A Correspondence-theoretic Account of Fixed Segmentism Reduplication

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Abstract

In fixed segmentism reduplication (FSR), reduplication is accompanied by addition of an affix which partially overwrites the reduplicant (the FSR affix). Nevins (2005) claims that the correspondence-theoretic analysis of FSR proposed by Alderete et al. (1999) faces three serious problems: *First*, it predicts the existence of unattested FSR systems where the FSR affix is backcopied to the base. *Second*, it predicts unattested FSR systems where the realization of the FSR affix depends on its relative size with respect to the portion of the reduplicant it strives to overwrite. *Third*, it cannot account for cases where overwriting replaces parts of the reduplicant even though concatenation of the FSR affix and the reduplicant would result in a phonologically licit structure. In this paper, we show that the first problem is empirically flawed since FSR copying is attested, and argue that the second and third problem find a straightforward solution in the independently motivated parametrization of optimality-theoretic constraints.

1. Alderete et al. (1999) on Fixed Segmentism Reduplication

Alderete et al. (1999) distinguish phonological and morphological FSR. In the former, a default segment is phonologically motivated whereas in the latter the fixed segmentism is a kind of affix. An example for phonological FSR is diminutive reduplication in Lushootseed. According to Urbanczyk (1996), the fixed segmentism **í** appears in reduplicants which would otherwise contain marked structure such as stressed schwa (the reduplicative prefix is stress-attracting) or a long vowel (1-a,b), but not with other roots (1-c,d):

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(1) *Reduplication in Lushootseed* (Urbanczyk, 1996)

a. təláw-il	'run'	t**í**-təlaw'-il	'jog'
b. s-du:k^{w}	'knife'	s-d**í**-du:k^{w}	'small knife'
c. čáləs	'go ahead'	čá-čaləs	'go ahead a bit'
d. s-duk^{w}	'bad'	s-dú-ʔ-du:k^{w}	'riff-raff'

These cases are analyzed by Alderete et al. (1999) as phonological *Emergence of the Unmarked* and are irrelevant for our argument. A notorious example for morphological FSR is English **schm**-reduplication which expresses roughly derision or irony. In **schm**-reduplication, the base is copied and **schm** is realized as the onset of the first syllable of the reduplicant, replacing the original onset of the base if necessary:

(2) *English* ***Schm****-reduplication*

a. table	table-schmable
b. plan	plan-schman
c. string	string-schming
d. apple	apple-schmapple

In contrast to cases of phonological FSR, the appearance of **schm** cannot be analyzed as a result of phonological optimization since this consonant combination is highly marked in English. In the correspondence-theoretic analysis proposed in Alderete et al. (1999), **schm** is simply taken to be an affix which is attached to the base concomitantly to reduplication. Hence the English case is parallel to the Bambara reduplication pattern in (3) where base and reduplicant are linked by the affixal element **o** :

(3) *Reduplication in Bambara* (Culy, 1985; Dumestre, 2003)

a. wulu	'dog'	wulu-o-wulu	'whichever dog'
b. malo	'uncooked rice'	malo-o-malo	'whatever uncooked rice'
c. muso	'woman'	muso-o-muso	'whatever woman'

Whereas affixation of **o** generally leads to phonologically wellformed structures in Bambara, only (2-d), based on the vowel-initial base **apple**, is phonotactically licit in English without further modification. Combining **schm** and consonant-initial bases (2-a-c) would lead to clusters such as ***ʃmt** which are excluded in English by high-ranked markedness constraints. Assuming that epenthesis is not possible, either **schm** or the onset of the reduplicant must be deleted, and hence compete for realization – a competition which is resolved by the two faithfulness constraints MAX-IO and MAX-BR, where the former demands realization of all input material in the output, and the latter requires that all segments of the base also appear in the reduplicant.

Reduplication is triggered by the abstract formant RED which consists of no phonological material of its own but whose "content [...] is determined by the base" (Nelson, 2002:321).[1] Thus the input for the OT-grammar consists of the root, the affix **schm** and RED. The correct English pattern is derived by ranking MAX-IO over MAX-BR as illustrated in table (4)[2].

(4) *Analysis:* MAX-IO ≫ MAX-BR

$t_1a_2b_3l_4e_5$-sch_6m_7-RED	MAX-IO	MAX-BR
☞ a. $t_1a_2b_3l_4e_5$-$sch_6m_7a_2b_3l_4e_5$		*
b. $sch_6m_7a_2b_3l_4e_5$-$sch_6m_7a_2b_3l_4e_5$	*!	
c. $sch_6m_7a_2b_3l_4e_5$-$t_1a_2b_3l_4e_5$		*!*
d. $t_1a_2b_3l_4e_5$-$t_1a_2b_3l_4e_5$	*!*	

Nevins' critique of Alderete et al. (1999) does not directly attack this simple and conceptually attractive analysis of the English data, but identifies two problems with the typological predictions of the assumed constraint set and claims that the correspondence-theoretic analysis is inadequate for a similar FSR pattern in Hindi. We will address all three problems in the following sections. Section 2 and 4 discuss the typological problems with backcopying and size-dependent FSR. The Hindi case is addressed in section 5. Section 3 provides an analysis for related problems in the root-and-pattern morphology of Hebrew. We will show that all alleged complications for a correspondence-theoretic analysis are either empirically untenable or are obliterated by the independently motivated parametrization of optimality-theoretic constraints. In sec-

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[1] Strictly speaking, there might be different RED morphemes in a single language resulting in different reduplication patterns (Urbanczyk, 1999). Each distinct RED, i.e. each morpheme which has the RED property, establishes a distinct correspondence relation and is governed by distinct BR faithfulness constraints defined with respect to this relation, which in turn trigger copying. Since we are only dealing with single reduplication processes for any given language, we will skip over these subtleties.

[2] Cf. Alderete et al. (1999:356).

tion 6 we discuss the alternative approach to FSR advocated by Nevins, and in section 7 we present our conclusions.

2. Morphological Backcopying

Because correspondence-theoretic OT allows candidates exhibiting any conceivable modification to the input, one of the possible outcomes in (4) is (4-b), where the FSR affix "backcopies" from the reduplicant to the base. As Nevins correctly points out, this candidate becomes optimal if the ranking of MAX-IO and MAX-BR is reversed:

(5) *Analysis:* MAX-BR ≫ MAX-IO

$t_1a_2b_3l_4e_5$-sch_6m_7-RED	MAX-BR	MAX-IO
a. $t_1a_2b_3l_4e_5$-$sch_6m_7a_2b_3l_4e_5$	*!	
☞ b. $sch_6m_7a_2b_3l_4e_5$-$sch_6m_7a_2b_3l_4e_5$		*
c. $sch_6m_7a_2b_3l_4e_5$-$t_1a_2b_3l_4e_5$	*!*	
d. $t_1a_2b_3l_4e_5$-$t_1a_2b_3l_4e_5$		*!*

Since it is one of the foundational tenets of Optimality Theory that – apart from systematic restrictions on possible rankings – constraints can be freely reranked, this combination of FSR and backcopying should be attested in some language. Hence we expect to find a language English' with the backcopying FSR construction in (5). Nevins (2005) classifies this pattern as typologically not attested and takes this alleged gap as evidence for a morphological approach to reduplication as in Raimy (2000) which he claims to be uncapable to derive fixed segmentism backcopying. We will discuss the differences between the correspondence-theoretic and the representational approach in section 6. Here, we show that backcopying of morphological material is indeed attested in the languages of the world and Nevins' argument is empirically problematic.

