Laryngeal licensing and laryngeal neutralization in Faroese and Icelandic

Gunnar Ólafur Hansson

In Icelandic, and in most dialects of Faroese, the fundamental laryngeal stop contrast is one of aspiration. This contrast is neutralized in certain positions, following patterns which appear problematic for perceptually-based theories (licensing by cue). In postvocalic onset position, a cue-rich environment, the contrast is absent in Icelandic. Most dialects neutralize to unaspirated \([p, t, k]\), whereas others have postaspirated \([p^\text{a}, t^\text{a}, k^\text{a}]\) instead. In the latter case, the appearance of loanwords with intervocalic \([p, t, k]\) is now creating an incipient aspiration contrast, undoing the previous neutralization pattern. The implications of these facts for Optimality Theory (Richness of the Base) are discussed. In certain dialects of Faroese, such postvocalic singleton onsets are realized as \(p^\text{pra}, t^\text{pra}, k^\text{pra}\). Curiously, this preaspiration is suppressed in precisely the contexts where it ought to be most salient. An OT analysis is developed to account for this distribution.

Keywords: Faroese, Icelandic, laryngeal features, Licensing by Cue, Optimality Theory, positional neutralization, preaspiration, Richness of the Base

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1. INTRODUCTION

The laryngeal phonology of Icelandic – the distribution of laryngeal features and alternations involving those features – has been the topic of a considerable body of research over the past few decades (e.g., Dráínsson 1978, Jónsson 1994, Ringen 1999, to name but a few). Laryngeal features have also occupied a prominent place in the general literature on neutralization, especially in works advocating the Licensing by Cue approach (Steriade 1995, 1997, 1999; cf. also Silverman 1997). This article examines patterns of laryngeal neutralization in Icelandic as well as its closest relative, Faroese, focusing on aspiration in particular.

It is argued that some of these neutralization patterns are problematic for theories such as Licensing by Cue, which are based on the availability and salience of acoustic cues to phonological contrasts. They are also shown to raise questions about the validity of Richness of the Base, one of the cornerstone principles of Optimality Theory. Similar problems arise from the way stops are realized in positions of
neutralization in certain dialects of Faroese, where the distribution of (pre)aspiration appears to be the exact opposite of what Licensing by Cue predicts. One of the conclusions is that Licensing by Cue has little predictive power except when interpreted as a diachronic principle governing actual neutralizing sound changes (mergers), rather than synchronically occurring neutralization patterns per se. The latter may be the indirect result of processes which, ultimately, have nothing to do with neutralization as such.

The structure of the article is as follows. Section 2 lays out some important theoretical notions, in particular the Richness of the Base principle and the Licensing by Cue approach. Section 3 describes the distribution of aspiration contrasts in Icelandic dialects, discussing the problems raised by some of the neutralization patterns, as well as how these are partly being undone by the advent of recent loanwords. Section 4 examines the loanword adaptation problem from a more general perspective, considering how the facts go against the predictions of Richness of the Base. Section 5 discusses the phonology of aspiration contrasts in Faroese dialects, paying particular attention to preaspirated singletons in Northern Faroese, whose behavior is problematic for Licensing by Cue. The problem is resolved in an OT analysis which, in order to handle the full range of facts, calls for constraints with somewhat unconventional properties. The conclusions are summarized in section 6.

2. THEORETICAL PRELIMINARIES

2.1 Neutralization and distribution patterns in Optimality Theory

The main topic of this article is patterns of laryngeal neutralization among obstruents in Icelandic and Faroese. The phonological behavior of obstruents in these languages is quite diverse, and they participate in a wide range of alternations. A few examples from Icelandic will serve as illustrations. Aside from alternations in manner, e.g., sof-a [sɔva] ‘to sleep’ vs. sof-n-a [ɔɔpna] ‘to fall asleep’, one also finds alternations in laryngeal features. Alternations in voicing are found in fricatives and sonorants, e.g., blíð-ur [pliðyr] ‘tender (masc.)’ vs. blíð-k-a [pliðka] ‘to appease’, and alternations in aspiration among stops, e.g., minn-t-i [mɪntʰɪ] ‘s/he reminded’ (Northern diall.) vs. miss-t-i [mɪstɪ] ‘s/he lost’. Perhaps the most famous phenomenon is that of preaspiration, whereby an underlyingly aspirated stop comes to be realized as an [h]+stop cluster, e.g., opin [ɔpʰɪn] ‘open (fem.)’ (Northern diall.) vs. opn-ar [ɔhpnar] ‘id. (plur.)’.

An analysis of the laryngeal phonology of these languages is of course not complete unless such alternations are accounted for. However, as the focus of this article is neutralization patterns, the discussion will instead focus entirely on
Surface distributions of the relevant segment types. Alternations such as the above-mentioned ones, and the complex input-output relationships they entail, will be left aside (but see Ringen 1999 for a recent treatment) entirely. The rationale for focusing on surface distributions has to do with the output-oriented character of Optimality Theory (henceforth OT; Prince & Smolensky 1993; McCarthy & Prince 1993, 1995), the framework in which the following discussion is couched. One of the key notions of OT is that the primary force shaping the phonologies of individual languages is well-formedness constraints on output representations, better known as Markedness constraints. The only constraints that make direct reference to the underlying input representation are Faithfulness constraints, which simply demand input-output identity (e.g., by prohibiting deletion, epenthesis, metathesis, or the altering of feature specifications).

