Anti-cyclic mutation in Stratal Containment

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Background A basic tenet of the Containment Theory version of Optimality Theory (Prince and Smolensky 2004; van Oostendorp 2007; Trommer and Zimmermann 2014) is that GEN is unable to delete phonological elements but can only manipulate relational properties (association lines) between them. Containment provides a means to account for certain kinds of opacity (van Oostendorp forth.) and incomplete neutralization phenomena (van Oostendorp 2008) in a parallel fashion. The general consensus in the literature is that when Containment is coupled with derivational models such as Stratal OT (Kiparsky 2000; Bermúdez-Otero 2012), its principle of non-deletion only holds within individual strata but not across strata. Instead, in accordance with basic principles of Lexical Phonology (Pulleyblank 1986 i.a.), a post-stratal "clean-up" takes place at the point when an output is shipped from one stratum to the next. As stated in the REBIRTHING (RB) hypothesis in Trommer (2011), this includes deletion of unassociated or phonetically invisible elements (stray erasure) and monochromatization (bracket erasure).

Claim This paper presents arguments for extending the core principles of Containment to the interface operations. I propose a more restrictive version of post-stratal purging that I dub LIMITEDREBIRTHING (LR). LR differs from RB in two respects: (i) erasure of morphological colors applies to phonological nodes but not to relational entities (association lines); (ii) phonological nodes are never deleted, regardless of whether they are pronounced or unpronounced. I discuss two applications of LR that demonstrate why this interface modification is necessary to account for otherwise problematic cases.

Data 1 Seereer, like other Atlantic languages, has a complex system of initial consonant mutations operating across its noun class system. Agent nouns in Seereer are formed on the basis of the infinitive stem by CVː-reduplication of the first stem syllable and addition of class 1 markers, viz. the prefix *o-* and continuancy mutation. Continuancy mutation affects underlying continuants and makes them non-continuant, e.g. $x \rightarrow q$ (cont. mut. applies vacuously to underlying stops). The intricate pattern is shown in (1), taken from (McLaughlin 2000: 334): Underlyingly non-continuant Cs show a voiceless C in the reduplicant but a voiced C in the base despite the apparent absence of a voice mutation trigger.

Analysis 1 The unexpected discrepancy in the reduplicated forms receives a straightforward explanation if we assume a complex morphological structure for infinitive stems: [INF [root]]. In other words, the infinitive stem is not identical to the verb root but is composed of an infinitive marker affixed to a root. The exponent of the infinitive is a floating [v] feature that is infixed to the right of the first stem consonant: The voiced stem-initial stops in non-reduplicated infinitives such as *bind* are thus the result of integrating [v] into the initial C of the verb root. While [v]-affixation happens at the stem level, [v]-integration (association of the feature to a root node) takes place at the postlexical level. Turning now to agent nouns, I analyze reduplication as being the effect of affixing two defective mora nodes, following the program of Saba Kirchner (2010) and Zimmermann (2014). This means that there are no BR-Faiths constraints available to regulate identity relations between segments in the base and in the reduplicant. Agent noun formation is a word-level process, meaning it applies after [v]-affixation (which takes place at the stem level) but before [v]-integration. For that reason, the onset copy contains a voiceless segment: late [v]-integration counter-feeds voicing mutation overapplication. [v] transparently triggers local mutation on the base C at the postlexical level, leaving the underlying voicelessness of the reduplicant C unharmed. The derivational histories of simple verbs and reduplicated agent nouns is summarized in (2).

(1)

BASE	AGENT NOUN	
bind	o-**p**iː-**b**ind	'write / writer'
dap	o-**t**aː-**d**ap	'launder / launderer'
gaʔ	o-**k**aː-**g**aʔ	'see / seer'
ɟik	o-**c**iː-**ɟ**ik	'buy / buyer'

(2)

LE	SL in	SL out	WL in	WL out	PL in	PL out	
pind	p$_{[v]}$ind	p$_{[v]}$ind	p$_{[v]}$ind	p$_{[v]}$ind	p$_{[v]}$ind	**b**ind	'write'
pind	p$_{[v]}$ind	p$_{[v]}$ind	o $_{[-c]}$ $^{\mu}$ $^{\mu}$ p$_{[v]}$ind	o p iː p$_{[v]}$ind	opiːp$_{[v]}$ind	opiː**b**ind	'writer'

Data 2 Lakota distinguishes plain, ejective, and aspirated voiceless stops. The phonetic nature of the friction noise in C^hV sequences is largely predictable and depends on the quality of the V (Ullrich 2011; Albright 2015). As a general rule of the thumb, friction is glottalic before *e* (/p^{h}e/ → [p^{h}e]) and velaric before *a* (/p^{h}a/ → [p^{x}a]). Lakota also has process of vowel mutation, commonly referred to as ablaut, whereby a final /A/ of some stems raises to *e* before certain clitic-like suffixes. As shown in (3), velaric aspiration exceptionally occurs before a derived (mutated) *e*.