First, FSR involving backcopying is found in Siroi, a non-Austronesian language of Papua New Guinea (Wells, 1979; Inkelas and Zoll, 2005). In Siroi, adjectives are reduplicated to express plural formation. In addition to reduplication, the fixed segmentism **g** replaces the onset of the second syllable in disyllabic words (6-a,b) and is infixed in monosyllabic words (6-c). Crucially, **g** does not only appear in the reduplicant but also in the base:[3]

(6) *Reduplication in Siroi* (Wells, 1979)

a.	maye	ma**g**e-ma**g**e	'good'
b.	sungo	su**g**o-su**g**o	'big'
c.	kuen	ku**g**en-ku**g**en	'tall'

A slightly different case of morphological backcopying can be observed in Seereer-Siin, an Atlantic language analyzed in detail by Mc Laughlin (2000). In Seerer, the first consonant of a noun stem undergoes mutation after specific noun class prefixes. Two patterns of mutation are found, voicing mutation (changing a voiced into a voiceless stop (7-a,b)) and continuancy mutation (changing a continuant into a stop, (7-c,d)). In (7), these mutation processes are triggered by the singular class prefix **o-** while the plural forms show the underlying root-initial consonant:

(7) *Consonant Mutation in Seerer-Siin* (Mc Laughlin, 2000)

	Sg	Pl		
a.	o-**c**ir	**ɟ**ir	'sick person'	*Voicing mutation*
b.	o-**k**awul	**g**awul	'griot'	
c.	o-**p**aɗ	**f**aɗ	'slave'	*Continuancy mutation*
d.	o-**t**ew	**r**ew	'woman'	

Consonant mutation interacts with a second process, derivation of agent nouns through reduplication where the reduplicative prefix is truncated to a CV: template (8). The patterns of interest here are the ones in (8-d-g): In contrast to voicing mutation (8-a-c), continuancy mutation affects the initial consonant of the root and applies optionally also to the reduplicant:

[3] Interestingly Siroi also violates the claim of McCarthy and Prince (1999) that there is no backcopying of prosodic templates (the "Kager-Hamilton problem"). Independent evidence for prosodic backcopying is found in Guarijio (Caballero, 2006).

(8) *Reduplication and Mutation in Seerer-Siin* (Mc Laughlin, 2000)

Voicing Mutation: No Featural Transfer

a. bind	'write'	o-pii-bind		'writer'
b. dap	'launder'	o-taa-dap		'launderer'
c. gim	'sing'	o-kii-gim		'singer'

Continuancy Mutation: Optional Featural Transfer

d. xoox	'cultivate'	o-qoo-xoox	o-qoo-**q**oox	'farmer'
e. fec	'dance'	o-pee-fec	o-pee-**p**ec	'dancer'
f. war	'kill'	o-baa-war	o-baa-**b**ar	'killer'
g. riw	'weave'	o-tii-riw	o-tii-**t**iw	'weaver'

Following Mc Laughlin (2000) we assume that mutation in Seerer is featural affixation of the features [–cont] and [–voice]. Under this analysis, backcopying in Seerer, although not FSR in the strict sense, is completely parallel to the situation in Siroi: A (featural) affix can only be realized by overwriting a feature specification of the reduplicant ([–cont] replaces [+cont] of the initial consonant) and this change is copied back to the base. Note that a derivational account of these patterns is problematic: One could assume that for the backcopying options in (8), mutation applies first to the base followed by reduplication. But morphologically mutation in these cases applies to nouns, not to verbs, hence the morphological structure of **o-baa-bar** is as in (9) which implies exactly the opposite ordering of phonological operations: **o** triggers mutation in the noun derived previously by reduplication:

(9) $[\mathrm{o}_{\mathrm{Class}}\ [\mathrm{Red}_{\mathrm{N}}\ [\mathrm{bar}]_{\mathrm{V}}]_{\mathrm{N}}]_{\mathrm{Class}}$

Moreover, the fact that there is no featural transfer for the voicing mutation which can be straightforwardly derived in Correspondence theory by the different ranking of base-reduplicant faithfulness constraints for voicing and continuancy, appears to be a mistery under a derivational account.

We conclude that morphological backcopying in FSR and more generally is empirically attested lending support to the correspondence-theoretic approach to FSR which naturally predicts this type of phenomena.[4]

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[4] Another possible example of morphological backcopying outside of FSR is found in Chumash:

3. Segment-counting Root-and-Pattern Morphology

Nevins extends his attack against a correspondence-theoretic account of FSR to Semitic root-and-pattern morphology based on the analysis of Hebrew denominal verb formation in Ussishkin (1999). Since the Hebrew case offers some essential insights which are important for the analysis of FSR we develop in the following sections, we will discuss this case even though we are not primarily concerned with morphological formations outside of reduplication. In a significant subgroup of Hebrew denominal verb formation, base vowels are overwritten by the vowel melody **i** – **e** and extended to the size of a bisyllabic minimal word by doubling the second root consonant:

(10) *Hebrew Denominal Verb Formation* (Ussishkin, 1999)

a. dam	'blood'	dimem	'to bleed'
b. xam	'hot'	ximem	'to heat'
c. xad	'sharp'	xided	'to sharpen'
d. cad	'side'	cided	'to side with'

Intuitively Ussishkin captures this pattern by the assumption that affixal vowels have to be realized inside the base, but since the size of the resulting structure is restricted to bisyllabicity, not all vowels can be parsed. Preference for the realization of affixal vowels is implemented by two separate faithfulness constraints for stem and affix vowels, MAX-VOWEL-AF and MAX-VOWEL-STEM, ranked in this order. MINWD abbreviates a set of constraints which jointly require that the prosodic word is a bisyllabic foot with a final consonant. INTEGRITY penalizes the doubling of segments:

(i) *Reduplication in Chumash* (Frampton, 2004)

a. s-kitwon	skit-kitwon	'it is coming out'
b. s-ikuk	sik-sikuk	'he is chopping, hacking'
c. s-iš-expeč	sisex-sexpeč	'they two are singing'

McCarthy and Prince (1995) assign the morphological structure s-RED-Root to these forms (where **s-** is an independent prefix), and argue that the segmental prefix is backcopied to the base with vowel-initial roots to satisfy the requirement that the reduplicant should be a heavy syllable (cf. **sik.si.kuk** vs. ***si.ki.kuk** without backcopying). However Inkelas and Zoll (2005) and Frampton (2004) argue against this analysis for Chumash.