Were it not for Markedness constraints, every conceivable string of segments would be a legitimate output in every language. This is because there are no limitations whatsoever on the set of possible input representations in a given language, by a principle known as Richness of the Base (Prince & Smolensky 1993:191, Smolensky 1996), which may be stated as follows:

(1) Richness of the Base (Smolensky 1996)
   The source of all systematic cross-linguistic variation is constraint reranking. In particular, the set of inputs to the grammars of all languages is the same. The grammatical inventories of a language are the outputs which emerge from the grammar when it is fed the universal set of all possible inputs.

The input set is thus universal and by definition infinite, whereas the actual lexicon of a given language is a sample drawn from that set. The phonology of a language can be seen as a ‘filter’, circumscribing the set of all permissible outputs (real or hypothetical) by prohibiting impermissible structures (again, real or hypothetical) from surfacing intact. It is important to note that in the OT framework, the constraint ranking is the only possible source of phonological generalizations, and that no constraints assess the well-formedness of lexical (input) representations.

Imagine a language $L$ where all lexical entries obey a certain generalization, and the morphological combinatorics are such that potential violations of that generalization happen never to arise. For example, all morphemes might consist exclusively of CV syllables. The only way to capture the generalization (the absence of CVC syllables from surface forms) is to have the relevant Markedness constraint (NoCoda) ranked above Faithfulness – effectively saying that even if input strings containing CVC syllables existed, they would be repaired (e.g., by epenthesis or deletion). Otherwise the phonological grammar of $L$ would be indistinguishable from that of another language where CVC syllables are free to occur in output forms, surely an inadequate characterization.
Although the Richness of the Base tenet is generally held to be a crucial cornerstone of the OT architecture, several of the facts discussed below raise questions about its validity as a general principle and its proper interpretation (see especially sections 3.3 and 4).

In OT, the unique character of the phonology of each individual language falls out from the relative ranking of constraints and the way constraints interact with one another. Through this interplay, Markedness constraints have at least three distinct manifestations:

(2) Effects of Markedness constraints in Optimality Theory
   a. They define the surface inventory of segments in the language
      (by excluding all impermissible segments).
   b. They define the surface phonotactics of the language
      (by excluding all impermissible segment sequences, syllables, etc.).
   c. In so doing, they trigger all attested discrepancies between input and output
      (manifested as surface alternations between related output forms).

In other words, restrictions on surface configurations and surface distributions (2a–b) are in a sense primary, whereas any ‘processes’ that may occur in the input–output mapping (2c) are merely secondary; the latter simply emerge as a consequence of enforcing the former.

It is against these background assumptions that the following discussion should be viewed. If, say, in a particular environment we find only [t] and never [ṭ] (or vice versa), then this is a general fact about the phonology of the language, and as such must follow from the constraint ranking which defines that language. Since /ṭ/ as well as /t/ are possible at the input level in any position, the non-occurrence of [ṭ] in the relevant environment in itself constitutes evidence of neutralization. It is immaterial whether evidence can be found of any ‘actual’ neutralization (merger) taking place in the input–output mapping of existing morphemes. The crucial issue is simply the systematic absence of the [ṭ] member of a (potential) [t]:[ṭ] surface contrast in a particular environment. It is interesting to note that, in this respect, the OT approach to contrast and neutralization is more akin to that of the Prague School (Trubetzkoy 1939) than to that of most of its predecessors within the generative tradition.

2.2 Licensing by Cue

In the analysis of neutralization, the notion of LICENSING has played a major role in the literature on generative phonology of the last two decades or so (see, e.g., Itô 1988, Goldsmith 1990, Lombardi 1995, Harris 1997). The general idea is that a particular contrast or feature may occur in a particular position only if explicitly licensed in that position. Traditionally, licensing contexts have been defined in terms of elements of
prosodic structure (e.g., coda or onset position) or autosegmental configurations of phonological features.

An alternative which has gained considerable popularity in recent years is the approach known as Licensing by Cue, exemplified primarily by the work of Steriade (1995, 1997, 1999) and her students (e.g., Silverman 1997). This approach derives licensing directly from considerations of low-level phonetic detail, primarily the acoustic-perceptual cues that signal particular features or contrasts. Much of the Licensing by Cue literature has focused on neutralization, in particular that of laryngeal contrasts. The core idea is that such contrasts are neutralized in positions where some of the relevant acoustic cues are relatively impoverished or absent. Conversely, a contrast is permitted (and thus ‘licensed’) in positions where it is more perceptible, i.e. where cues to it are more easily retrievable. (As to the way this is implemented within OT, see section 3.2.)