(3)

	'hit'	'try to do'	'tell the truth'
	/ap^{h}A/	/ijut^{h}A/	/wiʧak^{h}A/
no mutation	ap^{x}a-hã	ijut^{x}a-hã	wiʧak^{x}a-hã
e-mutation	a**p^{x}e**-ʃni	iju**t^{x}e**-ʃni	wiʧa**k^{x}e**-ʃni

Analysis 2 The paradigm uniformity effect seen in (3) poses a serious problem for standard modular approaches to phonology: if aspiration quality is a redundant feature computed at the phonology/phonetics interface, the phonetics should not have access to the information whether the vowel in a C^he sequence is derived or not (recall that non-derived *e* is accompanied by glottalic and derived *e* by velaric friction). A theory that rejects the strong notion of REBIRTHING in favor of a less rigid LIMITEDREBIRTHING, however, is able to account for these facts by referring to the type of lines between the vowel and the features associated to it. I analyze ablaut in Lakota as the result of a floating [-l] introduced by a mutation-triggering suffix associating to an underspecified stem-final vowel. Vowels that are fully specified for height features are protected by strong faithfulness constraints and never undergo mutation. If association lines are preserved in the course of a derivation, as stated by LR, the phonetics can make reference to them. In Lakota, the phonetics interprets aspirated transitions before a vowel as glottal if the vowel is linked to a [-l] feature via a non-epenthetic association line ((4)-c). Otherwise, it yields a velaric transition ((4)-ab). This analysis also extends to the same paradigm uniformity effect under ĩ-mutation, another active ablaut process in Lakota affecting /A/-final stems before a different set of suffixes. Similar to e-mutation, ĩ-mutation can be analyzed as resulting from affixation of (among others) a [-l] feature. Under LR, the derivational history of mutated /ĩ/ and the type of association to [-l] is visible at the end of the last phonological stratum. Under RB, the crucial information would not be accessible.

(4)

	LEXICAL ENTRY	WORD L OUTPUT	POSTL. L OUTPUT	ASPIRATION
a.	a [-h] [+l]	a [-h] [+l] [-l]	a [-h] [+l] [-l]	**velar**
b.	A [-h]	e [-h] [-l]	e [-h] [-l]	**velar**
c.	e [-h] [-l]	e [-h] [-l] [-l]	e [-h] [-l] [-l]	**glottal**

Discussion An obvious alternative to the analysis of Seereer presented here is discussed in McLaughlin (2000): using lexically indexed constraints targeting stems with voiced initial plosives, it is possible to straightforwardly account for voicing asymmetries. However, such an analysis loses the desirable unified treatment of continuancy and voicing mutation. The analysis sketched here seemingly runs against the ALTERNATION principle (van Oostendorp 2007), which could be remedied by analyzing voice mutation as involving insertion of an epenthetic LAR node acting as a buffer between the root node and the [v]. Note that recently, however, analyses in Containment which abandon ALTERNATION or make it a violable constraint have also been proposed (Trommer 2016). All in all, the Seereer case seems like a valid candidate for backing the non-deletion hypothesis of LR. The intuition behind the second claim of LR is that association lines are purely phonological in nature and do not have a morphological color to begin with, which is why they are not subject to fading at the interfaces and retain their status (underlying or epenthetic) throughout the course of the derivation. As has been noted in Bermudez-Otero (forth.), the Lakota data are among the very few potential counterexamples to the Russian Doll Theorem; assuming the above said holds, LR could help alleviate this problem. On a final note, the exact implications of LR for standard approaches to DEEs still require more careful scrutinization (Kiparsky 1993; Wolf 2008). Since LR does not abandon the notion of rebirthing of phonological nodes, I expect most traditional cyclic accounts to be compatible with LR.