A NON-OT CONSPIRACY IN ICELANDIC*

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1. Introduction

Groups of phonological processes that function to avoid surface occurrences of a certain phonological structure, such as vowel hiatus, have been called conspiracies (Kisseberth 1970). Calabrese (2005, 22) describes conspiracies as follows: "In the case of a conspiracy, a variety of different phonological processes have in common the avoidance of a given configuration." Optimality Theory (OT) accounts for conspiracies using ranked universal constraints that select an optimal candidate out of a possibly infinite number of possible candidates. The configuration to be avoided is represented by a "driver" constraint, which is a markedness constraint ranked over faithfulness constraints (M >> F1 >> F2, where M is a markedness constraint and F is a faithfulness constraint) (McCarthy 2002, 95). Using a derivational approach, Calabrese (2005) proposes constraints—universal or language specific—that identify the avoided configuration, and that trigger repair strategies, which are selected on a language-specific basis.

I will examine several phonological processes in Icelandic in which aspirated stops are either the target or a crucial part of the context. The input configuration that these processes share, and that each process alters, either by changing the consonant or by lengthening the vowel, is the configuration in (1).

(1) $\breve{V}C^h$ (in the syllable rhyme)

In the light of Calabrese's definition, we can say that these processes conspire to avoid the configuration in (1). I will show difficulties with Ringen's (1999) OT analysis and suggest that a Calabrese-style constraint-and-repair analysis may be able to formalize this "conspiracy" in a unitary way (cf. Kiparsky (1973)).

2. Aspiration in Icelandic

This study will focus on intervocalic and word-final stop-consonant clusters in Icelandic.[1] The underlying consonant inventory of Icelandic is given in (2). Corresponding orthographic symbols are in parentheses in italics and will be referred to as such in the text.

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1 I am not considering here monosyllabic words ending in a single consonant, such as *bað* [pɑːð] 'bath' (*baðs* [pɑðs] 'gen.sg.'), which have a long vowel conditioned by stress and extrametricality.

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(2) Underlying consonant inventory of Icelandic (adapted from Gibson 1997)[2]

	Labial	Coronal	Palatal	Velar	Glottal
Aspirated voiceless stops	pʰ (*p*)	tʰ (*t*)		kʰ (*k*)	
Unaspirated voiceless stops	p (*b*)	t (*d*)		k (*g*)	
Voiceless fricatives	f (*f*)	θ (*þ*), s (*s*)			h (*h*)
Voiced fricatives	v (*v*)	ð (*ð*)			
Nasals	m (*m*)	n (*n*)			
Liquids		l (*l*), r (*r*)			
Glides	w (*v*)		j (*j*)		

Aspiration or [spread glottis] ([SG]) is distinctive and underlying in Icelandic. Stops in Icelandic contrast for spread glottis; stops are uniformly voiceless (3).

(3)	a.	panna	[pʰɑn:ɑ]	'pan'
		banna	[pɑn:ɑ]	'forbid'
	b	tala	[tʰɑ:lɑ]	'speak'
		dala	[tɑ:lɑ]	'valley (gen pl)'
	c.	kaldur	[kʰɑltʏr]	'cold'
		galdur	[kɑltʏr]	'magic'

Word-initial stops are aspirated in all dialects. Non-word-initial stops are deaspirated in the Southern dialect, but not in the Northern dialect, as in (4). I assume stops are underlyingly aspirated in both dialects. Hereafter, for the sake of clarity, I will cite phonetic representations from the Northern dialect.

(4)			Southern	Northern	
	a.	api	[ɑ:pɩ]	[ɑ:pʰɩ]	'ape'
	b.	hata	[hɑ:tɑ]	[hɑ:tʰɑ]	'to hate'
	c.	loka	[lɔ:kɑ]	[lɔ:kʰɑ]	'to close'

Stops are aspirated in syllable onsets, word-initially (5a) and word-medially (5b), except after voiceless consonants (5c).

(5)	a.	prófa	[pʰrou:vɑ]	'to examine'
		trú	[tʰru:]	'belief'
	b.	apríl	[ɑ:pʰril]	'April'
		akrar	[ɑ:kʰrɑr]	'fields'
	c.	spara	[spɑ:rɑ]	'to save'

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[2] I have condensed the points of articulation used by Gibson to five, and eliminated the velar fricatives [x] and [ɣ], which are predictable. I assume that the voiceless palatal fricative [ç] is also derived. Note that phonetic [w] in hvað [hw̥ɑ:ð] 'what' (dialectal) is spelled with *v*.

