and only those) did not undergo deletion or epenthesis. How can this be? Obviously certain types of rerankings are more easily done than others. Apart from geminates, syllable-final /n/ is among the least marked codas (Itô 1986), which, in OT terms, means that the constraint against nasal codas is lowest in

the universal markedness hierachy. Consequently, reranking faithfulness constraints above the lowest of the Coda constraints is the least difficult reranking. In other words, markedness and universal developmental effects must also be taken into account if we aim at a full account of syllable optimization in Sranan.

Another problem for a strictly substratist approach concerns the different outcomes inspite of identical or similar substrate languages involved. For illustration, consider Saramaccan, another creole language of Surinam, which shares – roughly – the same substrate languages as Sranan. Saramaccan poses similar requirements on syllablic structure, with quite different results, as we can see in the following examples:[25]

(43) mosquito > masikíta
stone > sitónu
mix > mɔ́kísi
six > síkísi

Saramaccan, like Sranan, avoids non-nasal codas and complex onsets where sonority decreases. And, like in Sranan, word-final codas are repaired through paragoge. But even word-initially and word-internally epenthesis is often chosen over deletion. This means that the ranking of faithfulness constraints must have been different in the emergence of Saramaccan: observing the contiguity of segments is less important than to make sure that none of the base segments is deleted. Hence, the two contiguity constraints will have a lower position in the hierarchy than they have in Sranan while MAX will have a higher one. The result is a language where the sequence of the base elements is continuously disrupted by epenthetic elements but all elements of the base are parsed in the output.

We claim in this paper that deletion and epenthesis in Sranan are largely due to transfer from the substrate languages. How is it possible, we may then ask, that Sranan and Saramaccan, although having the same substrate languages, develop a different pattern of epenthesis and deletion?

To answer this question, it is necessary to represent the constraint hierarchy worked out for Sranan in a more schematic way. Let us substitute for every constraint *F*, if it is a faithfulness

[25] Data from Smith (1987). Accent marks indicate tones, in this case.

constraint and C, if it is a structural constraint. The overall constraint hierarchy for Sranan deletion and epenthesis repeated below as (a) is translated in the $\mathcal{F}/C$ hierarchy (b):

(44)

a.

SSP CODACOND NOINTRUDE

\ | /

MAX, NO SKIP

|

DEP

b.

C C $\mathcal{F}$

\ | /

$\mathcal{F}$, $\mathcal{F}$

|

$\mathcal{F}$

The hierarchy, except for NOINTRUDE, is characterized by high-ranked structural constraints: syllables must not have codas other than nasals and they must respect the sonority sequencing principle. We argue that it is this overall structure that is responsible for the observed effects: structural constraints dominate faithfulness constraints. Sranan and Saramaccan have in common that in both languages the structural constraints SSP and CODACOND are rather high in the hierarchy and are satisfied at the cost of faithfulness constraints. What differs in the two languages is the ranking of the faithfulness constraints among them: in Sranan it is better to delete in certain contexts where in Saramaccan it is better to epenthesize. So why isn't the ranking of the faithfulness constraints among them transferred from the substrate languages as well? The reason, we claim, is that in the substrate language themselves there is no evidence for the ranking between contiguity constraints, MAX and DEP. The speakers of Kikongo, Gbe or Twi are never confronted with the problem whether they should chose epenthesis or deletion in the case of, e.g., and [st] cluster simply because they are never presented with such an input cluster.[26] Hence, the creation of the creole, be it Sranan or Saramaccan, crucially involves the work of ranking faithfulness constraints among them.

[26] Of course it is also necessary that no such clusters arise through morphological affixation. We didn't find any cases where e.g. a root-final fricative met a suffix-initial consonant in the grammars of Kikongo, Gbe and Twi we consulted.

5. CONCLUSION

Let us summarize our findings. In this article we have investigated the restructuring of syllables in creolization, using one particular language, English-based Sranan, as a test case. We systematically compared early Sranan words with their English etyma in order to detect the non-uniform patterns of deletion and epenthesis that lead to Sranan's syllabic structure. These patterns were then analyzed in an optimality theoretic framework. It was shown that the observed phenomena can be accounted for in a unitary fashion by the complex interaction of violable ranked constraints. None of the two processes under investigation can be said to be the default mechanism. The non-uniformity of the effects, i.e. epenthesis in some environments, deletion in others, results from the complex interaction of structural and faithfulness constraints.

It was argued that high-ranking universal structural constraints are responsible for the emergence of rather simplex syllables, which gives the phenomena their universal flavor. The high ranking of structural constraints in the hierarchy is transferred from the substrate languages, to the effect that aspects of African grammar are imposed on the English base words. However, when syllable structure constraints allow it, the English output is faithfully preserved. The superstrate thus provides the segmental material on which structural constraints and faithfulness constraints operate.

The basic insight that superstrate, substrate and universals all contribute their specific share in creole genesis is in line with recent findings by Lefebvre (1999) concerning the emergence of creole syntax. Discerning these respective influences more clearly in different areas of creole grammar will certainly help to overcome all too simple explanations of creolization we may have adhered to in the past.

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