(11) *Denominal Verb from Biconsonantal Base* (Ussishkin, 1999)

$d_1a_2m_3$ + i_4 - e_5	MinWd	Max-V-Af	Max-V-Stem	Integrity
a. $d_1a_2m_3e_5m_3$		*!		*
b. $d_1i_4m_3a_2m_3$		*!		*
c. $d_1a_2m_3i_4m_3e_5$	*!			*
☞ d. $d_1i_4m_3e_5m_3$			*	*

For roots with a high vowel, there is an alternative which allows to maintain base *and* affix vowels. The base vowel can be employed as the featurally equivalent glide **j** in the onset position of the second syllable:

(12) *Denominal Verb from Glide-medial Base* (Ussishkin, 1999)

$t_1i_2k_3$ + i_4 - e_5	MinWd	Max-V-Af	Max-V-Stem	Integrity
a. $t_1i_2i_4e_5k_3$	*!			
b. $t_1i_4k_3e_5k_3$			*!	*
☞ c. $t_1i_4j_2e_5k_3$				

According to Nevins, a fatal flaw of this move is that it predicts the wrong result for **dam**. The **i** of the affix melody could also be used as a glide resulting in **dajem** (in the following ☛ indicates candidates which are empirically correct, but do not become optimal under the given ranking):

(13) *Problematic Candidate with Biconsonantal Base* (Nevins, 2005)

$d_1a_2m_3$ + i_4 - e_5	MinWd	Max-V-Af	Max-V-Stem	Integrity
a. $d_1a_2m_3e_5m_3$		*!		*
b. $d_1i_4m_3a_2m_3$		*!		*
c. $d_1a_2m_3i_4m_3e_5$	*!			*
☛ d. $d_1i_4m_3e_5m_3$			*!	*
☞ e. $d_1a_2j_4e_5m_3$				

Nevins attributes this problem to a fundamental problem with Correspondence Theory, namely the implementation of overwriting through constraint evaluation. However, we think that (13-d) is excluded by constraints and techniques which are fairly standard in OT. Note first that although **i** and **j** have the same distinctive features, they are not completely identical: **i** is dominated by a mora while **j** is not, hence replacing the former by the latter violates faithfulness since it implies deletion of a mora penalized by the constraint MAX-μ:

(14) MAX-μ: Input moras should have correspondent moras in the output.

Moreover, we assume that faithfulness constraints are parametrized in a way which is standard in the optimality-theoretic literature, namely the parametrization of faithfulness constraints to the domains affix and stem, which goes back to the original formulation of Correspondence Theory in McCarthy and Prince (1995):

> "It must be, then, that correspondence constraints are tied not only to specific dimensions (B-R, I-O, [...]), but also, in some cases at least, to specific morphemes or morpheme classes. Thus, the full schema for a faithfulness constraint may include such specifics as these: [...] the morphological domain (root, affix, or even specific morpheme) to which the constraint is relevant". (McCarthy and Prince, 1995:17)

In Ussishkin's analysis the parametrization of faithfulness constraints to stems and affixes is applied to the constraint MAX-V giving two MAX constraints which are ranked differently. We apply the same strategy to all faithfulness constraints, namely MAX-μ resulting in the subconstraints MAX-$\mu_{Af(fix)}$ and MAX-$\mu_{S(tem)}$, again with different ranking potential, and in the same way to INTEGRITY. Under the assumption that the vowel melody **i** – **e** contains true, i.e. moraic vowels, this gives straightforwardly the correct results. In (15), the stem vowel can be recycled as a glide since MAX-μ_S is ranked below all other constraints, but in (16) MAX-μ_{Af} which is ranked above INTEGRITY$_S$ blocks turning **i** into a glide by deleting its mora:

(15) *Glide-medial Base under Constraint Parametrization*

$t_1i_2k_3$ + i_4 - e_5	MAX-V$_{Af}$	INT$_{Af}$	MAX-μ_{Af}	MAX-V$_S$	INT$_S$	MAX-μ_S
a. $t_1i_4e_5k_3$				*!		*
b. $t_1i_4k_3e_5k_3$					*!	
☞ c. $t_1i_4j_2e_5k_3$						*

(16) *Biconsonantal Base under Constraint Parametrization*

$d_1a_2m_3$ + i_4 - e_5	MAX-V_{Af}	INT$_{Af}$	MAX-μ_{Af}	MAX-V_S	INT$_S$	MAX-μ_S
a. $d_1a_2m_3e_5m_3$	*!		*		*	
b. $d_1i_4m_3a_2m_3$	*!		*		*	
☞ c. $d_1i_4m_3e_5m_3$				*	*	*
d. $d_1a_2j_4e_5m_3$			*!			

There are two important points to note: First, this analysis systematically violates a metacondition McCarthy and Prince (1995) have proposed for morphologically parametrized faithfulness constraints, the *Root-Affix Faithfulness Metaconstraint*:

(17) *Root-Affix Faithfulness Metaconstraint, RAFM*
RootFaith ≫ AffixFaith (McCarthy and Prince, 1995)

The RAFM is based on the observation that in many harmony processes affixes systematically take over harmonic features from roots, e.g. in root-controlled vowel harmony in Turkish or Finnish. The RAFM is also inspired by the observation that the distribution of marked phonological structure in roots and affixes seems to differ: Affixes generally tend to be less marked than roots and it is "not uncommon to find languages where affixes have no complex onsets, consonant clusters, long vowels, or geminates, even if such structures do appear in roots" (Ussishkin, 1999:72). This is consistent with the assumption that faithfulness constraints for affixes are systematically lower-ranked than the corresponding constraints for roots.

However, there are a number of cases where the RAFM is systematically violated. Thus according to Krämer (2002), in Pulaar it is the suffix which controls vowel harmony for advanced tongue root, as can be seen in (18).[5] The root appears in a [+ATR] and a [–ATR] version according to the [ATR] feature of the suffix (**-du, -u** and **-ru** are allomorphs of the singular class marker, **-ɔ** is the diminutive singular class marker):

[5]Cf. also similar facts in Turkana (Noske, 2001).

(18) *Affix-controlled Vowel Harmony in Pulaar* (Paradis, 1992:87)

[+ATR] Affix	[–ATR] Affix	
a. ser-du	sɛr-ɔn	'rifle butt'
b. ᵐbeel-u	ᵐbɛɛl-ɔn	'shadow'
c. dog-oo-ru	dɔg-ɔ-w-ɔn	'runner'
d. lot-oo-ru	lɔt-ɔ-w-ɔn	'washer'

Also the observation that affixes are generally less marked than roots is problematic. For example, the English inflectional affixes of the shape **-z** and **-d** are probably unmarked with respect to their place of articulation (coronal), but marked in the sense that they are subminimal, i.e. form neither a minimal word nor a minimal syllable. Probably a better way to think about characteristic shapes of affixes is that they are systematically smaller and contain less phonological structure by avoiding branching in the form of complex onsets, codas, etc. See Downing (2006) for a recent discussion of evidence for the general tendency that the morphological status of linguistic expression correlates in a systematic way with phonological size.

There is a second interesting point about the analysis of Hebrew sketched above: The Max constraints relativized to specific morphological domains seem to be ranked "in blocks". All constraints relativized to affix material are ranked above the corresponding constraints relativized to stems. This is crucial for the constraints Max-V and Max-μ which suggests that the RAFM might be replaced by the metacondition on the ranking of faithfulness constraints formulated in (19):

(19) Max-Dep *Adjacency:*
Let α and β be different morphological domains
(e.g root, affix, base-reduplicant),
and $\{C_1, \ldots, C_n\}$ the set of Max and Dep constraints,
then either $\{C_1\alpha \ldots C_n\alpha\} \gg \{C_1\beta \ldots C_n\beta\}$ or
$\{C_1\beta \ldots C_n\beta\} \gg \{C_1\alpha \ldots C_n\alpha\}$.