Vowel length, which is predictable, and dependent on stress, is the diagnostic for syllable divisions. Primary stress is on the first syllable of a word; secondary stress is on alternate syllables. A primary stressed syllable is heavy and maximally bimoraic (the second vocalic mora cannot branch). Vowels are long in a stressed open syllable, and short in a closed syllable. A stressed syllable may be VV, VC or VCC, but not VVC. Final consonants are extrametrical, so that monosyllables ending in a single consonant have a long vowel, in the shape (C)VVC. Syllable divisions (marked by a period) are given in (6) and (7).

(6) a. (C)V:.{p,t,k,s}{v,j,r}
b. nepja [nɛ:.pʰjɑ] 'coldness'
vitja [vɪ:.tʰjɑ] 'to visit'
vökva [vœ:.kʰvɑ] 'to water'
flysja [flɪ:.sjɑ] 'to peel'

(7) a. (C)VC(C).CV(C) (where CC is not a sequence specified in (6a))
b. elda [ɛl.tɑ] 'to cook'
belja [pɛl.jɑ] 'to bellow'
hylmdi [hɪlm.tɪ] 'concealed' (hylma 'to conceal' (Côté 2004))

3. Preaspiration and Spirantization

3.1 Preaspiration

Preaspiration applies to an aspirated stop in the coda followed by an identical aspirated stop. Examples (from Þráinsson 1978) are given in (8), for non-derived and derived forms.

(8) a. Non-derived forms
hatt [hɑht] / hɑtʰtʰ/ 'hat' (acc.sg.)
þakka [θɑhkɑ] /θɑkʰkʰɑ/ 'thank'

b. Derived forms
feit [fei:tʰ] 'fem. sg.' feitt [feiht] /feitʰ + tʰ/ 'neut. sg' 'fat'
mæta [mɑi:tʰɑ] 'inf' mætti [mɑihtɪ] /mætʰ+tʰ+ɪ/ 'past 3 sg' 'meet'

Geminate stops are not ruled out per se, as shown by the long unaspirated stops in (9), which derive from unaspirated geminate stops.

(9) a. kobbi [kʰɔp:ɪ] 'young seal'
b. haddur [hɑt:ʏr] 'hair (poetic)'
c. bagga [pɑk:ɑ] 'pack (oblique)'

Preaspiration also applies to aspirated stops preceding *l*, *m*, or *n*. Recall from (6) that aspirated stops followed by the other sonorants—*r*, *j*, or *v* (from /w/[3])—are part of the syllable onset. Examples are in (10), from Þráinsson (1978).

[3] The possibility that the word-internal *v* in *vökva* is derived from an underlying *w* is explored further in Gibson (1997).

(10) a. Non-derived forms

epli [ɛhplɪ] /ɛp^{h}lɪ/ ‘apple’ opna [ɔhpnɑ] /ɔp^{h}nɑ/ ‘open’
ekla [ɛhklɑ] /ɛk^{h}lɑ/ ‘scarcity’ vakna [vɑhknɑ] /vɑk^{h}nɑ/ ‘awaken’
rytmi [rɪhtmɪ] /rɪt^{h}mɪ/ ‘rhythm’ (Rögnvaldsson 1986, 26)

b. Derived forms

pípa [p^{h}i:p^{h}ɑ] ‘fem.sg.’ pípna [p^{h}ihpnɑ] /p^{h}ip^h+nɑ/ gen.pl.‘pipe’
gata [kɑ:t^{h}ɑ] ‘fem.sg.’ gatna [kɑhtnɑ] / kɑt^h+nɑ/ gen.pl. ‘street’
depill [tɛ:p^{h}ɪtl̥] ‘m.sg.’ deplar [tɛhplɑr] /tɛp^{h}ɪl+ɑr/ ‘nom.pl.’ ‘dot’
jökull [jœk^{h}ʏtl̥] ‘m.sg. jöklar [jœhklɑr] /jœk^{h}ʏl+ɑr/ ‘pl’ ‘glacier’

Preaspiration is represented schematically in (11).[4]

(11) Preaspiration (Obligatory) (Syllable divisions are marked by a period.)

a. input: $\breve{V}C^h_i.C^h_j$ $(C^h_i = C^h_j)$ $(C^h_{i,j} = \{p^h, t^h, k^h\})$
output: $\breve{V}h.C_j$

b. input: $\breve{V}C^h_i.\{l, m, n\}$ $(C^h_i = \{p^h, t^h, k^h\})$
output: $\breve{V}hC_i.\{l, m, n\}$

3.2 Spirantization

Spirantization applies to aspirated *p* and *k* preceding a non-identical aspirated stop.[5] Examples are in (12).

(12) a. Non-derived forms

snökta [snœxtɑ] ‘to sob’ (snökt ‘sob’)
september [sɛftɛmpɛr] ‘September’

b. Derived forms

vaka [vɑ:k^{h}ɑ] ‘inf.’ vakti [vɑxtɪ] (past) 'be awake'
tæpur [t^{h}ai:p^{h}ʏr] (adj.m.) tæpt [t^{h}aift] (neut) ‘uncertain’
dýpka [tifkɑ] ‘deepen’ (djúp + ka) (djúpur [tju:p^{h}ʏr] ‘deep’)
(cf. blíðka [pliðk^{h}ɑ] ‘soften’ (blíð ‘mild’ + -ka)

Spirantization is represented schematically in (13). Notice the input set C^h_i does not include *t*. This will be referred to later.

(13) Spirantization (Obligatory) (Syllable divisions are marked by a period.)
input: $\breve{V}\ C^h_i.C^h_j$ $(C^h_i \neq C^h_j)(\ C^h_i = \{p^h, k^h\})$
output: $\breve{V}$ F. C_j (If $C^h_i = p^h$, F = [f]; If $C^h_i = k^h$, F = [x])

Preaspiration (11) and Spirantization (13) share the input configuration in (14).

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[4] The schematic representations I give of the processes discussed here are intended for descriptive purposes only. They are not intended as formal rule statements.

[5] Unaspirated stops are also spirantized preceding a stop (*tryggt* [t^{h}rɪxt] ‘ensure (past)’, *tryggja* [t^{h}rɪk$_j$:ɑ] ‘inf.’). Sonorants devoice before /t^h/ ‘past’ and /t^h/ ‘neut’: *mælti* [mɑil̥tɪ] (mæl+t^h +ɪ) ‘spoke’ ([mɑi:lɑ] ‘inf.’); cf. *dæmdi* [tɑimtɪ] (tæm + t + ɪ) ‘judged’).

(14) $\breve{V}C^h$ (in syllable rhyme)

In each case, C^h_i is altered in the output so that it is no longer aspirated: in (11a), it becomes [h][6]; in (11b), it becomes [hC_i]; in (13) it becomes the homorganic fricative.

4. Aspirated Stops Before *s*

4.1 Uninflected forms

The sibilant *s* is the only fricative that occurs in aspirated stop-fricative sequences.[7] In uninflected forms, *p* and *k* are optionally spirantized to the corresponding homorganic fricative (15).[8] The stops are unaspirated before *s*.

(15) Optional spirantization before –*s* (data from Kristinsson 1982)
a. Nonderived forms
lax 'salmon' [lɑxs] [lɑks]
öxull 'axis' [œxsʏtl̥] [œksʏtl̥]

b. Derived forms (-*si* 'nominalizer; -*stur* 'superlative')
stráksi 'chap' (strák + si) [strɑuxsɪ] [strɑuksɪ] (strákur 'boy')
mýkstur 'softest' (mýk + stur) [mixstʏr] [mikstʏr] (APK)
(mjúkur [mju:k[h]ʏr] 'soft')
dýpstur 'deepest' (dýp + stur) [tifstʏr] [tipstʏr] (APK)
(djúpur [tju:p[h]ʏr] 'deep')

4.2 Forms Inflected with Possessive -*s*

Strong masculine and neuter nouns and adjectives ending in *p* or *k* optionally spirantize before the genitive singular ending –*s*. In addition, the stem vowel can lengthen before an unspirantized stop, as in the paradigm in (16).

(16) Long vowel before genitive –s (from Kristinsson 1982, 34)
a. laks (lak + s) /lɑk[h] +s/ (gen.sg.) [lɑxs] *[lɑks] [lɑ:ks]
b. lags (lag + s) /lɑk+s/ (gen.sg.) [lɑxs] [lɑks] *[lɑ:ks]
c. lak [lɑ:k] /lɑk[h]/ 'bedsheet' (southern dialect)
d. lag [lɑ:ɣ] /lɑk/ 'layer'

The stem in (16a) ends in an aspirated velar stop; the stem in (16b) ends in an unaspirated velar obstruent. For both *laks* and *lags*, the stop optionally spirantizes before –*s*. However, for *laks,* the vowel is obligatorily long in this

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6 No theoretical claim is intended here. Analyses differ in how they treat the input-output relation in (11a); my description is close to that proposed by Þráinsson (1978).

7 The preterite/past participle ending is [ð] after vowels and voiced fricatives (*sagði* [sɑɣðɪ] 'said (3 sg)'), but [t] after aspirated stops (*vakti* [vɑxtɪ] 'be awake (3 sg)').

8 The use of the stop rather than the fricative in uninflected forms is a new development, found mainly among younger age groups (Gíslason and Þráinsson 2000: 185-6).

dialect if the stop is not spirantized. The vowel cannot be long in this context in *lags*, suggesting that it is the aspirated *k* in *laks* that is responsible for the long vowel, since *laks* and *lags* differ only in the presence or absence of aspiration on the final stop in underlying representation. Note that *laks* and *lags* have the same morphological structure: [[lak]s]; [[lag]s]. Hence it cannot be the morphological boundary in *laks* that is responsible for the vowel length, (as suggested by Rögnvaldsson (1986, 36)). A schematic derivation is in (17).