(19) licenses the ranking in (15) and (16) summarized schematically in (20-a), but also the ranking in (20-b), where the constraints relativized to stems and affixes are systematically flipped. What is systematically excluded are rankings as in (20-c,d), where stem and affix Max constraints alternate in their ranking:

(20)

a. $\textsc{Max}\text{-}V_{Af} \gg \ldots \gg \textsc{Max}\text{-}\mu_{Af} \gg \ldots \gg \textsc{Max}\text{-}V_{S} \gg \ldots \gg \textsc{Max}\text{-}\mu_{S}$
b. $\textsc{Max}\text{-}V_{S} \gg \ldots \gg \textsc{Max}\text{-}\mu_{S} \gg \ldots \gg \textsc{Max}\text{-}V_{Af} \gg \ldots \gg \textsc{Max}\text{-}\mu_{Af}$
c. $\textsc{Max}\text{-}V_{Af} \gg \ldots \gg \textsc{Max}\text{-}\mu_{S} \gg \ldots \gg \textsc{Max}\text{-}V_{S} \gg \ldots \gg \textsc{Max}\text{-}\mu_{Af}$
d. $\textsc{Max}\text{-}V_{S} \gg \ldots \gg \textsc{Max}\text{-}\mu_{Af} \gg \ldots \gg \textsc{Max}\text{-}V_{Af} \gg \ldots \gg \textsc{Max}\text{-}\mu_{S}$

The generalization expressed by MAX-DEP Adjacency does not extend to IDENT constraints since morphological backcopying in Seerer-Siin crucially depends on ranking IDENT-BR higher (or on par) than IDENT-IO for continuancy, but lower for voicing. However, (19) covers also DEP constraints. For example for the constraints $\textsc{Max}_{S}$, $\textsc{Dep}_{S}$, $\textsc{Max}_{Af}$, and $\textsc{Dep}_{Af}$ only the rankings subsumed by (21-a) and (21-b) are licit according to (20), excluding other conceivable rankings such as (21-c) and (21-d):

(21)

a. $\{\textsc{Max}_{S}, \textsc{Dep}_{S}\} \gg \{\textsc{Max}_{Af}, \textsc{Dep}_{Af}\}$
b. $\{\textsc{Max}_{Af}, \textsc{Dep}_{Af}\} \gg \{\textsc{Max}_{S}, \textsc{Dep}_{S}\}$
c. $\textsc{Max}_{Af} \gg \textsc{Max}_{S} \gg \textsc{Dep}_{Af} \gg \textsc{Dep}_{S}$
d. $\textsc{Max}_{Af} \gg \textsc{Dep}_{S} \gg \textsc{Dep}_{Af} \gg \textsc{Max}_{S}$

The consequences of MAX-DEP Adjacency for DEP constraints will play a crucial role for our analysis of segment-counting FSR in section 4.

4. Segment-counting Fixed Segmentism Reduplication

Since Alderete et al. (1999) derive overwriting in English FSR through a faithfulness constraint which effectively compares whether the root onset or the FSR affix are longer – MAX-IO prefers realization of more input segments – one can easily imagine scenarios, in which varying the size of the root onset should yield different FSR patterns. As Nevins (2005) formulates it:

> "Faithfulness constraints that are evaluated on the basis of segment counting predict a typology of languages in which ... optimization dictates that the relative *size* of the affixal material determines whether it will win out and 'overwrite' the base ..." (Nevins, 2005:275)

In the tableaus (22) and (23), we show that the analysis of Alderete et al. (1999) predicts precisely those inconsistent patterns depending on the size of the base onset. (22) illustrates the English ranking for a root without onset. Backcopying of the FSR affix (22-b) comes “for free” (without the necessity to overwrite and to violate MAX-IO) and fares equally well as the correct candidate (22-a):

(22) *Wrong Prediction for Vowel-initial Base* (Nevins, 1995)

$a_1pp_2l_3e_4$-sch_5m_6-RED	MAX-IO	MAX-BR
☞ a. $a_1pp_2l_3e_4$-$sch_5m_6a_1pp_2l_3e_4$		
☞ b. $sch_5m_6a_1pp_2l_3e_4$-$sch_5m_6a_1pp_2l_3e_4$		
c. $sch_5m_6a_1pp_2l_3e_4$-$a_1pp_2l_3e_4$		*!*
d. $a_1pp_2l_3e_4$-$a_1pp_2l_3e_4$	*!*	

In (23) **schm**-reduplication for the English' ranking is shown for lexemes with different onset lengths. Straightforward backcopying only occurs with bases of onset length 1. With onset-less bases and bases starting with two consonants we get optionality. With a base whose onset contains three consonants, the FSR affix is suppressed:

(23) *Inconsistent FSR in English'*

	MAX-BR	MAX-IO
1: $a_1pp_2l_3e_4$-sch_5m_6-RED		
☞ a. $a_1pp_2l_3e_4$-$sch_5m_6a_1pp_2l_3e_4$		
☞ b. $sch_5m_6a_1pp_2l_3e_4$-$sch_5m_6a_1pp_2l_3e_4$		
c. $a_1pp_2l_3e_4$-$a_1pp_2l_3e_4$		*!*
2: $t_1a_2b_3l_4e_5$-sch_6m_7-RED		
a. $t_1a_2b_3l_4e_5$-$sch_6m_7a_2b_3l_4e_5$	*!	
☞ b. $sch_6m_7a_2b_3l_4e_5$-$sch_6m_7a_2b_3l_4e_5$		*
c. $t_1a_2b_3l_4e_5$-$t_1a_2b_3l_4e_5$		**!
3: $p_1l_2a_3n_4$-sch_5m_6-RED		
a. $p_1l_2a_3n_4$-$sch_5m_6a_3n_4$	*!*	
☞ b. $sch_5m_6a_3n_4$-$sch_5m_6a_3n_4$		**
☞ c. $p_1l_2a_3n_4$-$p_1l_2a_3n_4$		**
4: $s_1t_2r_3i_4ng_5$-sch_6m_7-RED		
a. $s_1t_2r_3i_4ng_5$-$sch_6m_7i_4ng_5$	*!**	
b. $sch_6m_7i_4ng_5$-$sch_6m_7i_4ng_5$		***!
☞ c. $s_1t_2r_3i_4ng_5$-$s_1t_2r_3i_4ng_5$		**

As Nevins argues, there are no attested cases of FSR where the realization of the FSR affix depends on the number of segments in the base, hence the factorial typology of the correspondence-theoretic analysis seems to make a wrong prediction. This problem cannot be solved by simply adding more constraints. Assuming a ranking where MAX-BR and MAX-IO, ranked in this order, are ranked highest, at least the outputs for **table** and **string** will be just as in (23), no matter what other constraints are ranked lower. Hence inconsistent FSR triggered by segment counting would still be part of the factorial typology.

We accept Nevins' conclusion that the analysis of Alderete et al. (1999) is seriously flawed by this misprediction, but we don't think that it points to any fundamental problem of OT or Correspondence Theory. Instead we argue that patterns as in (23) are excluded by standard means of parametrizing faithfulness constraints to the domains affix and stem which we have introduced in section 3. Restricting ourselves to MAX and DEP constraints the following faithfulness constraints are relevant for FSR:[6]

(24)
a. MAX-S: Every segment of the stem in the input has a correspondent in the base in the output.
b. DEP-S: Every segment of the base in the output has a correspondent in the stem in the input.
c. MAX-AF: Every segment of an affix in the input has a correspondent in an affix in the output.
d. DEP-AF: Every segment of an affix in the output has a correspondent in an affix in the input
e. MAX-BR: Every segment in the base has a correspondent in the reduplicant.
f. DEP-BR: Every segment in the reduplicant has a correspondent in the base.

According to the MAX-DEP Adjacency Condition stated in (19), MAX and DEP constraints relativized to a specific morphological domain are effectively organized in blocks which are ranked uniformly with respect to MAX and DEP constraints relativized to other morphological domains. This allows to represent possible rankings of the constraints in (24) as concisely as in (25) to (27) where the corresponding pairs of MAX and DEP violations are summarized as FAITH-S, FAITH-AF, and FAITH-BR, while the single MAX and DEP violations are indicated by "m" and "d" respectively in the single cells. If stem and affix-faithfulness constraints are undominated, we get the English pattern:[7]

---

[6]Contra McCarthy and Prince (1993) we take it for granted that epenthetic segments are morphologically affiliated to stems or affixes depending on the consequences of their affiliation for the constraint ranking. The claim of McCarthy and Prince that epenthetic segments are without any morphological affiliation makes a unified parametrization of faithfulness constraints impossible since constraint such as DEP-IO$_{\text{Affix}}$ and Dep-IO$_{\text{Stem}}$ would never be violated.

[7]Although the abstract morpheme RED is often characterized as an affix, we take it to be invisible for input-output faithfulness constraints, and more specifically for faithfulness constraints relativized to affixes. This hypothesis should be uncontroversial for MAX and IDENT constraints: Since RED morphemes do not have any input segments there are no segments which could be deleted or modified in the output. We assume that RED is also "invisible" for input-output DEP constraints.

(25) *Possible Rankings for English*

	FAITH-S	FAITH-AF	...
1: $a_1pp_2l_3e_4$-sch_5m_6-RED			
☞ a. $a_1pp_2l_3e_4$-$sch_5m_6a_1pp_2l_3e_4$			
b. $sch_5m_6a_1pp_2l_3e_4$-$sch_5m_6a_1pp_2l_3e_4$	dd!		
c. $a_1pp_2l_3e_4$-$a_1pp_2l_3e_4$		mm!	
2: $t_1a_2b_3l_4e_5$-sch_6m_7-RED			
☞ a. $t_1a_2b_3l_4e_5$-$sch_6m_7a_2b_3l_4e_5$			
b. $sch_6m_7a_2b_3l_4e_5$-$sch_6m_7a_2b_3l_4e_5$	mdd!		
c. $t_1a_2b_3l_4e_5$-$t_1a_2b_3l_4e_5$		mm!	
3: $p_1l_2a_3n_4$-sch_5m_6-RED			
☞ a. $p_1l_2a_3n_4$-$sch_5m_6a_3n_4$			
b. $sch_5m_6a_3n_4$-$sch_5m_6a_3n_4$	mmdd!		
c. $p_1l_2a_3n_4$-$p_1l_2a_3n_4$		mm!	
4: $s_1t_2r_3i_4ng_5$-sch_6m_7-RED			
☞ a. $s_1t_2r_3i_4ng_5$-$sch_6m_7i_4ng_5$			
b. $sch_6m_7i_4ng_5$-$sch_6m_7i_4ng_5$	mmmdd!		
c. $s_1t_2r_3i_4ng_5$-$s_1t_2r_3i_4ng_5$		mm!	

Backcopying results if affix and base-reduplicant faithfulness constraints are ranked highest:

(26) *Backcopying Rankings*

	FAITH-AF	FAITH-BR	…
$a_1pp_2l_3e_4$-sch_5m_6-RED			
a. $a_1pp_2l_3e_4$-$sch_5m_6a_1pp_2l_3e_4$		dd!	
☞ b. $sch_5m_6a_1pp_2l_3e_4$-$sch_5m_6a_1pp_2l_3e_4$			
c. $a_1pp_2l_3e_4$-$a_1pp_2l_3e_4$	dd!		
$t_1a_2b_3l_4e_5$-sch_6m_7-RED			
a. $t_1a_2b_3l_4e_5$-$sch_6m_7a_2b_3l_4e_5$		mdd!	
☞ b. $sch_6m_7a_2b_3l_4e_5$-$sch_6m_7a_2b_3l_4e_5$			
c. $t_1a_2b_3l_4e_5$-$t_1a_2b_3l_4e_5$	mm!		
$p_1l_2a_3n_4$-sch_5m_6-RED			
a. $p_1l_2a_3n_4$-$sch_5m_6a_3n_4$		mmdd!	
☞ b. $sch_5m_6a_3n_4$-$sch_5m_6a_3n_4$			
c. $p_1l_2a_3n_4$-$p_1l_2a_3n_4$	mm!		
$s_1t_2r_3i_4ng_5$-sch_6m_7-RED			
a. $s_1t_2r_3i_4ng_5$-$sch_6m_7i_4ng_5$		mmmdd!	
☞ b. $sch_6m_7i_4ng_5$-$sch_6m_7i_4ng_5$			
c. $s_1t_2r_3i_4ng_5$-$s_1t_2r_3i_4ng_5$	mm!		

Finally we get complete suppression of the FSR affix if stem and base-reduplicant faithfulness constraints are undominated. Under this ranking, FSR can not be distinguished from reduplication without fixed segmentism in the input:

(27) *Suppression of the FSR Affix*

	Faith-S	Faith-BR	…
$a_1pp_2l_3e_4$-sch_5m_6-RED			
a. $a_1pp_2l_3e_4$-$sch_5m_6a_1pp_2l_3e_4$		dd!	
b. $sch_5m_6a_1pp_2l_3e_4$-$sch_5m_6a_1pp_2l_3e_4$	dd!		
☞ c. $a_1pp_2l_3e_4$-$a_1pp_2l_3e_4$			
$t_1a_2b_3l_4e_5$-sch_6m_7-RED			
a. $t_1a_2b_3l_4e_5$-$sch_6m_7a_2b_3l_4e_5$		mdd!	
b. $sch_6m_7a_2b_3l_4e_5$-$sch_6m_7a_2b_3l_4e_5$	mdd!		
☞ c. $t_1a_2b_3l_4e_5$-$t_1a_2b_3l_4e_5$			
$p_1l_2a_3n_4$-sch_5m_6-RED			
a. $p_1l_2a_3n_4$-$sch_5m_6a_3n_4$		mmdd!	
b. $sch_5m_6a_3n_4$-$sch_5m_6a_3n_4$	mmdd!		
☞ c. $p_1l_2a_3n_4$-$p_1l_2a_3n_4$			
$s_1t_2r_3i_4ng_5$-sch_6m_7-RED			
a. $s_1t_2r_3i_4ng_5$-$sch_6m_7i_4ng_5$		mmmdd!	
b. $sch_6m_7i_4ng_5$-$sch_6m_7i_4ng_5$	mmmdd!		
☞ c. $s_1t_2r_3i_4ng_5$-$s_1t_2r_3i_4ng_5$			