(17) a. underlying: CVC^{h}s]$_\sigma$ (/lɑk^h + s/)
b. intermediate stage: CV:C^{h}s]$_\sigma$ (/lɑ:k^h s/)
c. phonetic form: CV:Cs]$_\sigma$ [lɑ:ks] (deaspiration before [s])

Some dialects allow a short vowel preceding a deaspirated stop in the possessive: [lɑks]. This gives three variants for *-s* possessives with stems ending in *p* or *k*, as in (18a, b) (examples from Gíslason and Þráinsson 2000: 80). Gíslason and Þráinsson (2000: 185) also cite (18c), with a long vowel and an aspirated stop, from the northern dialect.

(18) a. skips [sk$_j$ɪfs] [sk$_j$ɪ:ps] [sk$_j$ɪps] ‘ship (gen.sg.)’
b. þaks [θɑxs] [θɑ:ks] [θɑks] ‘roof (gen.sg.)’
c. þaks [θɑ:k^{h}s] (northern dialect)

Masculine and neuter stems ending in *–t* optionally allow a long vowel before possessive *–s*. However, spirantization does not apply to *t*.[9] The noun *vit* ‘intelligence’ has the variants in (19).

(19) vits (vit + s) ‘intelligence (gen.sg.)’ [vɪ:ts] [vɪts] *[vɪθs]

Lengthening of the vowel before C^{h}s applies only in the possessive. For the forms in (20), a long vowel is not possible (cf. (15)).

(20) a. lax ‘salmon’ [lɑxs] [lɑks] *[lɑ:ks] (Kristinsson 1982)
öxull ‘axis’ [œxsʏtl̥] [œksʏtl̥] *[œ:ksʏtl̥] (Kristinsson 1982)

b. stráksi ‘chap’ [strɑuxsɪ] [strɑuksɪ] *[strɑu:ksɪ] (APK)
mýkstur ‘softest’ [mixstʏr] [mikstʏr] *[mi:kstʏr] (APK)
dýpstur ‘deepest’ [tifstʏr] [tipstʏr] *[ti:pstʏr] (APK)

Schematic representations of the processes discussed in this section are in (21) and (22).

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9 The failure of *t* to spirantize before *s* may be due to a constraint against the sequence [θs]; compare *baðs* ‘bath, gen.sg.’ [paðs], *[paθs]. In *báts* [pɑus:] (/pɑut^h + s/), genitive singular of *bátur* [pɑu:t^{h}ʏr] ‘boat’, the *t* of the stem totally assimilates to *s*. I consider this a process different from the spirantization before *s* being discussed in this section. The assimilation in *báts* is total rather than partial, as in (18). Furthermore, the total assimilation of *t* to *s* in possessives is limited to frequent lexemes (Gíslason and Þráinsson 2000: 85). For *báts*, three variants are possible: [pɑu:ts], [pɑuts], [pɑus:] (Árnason 1980: 233).

(21) Spirantization before *s* (Optional)
input: $\breve{V}\ C^h_i$ (.)s ($C^h_i = p^h, k^h$)
output: $\breve{V}$ F(.) s (If $C^h_i = p^h$, F = [f]; If $C^h_i = k^h$, F = [x])

(22) Vowel lengthening before *–s* (genitive sg) (Optional)
input: $\breve{V}\ C^h_i + s$ ($C^h_i = p^h, t^h, k^h$) (–s ‘genitive sg’)
output: V: $C^h_i + s$

The configuration common to the input in (21) and (22), as well as (11) and (13), is $\breve{V}C^h$ (in the syllable rhyme). The outputs are altered so that in (21), there is no longer an aspirated stop following the short vowel, and in (22), there is an aspirated stop, but it no longer follows a short vowel, since the vowel is long. The output in (22) gives the northern pronunciation in (18c). Deaspiration of a stop preceding *s* and following a short vowel may also be a general process.[10]

5. tk Clusters

Clusters of tC^h are limited to *tk*; *t* does not occur in clusters before *p*. Clusters of *tk* occur in a small set of words, such as those in (23).[11]

(23) Words with –tk- clusters (-k ‘inchoative’, -a ‘infinitive’)
a. notkun ‘use (m.sg.)’ (not- ‘use’ + k +un ‘nominalizer’)
b. notka ‘to use’ (not- ‘use’ + k + a)
c. litka ‘to colour’ (lit ‘colour’ + k + a)
d. vitkast ‘become sensible’ (vit ‘sense’ + k + a +st ‘reflexive’)
e. flýtka ‘to speed up’ (flýt- + k + a) (cf. flýta ‘speed up’)
f. ljótka ‘to become ugly’ (ljót ‘ugly’ + k + a)

Recall that Preaspiration does not apply to *tk*, and Spirantization does not apply to *t*. Taking (23a) as an example, *notkun* has the variant pronunciations in (24).