Since (25) to (27) exhaust all ranking possibilities, it is easy to see that the constraint system in (24) systematically excludes segment-counting FSR, i.e. FSR where realization and backcopying of the FSR affix varies with the phonological size of the base. To see that the Max-Dep Adjacency condition is crucial to exclude this kind of patterning consider just one ranking where it is not obeyed. Thus in (28), Max-Af ≫ Max-S ≫ Dep-BR dominate all other faithfulness constraints, and we get backcopying of **schm** with vowel-initial bases, but not with consonant-initial ones:

(28) *Inconsistent FSR Backcopying*

	MAX-AF	MAX-S	DEP-BR	...
1: a$_1$pp$_2$l$_3$e$_4$-sch$_5$m$_6$-RED				
a. a$_1$pp$_2$l$_3$e$_4$-sch$_5$m$_6$a$_1$pp$_2$l$_3$e$_4$			*!*	
☞ b. sch$_5$m$_6$a$_1$pp$_2$l$_3$e$_4$-sch$_5$m$_6$a$_1$pp$_2$l$_3$e$_4$				
c. a$_1$pp$_2$l$_3$e$_4$-a$_1$pp$_2$l$_3$e$_4$	*!*			
2: t$_1$a$_2$b$_3$l$_4$e$_5$-sch$_6$m$_7$-RED				
☞ a. t$_1$a$_2$b$_3$l$_4$e$_5$-sch$_6$m$_7$a$_2$b$_3$l$_4$e$_5$			**	
b. sch$_6$m$_7$a$_2$b$_3$l$_4$e$_5$-sch$_6$m$_7$a$_2$b$_3$l$_4$e$_5$		*!		
c. t$_1$a$_2$b$_3$l$_4$e$_5$-t$_1$a$_2$b$_3$l$_4$e$_5$	*!*			
3: p$_1$l$_2$a$_3$n$_4$-sch$_5$m$_6$-RED				
☞ a. p$_1$l$_2$a$_3$n$_4$-sch$_5$m$_6$a$_3$n$_4$			**	
b. sch$_5$m$_6$a$_3$n$_4$-sch$_5$m$_6$a$_3$n$_4$		*!*		
c. p$_1$l$_2$a$_3$n$_4$-p$_1$l$_2$a$_3$n$_4$	*!*			
4: s$_1$t$_2$r$_3$i$_4$ng$_5$-sch$_6$m$_7$-RED				
☞ a. s$_1$t$_2$r$_3$i$_4$ng$_5$-sch$_6$m$_7$i$_4$ng$_5$			**	
b. sch$_6$m$_7$i$_4$ng$_5$-sch$_6$m$_7$i$_4$ng$_5$		*!**		
c. s$_1$t$_2$r$_3$i$_4$ng$_5$-s$_1$t$_2$r$_3$i$_4$ng$_5$	*!*			

5. Phonologically Unmotivated Overwriting in Hindi

In our discussion of English, we have systematically neglected a candidate like ***schmtable-schmtable** which does not violate any faithfulness constraint: no root material is deleted or inserted, the affix is realized and base and reduplicant are maximally faithful to each other. By assumption, such a candidate is ruled out by high-ranked markedness constraints banning onsets like **schmt** in English. The final problem Nevins addresses in his paper is an FSR formation in Hindi where overwriting happens even though non-overwriting would result in a phonotactically licit sound sequence of the language. In the relevant reduplication pattern, **v** systematically overwrites the first consonant of the root, as can be seen in (29):[8]

[8]We abstract away from the fact that in cases, where the root onset is already **v**, the allomorph **ʃ** appears in the reduplicant instead of **v**.

(29) *FSR in Hindi* (Nevins, 2005:280)

a. roti roti-voti 'bread and the like'
b. mez mez-vez 'tables and the like'
c. tras tras-vras 'grief and the like'
d. aam aam-vaam 'mangoes and the like'

If **v** is simply an affix we would incorrectly expect ***roti-vroti** for (29-a). The markedness constraint in (30) banning a consonant cluster like **vr** cannot be ranked high in Hindi since this very same onset can be found in the reduplicated form **tras-vras**.

(30) $*[_\sigma$CC: Onsets are simple. (Kager, 1999)

The dilemma of ranking $*[_\sigma$CC high enough to rule out **roti-vroti** and low enough to allow **tras-vras** is sketched in (31) and (32). If $*[_\sigma$CC is ranked above FAITH-BR (31), we get the correct output for the input **roti** (29-a), but incorrect overwriting for **vras** (29-c). The opposite ranking (32) makes the right prediction for **tras**, but leads incorrectly to non-overwriting for the onset of **roti**:

(31) *FSR in Hindi with* $*[_\sigma$CC *Dominating* FAITH-BR

	FAITH-AF	FAITH-S	$*[_\sigma$CC	FAITH-BR
$r_1o_2t_3i_4$-v_5-RED				
☞ a. $r_1o_2t_3i_4$-$v_5o_2t_3i_4$				md
b. $v_5o_2t_3i_4$-$v_5o_2t_3i_4$		md!		
c. $r_1o_2t_3i_4$-$r_1o_2t_3i_4$	m!			
d. $r_1o_2t_3i_4$-$v_5r_1o_2t_3i_4$			*!	d
e. $v_5r_1o_2t_3i_4$-$v_5r_1o_2t_3i_4$		d!	**	
$t_1r_2a_3s_4$-v_5-RED				
☛ a. $t_1r_2a_3s_4$-$v_5r_2a_3s_4$			*!*	md
b. $v_5a_3s_4$-$v_5a_3s_4$		mmd!		
☞ c. $t_1r_2a_3s_4$-$v_5a_3s_4$			*	mmd
d. $t_1r_2a_3s_4$-$t_1r_2a_3s_4$	m!		**	

(32) *FSR in Hindi with* Faith-BR *Dominating* $*[_\sigma CC$

	Faith-Af	Faith-S	Faith-BR	$*[_\sigma CC$
$r_1o_2t_3i_4$-v_5-RED				
☛ a. $r_1o_2t_3i_4$-$v_5o_2t_3i_4$			md!	
b. $v_5o_2t_3i_4$-$v_5o_2t_3i_4$		md!		
c. $r_1o_2t_3i_4$-$r_1o_2t_3i_4$	m!			
☞ d. $r_1o_2t_3i_4$-$v_5r_1o_2t_3i_4$			d	*
e. $v_5r_1o_2t_3i_4$-$v_5r_1o_2t_3i_4$		d!		**
$t_1r_2a_3s_4$-v_5-RED				
☞ a. $t_1r_2a_3s_4$-$v_5r_2a_3s_4$			md	**
b. $v_5a_3s_4$-$v_5a_3s_4$		mmd!		
c. $t_1r_2a_3s_4$-$v_5a_3s_4$			mmd!	*
d. $t_1r_2a_3s_4$-$t_1r_2a_3s_4$	m!			**

As before we will show that the insufficiency of a simple OT-analysis does not reveal any general problem with correspondence-theoretic OT, but can be straightforwardly resolved by a finer-grained analysis invoking constraint parametrization.

The crucial observation is now that Hindi does not prohibit complex onsets in general but a complex onset in the reduplicant not being present in the base. Whether the reduplicant violates a markedness constraint is not decided in isolation but in comparison with the violations of the base. This is highly reminiscent of a state of affairs captured in McCarthy (2003) by "Comparative Markedness". We will first sketch McCarthy's theory and then show that a natural generalization of his approach accounts naturally for the Hindi data.