(24) *notkun* — five pronunciations
a. [nɔ:tkʏn] (ER, APK) (vowel lengthening, southern standard)
b. [nɔhtkʏn] (Rögnvaldsson 1984, 4) (preaspiration)
c. [nɔθkʏn] (Bérkov 1962) (spirantization)
d. [nɔtkʏn][12] (deaspiration)
e. [nɔtk^{h}ʏn] (KMJ) (despiration), (northern)

We could say that Preaspiration and Spirantization apply to *t* in (24b, c) by analogy to the normal cases covered in section 3. However, the vowel

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10 KMJ reports *skaps*, the possessive of *skap* [skɑ:p^h] ‘mood’ as [skɑps], and *leiks*, the possessive of *leikur* [lei:k^{h}ʏr]‘game’, as [leiks], both with a short vowel and unaspirated stop. KMJ has the northern dialect.

11 Not all of these words are in common use. Those that are appear to include *notkun*, *litka*, and *vitkast*.

12 This variant is probably more common in fast speech than in normal speech (APK). APK also reports having heard (24c), the spirantized variant.

lengthening in (24a) is not similarly relatable to other processes. Nor does it occur with other derivatives in *–ka* and *–kun*, as in (25).

(25)	a.	dýpka	[tifkɑ]	*[ti:fkɑ]	'deepen' (djúp + ka)
	b.	dýpkun	[tifkʏn]	*[ti:fkʏn]	'deepening'
	b.	grænka	[krɑiŋkʰɑ]	*[krɑi:ŋkʰɑ]	'become green' (græn 'green')
	c.	blíðka	[pliðkʰɑ]	*[pli:ðkʰɑ]	'soften' (blíð 'mild' nom sg f)
	d.	blíðkun	[pliðkʰ ʏn]	*[pli:ðkʰʏn]	'softening'

The processes in (24) are represented schematically in (26).

(26) a. t+k clusters: vowel lengthening
input: V̌ tʰ . + kʰ...
output: V: tʰ . + kʰ...

b. t+k clusters: Preaspiration
input: V̌ tʰ . + kʰ...
output: V̌ ht . + kʰ...

c. t+k clusters: Spirantization
input: V̌ tʰ . + kʰ...
output: V̌ θ. + kʰ...

d. t+k clusters: Deaspiration
input: V̌ tʰ . + kʰ...
output: V̌ t . + kʰ...

The input configuration that (26) shares with (11), (13), (21), and (22) is V̌Cʰ (in the syllable rhyme). The repairs, including the vowel lengthening, serve to alter the input so that an aspirated stop does not follow a short vowel in the output.

6. An OT Analysis

6.1 Vowel Length

Ringen (1999) proposes an OT analysis of Preaspiration (11) and Spirantization (13), using the highly ranked "driver" constraint (27a), which is ranked over relevant faithfulness constraints (27b).

(27) a. * µptk[sg] Obstruent stops that are [spread glottis] may not be moraic. (Ringen 1999)

b. *µptk[sg] >> ID-IOobs[sg] >> ID-IO(f) (Ringen 1999)

The constraint (27a) rules out Cʰ (in the rhyme) following V̌, since syllables are maximally bimoraic in Icelandic. However, as we have seen, moraic Cʰ can also be avoided by lengthening the vowel, resulting in a bimoraic vowel, as in (16a) and (24a). To see if Ringen's OT analysis can account for this option, we need to look at Benua's (1995) OT treatment of vowel length in Icelandic, which Ringen assumes.

Benua (1995, 94) assumes the constraints in (28a-c), ranked in (28d).

(28) a. Stress-to-Weight (S → W) "If stressed, then heavy."
b. No-Long-V (*VV) "no long vowels"
c. Ident-IO(v-length)
d. (S → W) >> (*VV) >> Ident-IO(v-length)

She also assumes the undominated constraints in (29).

(29) a. Word-initial syllable gets primary stress.
b. Weight by Position (a coda consonant is moraic)

These constraints interact as in the tableau in (30), based on Benua (1995, 95).

(30) ham.ra 'to hammer'

Input	Output	S → W	*VV	ID-IO(v-length)
/hɑm.rɑ/	☞ a. hɑm.rɑ			
	b. hɑɑm.rɑɑ		**!	**
	c. hɑɑm.rɑ		*!	*
/hɑɑm.rɑɑ/	☞ a. hɑm.rɑ			**
	b. hɑɑm.rɑɑ		**!	
	c. hɑɑm.rɑ		*!	*

In (30), the initial stressed syllable is heavy in all candidates, satisfying S → W. The decision falls to the next constraint in the hierarchy, *VV, which ensures that a closed syllable with a long vowel is not optimal when there is a closed syllable available that has a short vowel. Thus, the (b) and (c) candidates with long vowels are rejected in favour of the (a) candidates.

In (32) and (33), I apply Benua's model to the long-vowel pronunciations of *notkun* (24a) and *laks* (16a).[13] The constraint ranking is in (31).

(31) (S → W) >> (*VV), *µptk[sg] >> ID-IOobs[sg]

(32) *notkun* [nɔ:tkʏn] 'use' ([ɔɔ] = long [ɔ])

Input	Output	S → W	*VV	*µptk[sg]	ID-IOobs[sg]
/ nɔtʰkʰʏn/	a. nɔtʰkʏn			*!	*
	☛ b. nɔtkʏn				**
	c. nɔɔtʰkʏn		*!		*
	☹ d. nɔɔtkʏn		*!		**

13 I am following Ringen (1999) in assuming that Weight by Position assigns a mora only to a coda consonant adjacent to a short vowel, so that the syllable is maximally bimoraic.

(33) *laks* [lɑ:ks] 'bedsheet (gen.sg.)' ([ɑɑ] = long [ɑ])

Input	Output	S → W	*VV	*µptk[sg]	ID-IOobs[sg]
/lɑkʰ+s/	a. lɑkʰs			*!	
	☛ b. lɑks				*
	c. lɑɑkʰs		*!		
	☹ d. lɑɑks		*!		*

In (32) and (33), only the short-vowel variants in (b) are optimal. The desired long-vowel variants in (d) are ruled out by high-ranked *VV. Recall that VVC syllables are not normally allowed except in monosyllables, where the final C is extrametrical (cf. *tal* [tʰɑ:l] 'speech'; *tals* [tʰɑls] 'gen.sg.').

6.2 Morpheme-Specific Constraints

Pater (2006) offers a model in which an exceptional structure is encoded in the underlying form, and a lexically indexed faithfulness constraint ranked over the relevant markedness constraint forces that structure to be kept in the output. I propose the lexically indexed constraint, ranking and underlying forms in (34).

(34) a. Ident-IO(v-length)-L
b. Ident-IO(v-length)-L >> (*VV) >> Ident-IO(v-length)
c. *notkun* /nɔɔtʰ$_L$ + kʰʏn/; *lak* /lɑɑkʰ$_L$/,
d. *dýpkun* /tipʰ + kʰʏn /, *lag* /lɑk/

The constraint in (34a) is indexed L, and the stems in (34c) are indexed L in underlying representation. The stems in (34d) are unindexed. The tableaux in (35) and (36) show how this works.

(35) *notkun* [nɔ:tkʏn]; *dýpkun* [tifkʏn] ([ɔɔ] = long [ɔ]; [ii] = long [i])

Input	Output	ID-IO(v-length)-L	*VV	ID-IO(v-length)
/nɔɔtʰ$_L$ + kʰʏn/	☞ a. nɔɔtkʏn		*	
	b. nɔtkʏn	*!		*
/tipʰ + kʰʏn/	a. tiifkʏn		*!	*
	☞ b. tifkʏn			

(*dýpkun* is phonetically [tifkʏn] by other constraints; [SG] faithfulness constraints are lower ranked)

(36) *laks* [lɑ:ks]; *lags* [lɑks] ([ɑɑ] = long [ɑ])

Input	Output	ID-IO(v-length)-L	*VV	ID-IO(v-length)
/lɑɑkʰ$_L$ + s/	☞ a. lɑɑks		*	
	b. lɑks	*!		*
/lɑk+s/	a. lɑɑks		*!	*
	☞ b. lɑks			

([SG] faithfulness constraints are lower ranked.)

The index L refers to the set of forms in (37a and b), formalized in (38).

(37) L = (a) a stem ending in *t* followed by a suffix beginning with *k*
(b) strong masculine and neuter noun and adjective stems ending in *<p,t,k>* + genitive -*s*

(38) $L = \{[[\ldots t^h] + [k^h \ldots]]_{N,\,V} \;\wedge\; [[\ldots\{p^h,t^h,k^h\}]_{\{masc,\,neut\}} + s]\}$

L correctly restricts exceptions to vowel length. If, for example, a verb stem such as *mæt-* (*mæta* [mɑi:tʰɑ] 'to meet') were indexed for L, an incorrect preterite *[mɑi:htɪ] would result, assuming an indexed stem /mæ:t_L/, instead of the correct [mɑihtɪ] *mætti* 'met' (-*t* 'preterite', -*i* '3 sg.'). If, on the other hand, the strong masculine noun *hlutur* [l̥ʏ:tʰʏr] 'thing', which does not take genitive singular –*s* (*hlutar* 'gen.sg.'), were indexed for L, the definite dative singular *hlutnum* [l̥ʏhtnʏm] (-*num* 'def.dat.sg.') would incorrectly have a long vowel: *[l̥ʏ:htnʏm]), assuming /l̥ʏ:t^h_L/.