In Comparative Markedness Theory, markedness constraints are parametrized with respect to the "fully faithful candidate" (FFC), the candidate for a given constraint evaluation which is maximally faithful to the input structure. Consequently every standard markedness constraint M is replaced by two constraints $_OM$ and $_NM$, where $_O$M assigns violation-marks to "old" marked structures, i.e. those being present in the FFC, and $_N$M penalizes "new" marked structures, i.e. those not being present in the FFC So $_N$M compares candidates in the output assigning violation marks only if it has not assigned a violation mark to one designated candidate. A typical example of a comparative markedness effect is voicing assimilation in Mekkan Arabic (McCarthy, 2003; Abu-Mansour, 1996; Bakalla, 1973), where voicing of underlying obstruents is generally retained in the output (33-a), but voiced coda obstruents assimilate in voicing to a following voiceless obstruent (33-b). However, a voiceless coda obstruent does not assimilate to a following voiced obstruent (33-c):

(33) *Mekkan Arabic Voicing Assimilation*
(Abu-Mansour, 1996; Bakalla, 1973)

a. /ʔibnu/ ʔibnu 'his son'
b. /ʔagsam/ ʔaksam 'he swore an oath'
c. /ʔakbar/ ʔakbar 'older'

Crucially, the markedness constraint NoVoicedObstruent (NoVcdOb) is obeyed in blocking a *new* voiced obstruent through assimilation (***agbar**), but can be violated by an *old* voiced obstruent, i.e. one which is already present in the input. The tableaus in (34) show how parametrization of (NoVcdOb) allows to derive this ambiguous behavior of the markedness constraint:

(34) *Mekkan Arabic Voicing Assimilation* (McCarthy, 2003)

	$_{N}$NoVcdOb	Agr(voice)	Id(voice)	$_{O}$NoVcdOb
ʔ$_1$a$_2$g$_3$s$_4$a$_5$m$_6$				
☞ a. ʔ$_1$a$_2$k$_3$s$_4$a$_5$m$_6$			*	
b. ʔ$_1$a$_2$g$_3$s$_4$a$_5$m$_6$		*!		
ʔ$_1$a$_2$k$_3$b$_4$a$_5$r$_6$				
☞ a. ʔ$_1$a$_2$k$_3$b$_4$a$_5$r$_6$		*		
b. ʔ$_1$a$_2$g$_3$b$_4$a$_5$r$_6$	*!		*	*
ʔ$_1$i$_2$b$_3$n$_4$u$_5$				
☞ a. ʔ$_1$i$_2$b$_3$n$_4$u$_5$				*
b. ʔ$_1$i$_2$p$_3$n$_4$u$_5$			*!	

As McCarthy notes, Comparative Markedness naturally extends from input-output correspondence to other types of correspondence. Thus in a derived-environment effect such as Korean palatalization, palatalization of **t** only applies if it is triggered by a following **i** across a morpheme boundary.

(35) *Korean Palatalization* (Ahn, 1998)

a. /pat^h-i/ → pac^{h}i 'field-COP'
/mat-i/ → maci 'eldest-NOM'
/put^h-i/ → puc^{h}i 'to stick to-CAUS'
/tot-i/ → toci 'rise-NOM'
b. /mati/ → mati 'knot'
/kac^{h}i/ → kac^{h}i 'value'

This pattern can be captured by splitting the markedness constraint PAL, which penalizes instances of coronal consonants followed by **i**, relativizing it to Comparative Markedness in output-output (OO) correspondence. Thus OO-$_{O}$PAL targets **ti**-sequences which are already present in the (output of the) morphological base of the evaluated form, while OO-$_{N}$PAL targets violations which are new in the sense that they appear in the output of the derived (in this case affixed) form, but not in the (unaffixed) morphological base. Assuming that only the latter constraint is ranked above the relevant faithfulness constraints it follows that the forms in (35-a) undergo palatalization, but not the ones in (35-b).

We expect that the same extension as for output-output correspondence also applies to base-reduplicant correspondence, and in fact this is what happens in the Hindi FSR case. Hence *[$_\sigma$CC is replaced by the constraints in (36):

(36) a. BR$_{N}$*[$_\sigma$CC: Avoid complex onsets in the reduplicant which do not have a counterpart in the base.
b. BR$_{O}$*[$_\sigma$CC: Avoid complex onsets in the reduplicant which have a counterpart in the base.

By ranking BR$_{N}$*[$_\sigma$CC over FAITH-BR over BR$_{O}$*[$_\sigma$CC, the correct candidate **roti-voti** becomes optimal since **roti-vroti** creates a "new" complex onset not corresponding to a complex onset in the base and therefore violates BR$_{N}$*[$_\sigma$CC. This complex onset can be prohibited without causing any problem for **tras-vras**. The latter only violates the deeper ranked BR$_{O}$*[$_\sigma$CC, and not the high-ranked BR$_{N}$*[$_\sigma$CC since the complex onset **vr** in the reduplicant corresponds to the complex onset **tr** in the base. The tableaus in (37) illustrates the derivation of the correct FSR-pattern in Hindi. As can be seen, the low-ranked BR$_{O}$*[$_\sigma$CC does not decide optimality in any competition (FAITH is abbreviated as F).

(37) *Hindi FSR with Comparative Markedness Constraints*

	F-AF	F-S	BR_N *[$_\sigma$CC	F-BR	BR_O *[$_\sigma$CC
$r_1o_2t_3i_4$-v_5-RED					
☞ a. $r_1o_2t_3i_4$-$v_5o_2t_3i_4$				md	
b. $v_5o_2t_3i_4$-$v_1o_2t_3i_4$		md!			
c. $r_1o_2t_3i_4$-$r_1o_2t_3i_4$	m!				
d. $r_1o_2t_3i_4$-$v_5r_1o_2t_3i_4$			*!	d	
e. $v_5r_1o_2t_3i_4$-$v_5r_1o_2t_3i_4$		d!			*
$t_1r_2a_3s_4$-v_5-RED					
☞ a. $t_1r_2a_3s_4$-$v_5r_2a_3s_4$				md	*
b. $v_5a_3s_4$-$v_5a_3s_4$		mmd!			
c. $t_1r_2a_3s_4$-$v_5a_3s_4$				mmd!	
d. $t_1r_2a_3s_4$-$t_1r_2a_3s_4$	m!			md	*

6. Fixed Segmentism Reduplication and Readjustment

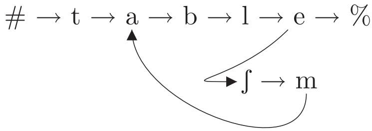
As an alternative to the correspondence-theoretic FSR, Nevins advocates the approach of Raimy (2000) who also provides an analysis of English **schm**-reduplication.[9] In Raimy's approach precedence relations between the segments of a string are explicit represented by links depicted as arrows. For example, Raimy encodes the word **table** as in (38), where "#" represents the beginning and "%" the end of the string:

(38) $\# \rightarrow t \rightarrow a \rightarrow b \rightarrow l \rightarrow e \rightarrow \%$

Reduplication is then analyzed as the effect of readjustment rules, morphosyntactically conditioned phonological rules familiar from Distributed Morphology (Halle and Marantz, 1993). While readjustment rules are generally a rather unrestrictive device, the rules assumed by Raimy for **schm**-reduplication just introduce additional precedence links for **schm** linking the last base consonant to the beginning of **schm** and looping back from the end of **schm** to the first vowel of the base:

[9] We will abstract away from technical differences between Raimy's framework and different formalizations in the work of Nevins. Cf. e.g. Nevins (2002, 2006).