This approach encounters a descriptive problem with nouns like *skápur* (39a) that have a long vowel in the genitive singular (39b), which justifies a lexically indexed stem with a long vowel (39c), but that have a short stem vowel in the definite dative singular (39d). The indexed stem in (c) incorrectly predicts a long stem vowel in this form, as in (e).

(39)
a. skápur [skɑu:pʏr] 'cupboard'
b. skáps [skɑu:ps] (gen.sg.) (Einarssson 1945)
c. /skɑu:p^h_L/
d. skápnum [skɑuhpnʏm] (skáp + num) 'def. dat. sg.'
e. * [skɑu:hpnʏm]

One solution might be to index –*num* [-L]. Then genitive –*s* will be [+L], meaning every –*s* genitive calls up (34a), and must have a stem with specified underlying vowel length for (34a) to refer to. Some will have a short vowel: *baðs*$_{+L}$ 'bath, gen.sg.' [pɑðs], /pɑð/; some, a long vowel: *skós*$_{+L}$ 'shoe, gen.sg.' [skou:s], /skou:/ (*skór* 'shoe'), both contrary to the principle of Richness of the Base (McCarthy 2002, 68–70) observed by Benua in (30).

6.3 Rank-ordering model of EVAL (ROE)

Coetzee (2006) proposes the Rank-ordering model of EVAL (ROE), in which variation is accounted for by the rank-ordering imposed on a candidate set. assuming non-optimal candidates are accessible to the speaker. The likelihood that a candidate will be selected correlates with its degree of well-formedness: the more well-formed it is (the more optimal on the basis of the constraint ranking), the more likely it is to be selected as output, and the more frequent it is likely to be. An illustrative tableau is in (40).

(40) Illustration (Coetzee 2006, 339, 341)

/prak/	*Complex	Max	NoCoda
1. pak		*	*
2. pa		**!	
3. prak	*!		*
4. pra	*!	*	

[pak] > [pa] > [prak] > [pra]

decreasing well-formedness; decreasing likelihood of being selected as output

In (40), [pak], the optimal candidate, is predicted to be the most frequent; [pra], the least optimal candidate, will be the least frequent. In (42), I apply this model to the variant pronunciations of *notkun* in (24a-d) (excluding the northern pronunciation in (e)). Constraints from Ringen (1999) are in (41).

(41) Constraints from Ringen (1999)
- (a) Multiple Link [sg] (Multi Link): [spread glottis] must be linked to more than one consonant.
- (b) IdentIOμ (ID-IOμ): Correspondent consonants must have identical numbers of moras in the input and output.
- (c) Dep Root: Do not insert root nodes.

(42) Tableau for *notkun* (constraints and rankings based on Ringen 1999)

/nɔ t + kʏn/ [sg] [sg]	*VV	*μptk[sg]	*θ	ID-IOμ	Multi Link	ID-IOobs [sg]	Dep Root	ID-IO(f)
μ μ a. [nɔ t kʏn]	*!					**		**
μ μ b. [nɔ h t kʏn] [sg]				*		*	*	*
μ μ c. [nɔ θ kʏn] [sg]			*!	*				*
μ μ d. [nɔ t kʏn]				*		*!*		**

[nɔhtkʏn] > [nɔtkʏn] > [nɔθkʏn] > [nɔ:tkʏn]

Most well-formed — Least well-formed

The tableau predicts that [nɔ:tkʏn], being the least well-formed, will be the least likely to occur; yet this is the most common pronunciation in the southern dialect. (The relative frequency of the other pronunciations has not been studied, to my knowledge, although (d) is probably the least frequent (cf. footnote 12).)

6.4 Output-Output Correspondance

In Benua's (1997) model of transderivational correspondance, one form in a paradigm may be predicted by analogy from another form in the paradigm. An output-output constraint for vowel length is in (43).

(43) OO-Ident (v-length)-L >> *VV >> Ident-IO(v-length)

In this model, [nɔ:tkʏn] (not$_L$ + kun) would be analogized to *not* [nɔ:t] 'use' (nom./acc.pl.), and [lɑ:ks] (lak$_L$ + s) would be analogized to *lak* [lɑ:k] (acc.sg.). The constraint is restricted to the set L, to avoid analogizing *blíðka* ([pliðk^{h}ɑ])] 'to soften' to *blíð* [pli:ð] 'mild (nom.sg.f.)' to produce *[pli:ðk^{h}ɑ], or *baðs* ([pɑðs]) (*bað* + *s*) to *bað* [pɑ:ð] 'nom/acc sg' to produce *[pɑ:ðs].

Nouns like *skápur* (39) pose a problem. The long vowel in *skáps*$_L$ [skɑu:ps] (skáp$_L$ + s) can be analogized to *skáp* [skɑu:p] 'acc.sg.' But for *skápnum*$_L$ [skɑuhpnʏm] (skáp$_L$ + num) 'def. dat. sg.' *[skɑu:hpnʏm], there is no form in the paradigm to which it can be analogized. If *–num* is indexed [-L], then *–s* is [+L], wrongly predicting *[pɑ:ðs] for *baðs*$_{+L}$ (base *bað* [pɑ:ð]).

7. A Derivational Proposal

In the OT models I have examined, the set L (37) seems to be arbitrary. If we look at L in the light of the quasi-rules in (11), (13), (21), (22) and (26), we see that L as the context for irregular vowel lengthening is not in fact arbitrary, but fills in gaps left by Preaspiration and Spirantization, which miss some $\check{V}C^h$ structures . Clusters of *tk* are the intersection of gaps left by Preaspiration, which does not apply to non-geminate clusters, and Spirantization, which does not apply to *t*. For *–s* genitives of strong masculines and neuters ending in *p*, *t*, *k*, Spirantization before *s* (21) applies optionally to *p* and *k*, and it does not apply to *t*. There are several ways to resolve *tk* clusters, as in (26), and likewise several ways to resolve *–s* genitives of stems ending in aspirated stops—spirantization (except *t*), vowel lengthening, or deaspiration (18). The effect is that the output conforms to the constraint (27a), stated in moraic terms, or alternatively to the structural constraint in (44).

(44) * $\check{V}C^h$ in the syllable rhyme

I assume the rule-based lexical phonology in (45), from Indriðason (1994).

(45) Lexical strata for Icelandic (Indriðason 1994, 37)
Stratum 1 – derivation I
Stratum 2 – inflection
Stratum 3 – definite suffix
Stratum 4 – compounding and derivation II

Constraints (44) or (27a) would be ordered at Stratum 3, to trigger Preaspiration in *skápnum* [skɑuhpnʏm], which consists of a stem /skɑup^h/ plus the definite suffix *–num* /nʏm/. If the constraint were ordered at an earlier stratum, the aspiration on the stem would be deleted by a repair before Preaspiration could apply to the suffixed form at Stratum 3. However, Vowel lengthening before *–s*, Spirantization before *s*, and Preaspiration apply to inflected forms at Stratum 2, to feed definite suffixation at Stratum 3 (46).

(46) a. Vowel lengthening before *–s* (Stratum 2)
laksins [lɑ:ksɪns] 'bedsheet (def.gen.sg.)' (APK)
(laks (lak+s) [lɑ:ks] 'gen.sg.' + -ins 'def.gen.sg.')
(compare lagsins [lɑksɪns] 'layer (def.gen.sg.)' (APK)
(lags (lag+s) [lɑks] 'gen.sg.' + ' + -ins 'def.gen.sg.')

b. Spirantization before *s* (Stratum 2)
laksins [lɑxsɪns] 'bedsheet (def.gen.sg.)' (APK)
(laks [lɑxs] (lak+s) + ins)

c. Preaspiration (Stratum 2)
gatnanna [kɑhtnɑnɑ] 'street (def.gen.pl.)'
(gatna [kɑhtnɑ] 'gen.pl.' (gat-+-na 'gen.pl.f.'); + -nna 'def.gen.pl.'; gata [kɑ:t^{h}ɑ] 'street')

Since these processes apply independently of the constraint, which is at Stratum 3, the constraint is not needed to trigger them and is therefore superfluous. If, however, final consonant extrametricality applies throughout the derivation, it will protect the final *p* of *skáp* from deaspiration, and the constraint is then functional in the grammar.

8. Conclusion

I have reviewed several phonological processes in Icelandic that collectively function to avoid the structure in (1), thereby fitting the definition of a conspiracy. Optimality Theoretic analyses encounter problems in accounting for irregular vowel lengthening in the genitive singular. In an analysis using stratum-ordered rule application, a formal constraint may function to trigger the processes seen as repairs. If so, then this functionally unified set of processes is formalizable as a unitary linguistic phenomenon.

Notes

APK = Ari Páll Kristinsson
ER = Eiríkur Rögnvaldsson
KMJ = Kristín M. Jóhannsdóttir

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