(39)



Since Raimy assumes that looping representations cannot be pronounced, they are repaired at linearization resulting in phonetic doubling of the looping material as in (40):

(40) #→ t → a → b → l → e → ʃ→ m → a → b → l → e → %

In the same vein, Nevins provides an explicit analysis of FSR in Hindi assuming the two readjustment rules paraphrased in (41):

(41) *Readjustment Rules for Hindi*

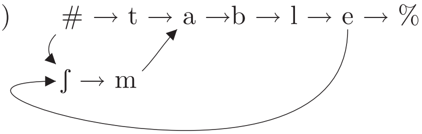
a. If the base starts with a consonant, add precedence links from the last segment of the base to **v**, and from **v** to the second segment of the base.

b. Add a precedence link from the last segment of the base to **v**, and from **v** to the first segment of the base.

In effect, (41-a) reduplicates the base of consonant-initial bases and replaces the initial consonant in the reduplicant with **v**. Under the assumption that (41-a) and (41-b) are disjunctively ordered according to the Elsewhere Principle, (41-b) is restricted to vowel-initial bases, and modifies them by reduplication and prefixing **v** to the reduplicant. In the following paragraphs we will discuss how the readjustment approach fares for the problems Nevins raises for the correspondence-theoretic account:

Backcopying: Unfortunately, it is not entirely clear what typological predictions the readjustment approach to FSR makes. Consider first backcopying in general. The crucial question is whether a single readjustment rule or an ordered sequence of readjustment rules could effect a change from (38) to (42) which would amount to replacing the onset of the base by **schm** and applying total reduplication to the resulting form:[10]

(42)



Since non-reduplicative readjustment rules seem to be capable to perform quite radical segmental changes,[11] and full reduplication is a standard operation in Raimy's model, we suppose that overwriting and concomitative reduplicative backcopying might well be in the formal range of the framework.

Segment-counting Fixed Segmentism Reduplication: Nevins' formalism is clearly capable to capture specific types of segment-counting FSR. Thus imagine a language Hindi' which replaces (41) by the following rules:[12]

(43) *Readjustment Rules for Hindi'*

a. If the base starts with two consonants, add a precedence link from the last segment of the base to the first segment of the base.
b. If the base starts with a consonant, add precedence links from the last segment of the base to **v**, and from **v** to the second segment of the base.
c. Add a precedence link from the last segment of the base to **v**, and from **v** to the first segment of the base.

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[10] Linearization brings about that **t** in (42) is not pronounced since it resides on a dead branch of the precedence relation. See Nevins and Guimarañes (2006) for technical details.

[11] For example, Halle and Marantz (1993:128) suggest a readjustment rule which replaces the rime of the verbs **shall**, **will**, **can** and **stand** by **u** in past finite forms.

[12] One might argue that (43-a) is not a licit readjustment rule because grammatical processes are not allowed to "count" segments. However, also Nevins' rules clearly target the second base consonants, and for phenomena such as syllable weight and foot construction it seems to be indispensable to check whether there are at least two instances of specific phonological entities (e.g. moras and syllables) in a given domain.

In Hindi' **v** appears only if the base is onset-less (**aam** → **aam-vaam**) or starts with a single consonant (**roti** → **roti-voti**), but for base forms with complex onsets, no overwriting happens (**tras** → **tras-tras**). If we allow a single readjustment rule to cause backcopying (cf. the discussion above), we can capture an even more familiar pattern (Hindi'') where **v**-attachment and backcopying obtain for bases starting with vowels or single consonants (**aam** → **vaam-vaam**, **roti** → **voti-voti**), while overwriting fails again for bases starting with more consonants (**tras** → **tras-tras**):

(44) *Readjustment Rules for Hindi''*

a. If the base starts with two consonants, add a precedence link from the last segment of the base to the first segment of the base.
b. If the base starts with a consonant, add precedence links from the start symbol to **v**, from **v** to the second segment of the base, and from the last segment of the base to **v**.
c. Add precedence links from the start symbol to **v**, from **v** to the first segment of the base, and from the last segment of the base to **v**.

(44) is a system which, apart from the optionality there, is very similar to the segment-counting version of English' sketched in (23): Back-copying happens if the FSR affix is as long or longer than the onset of the base, otherwise the FSR affix is suppressed. Still another system which might be derived (Hindi''') is one where consonant-initial bases exhibit reduplication and overwriting by **v** in the reduplicant (**roti** → **roti-voti**, **tras** → **tras-vras**), while vowel-initial bases undergo full reduplication without a fixed segment (**aam** → **aam-aam**).

(45) *Readjustment Rules for Hindi'''*

a. If the base starts with a consonant, add precedence links from the last segment of the base to **v**, and from **v** to the second segment of the base.
b. Add a precedence link from the last segment of the base to the first segment of the base.

Hindi''' exemplifies a kind of "anti-competition" pattern. The FSR appears only if it can overwrite, but not where it would form the onset of the reduplicant without competition. It is unclear to us whether Hindi', Hindi'', or Hindi''' are possible FSR patterns. They are impossible under the correspondence-theoretic analysis developed in this paper since they fall outside the factorial typology introduced in section 4, and are clearly not motivated by Comparative Markedness constraints (cf. section 5). Since none of the FSR types deriving from (43) to (45) seems to be attested, we conclude that the readjustment-based approach is overly powerful. Ironically it runs into roughly the same kind of problems which Nevins attested to the analysis of Alderete et al. (1999).

Fixed Segmentism Reduplication in Hindi: Although Nevins' formalism is capable to capture the Hindi data, it does so at the cost of duplicating crucial morphological information: Two distinct rules specify the same affix (**v**) and cause reduplication under minimally distinct conditions. Nevins counters this objection by stating that "any formulation of a rule or set of constraints for Hindi FSR must say something of the form 'If consonant-initial, do this; otherwise, if vowel-initial, do that,' which, the form of English conditional clauses notwithstanding, represent two distinct processes" (Nevins, 2005:285). However, under the optimality-theoretic analysis sketched in section 5 the different behavior of vowel-initial and consonant-initial bases follows from independently motivated phonological constraints, not from language-specific morphological stipulation. More generally, it is unclear whether morphological rules must have the capability to distinguish syllables with onsets from those without, while this is uncontroversial in the case of phonological constraints, which clearly favors a phonological account of the Hindi data.

7. Conclusion

Fixed segmentism reduplication involving backcopying of the FSR affix to the base is clearly a formal possibility employed in human language, while segment-counting FSR is so far unattested. We have shown that this state of affairs is captured best by a correspondence-theoretic account of reduplication taking full advantage of the independently motivated parametrization for faithfulness constraints, with minimal additional assumptions. The apparently phonologically unmotivated overwriting in the FSR of Hindi has turned out to fill a typological gap in the range of possible Comparative Markedness effects.

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