Licensing by Cue makes very specific predictions about implicational relationships between different neutralization contexts. If a contrast is neutralized in a given environment, it will also be neutralized in all environments that have poorer cueing potential for that feature. For example, a stop voicing contrast may be neutralized before obstruents – where stops are typically unreleased, and all release-related cues are thus absent – while being maintained before sonorants, where more cues are available. There are certainly languages which maintain a voicing contrast in both environments, with no neutralization whatsoever. However, if a particular language neutralizes voicing before sonorants (a cue-rich environment), Licensing by Cue predicts that it will also do so before obstruents as well as in phrase-final position (cue-poor environments).

By and large, these predictions are borne out in the cross-linguistic typology of positional neutralization patterns, as amply documented in Steriade (1995, 1997). However, as will be argued below, the distribution of aspiration contrasts in Icelandic and Faroese, and the phonetic realization of stops in positions of neutralization, is problematic for the Licensing by Cue approach, running counter to its predictions in several ways.

3. ICELANDIC: NEUTRALIZATION TARGETS CUE-RICH CONTEXTS

The surface inventory of obstruents in Icelandic is as shown in (3). Note that the two stop series, transcribed here as [pʰ tʰ cʰ kʰ] vs. [p t c k], correspond in most cases to orthographic p, t, k(j) vs. b, d, g(j). The latter series, consisting of voiceless unaspirated stops, has frequently been rendered with [b̥ d̥ ɹ̥ ŋ̥] in earlier works on Icelandic phonetics and phonology, in part due to influence from the orthography. This is misleading, however, in that these plosives are consistently voiceless regardless of position, and are indistinguishable from those occurring in clusters like sp, sk, etc.²
Among plosives, the fundamental distinction is between aspirated and unaspirated, although it is lexically contrastive only in certain positions. The aspiration contrast has typically been analyzed in terms of [+spread glottis] vs. [−spread glottis] (þráinsson 1978) or, alternatively, presence vs. absence of privative [spread glottis] or [asp] (Jónsson 1994, Ringen 1999).

The following discussion will focus on the surface distribution of two particular segment types: aspirated and unaspirated plosives. It should be noted that, as suggested by durational studies, the so-called ‘preaspirated’ stops of Icelandic are best interpreted as clusters at the surface level, consisting of a full-blown segment [h] followed by a stop (see, e.g., þráinsson 1978, Indriðason et al. 1990–91, and references cited there). From the point of view of surface phonotactics, output strings like [VhkV] or [VhknV] are, for all practical purposes, comparable to [VskV], [VsknV], etc. – even though the former may stand in a rather more complicated relationship to their underlying representations.

For this reason, the two Icelandic segment types whose relative distribution is under examination here are, strictly speaking, POSTaspirated vs. unaspirated stops; in other words, [pʰ tʰ cʰ kʰ] vs. [p t c k]. Where convenient, the shorthand notation Tʰ vs. T will be used in the remainder of the article.

### 3.1 The surface distribution patterns

With respect to the phonology of aspiration, Modern Icelandic can be divided into two dialect areas: the ‘hard’ dialects (harðmaður), spoken in the north and northeast, and the ‘soft’ dialects (líðmaður), spoken in the rest of the country. I will follow most current practice (e.g., Jónsson 1994) in referring to these as the Northern Dialect (ND) and Southern Dialect (SD), respectively. It should be kept in mind that the latter is something of a misnomer, as that variety is not restricted to southerly regions (it also covers the entire western half of the country, including the West Fjords in the far northwest, as well as most of the east coast).

Both varieties allow an aspiration contrast in root-initial position, as shown in (4a). The relevant domain appears to be morphological (the root) rather than prosodic (e.g., the stressed syllable, the prosodic word, etc.). An underlying contrast frequently surfaces within compounds, (4b), or prefixed words, (4c), where there is no secondary stress on the syllable containing the relevant stop. To the extent that any secondary stress is present at all, it typically falls on the third syllable, as in (4c).
Aspiration contrast in root-initial position (all dialects)

a. [tʰi:na] tína ‘to pick’ [kʰrau] krá ‘pub’

b. [’man.tʰal] mann#tal ‘census’
   [’man.toum] mann#dóm ‘manliness (acc.)’

c. [’ou.tʰel(,)ja] ó#teljandi ‘innumerable’
   [’ou.trei(,)pan.ti] ó#drepandi ‘indomitable’

Since Icelandic simply does not allow initial stop+obstruent clusters, these word-initial stops are always released into a sonorant (including /v/, which behaves as a sonorant in several respects). This is exactly the position defined by Lombardi’s (1995) ‘Laryngeal Constraint’ (reinterpreted in Lombardi 1999 as a privileged position with respect to Faithfulness to laryngeal features). Jónsson (1994) adopts Lombardi’s licensing condition, adding a word-boundary restriction to ensure that aspirated stops are licensed in initial position only.

The need for such a boundary restriction becomes evident when we examine word-medial stops that are also released into a sonorant. The most important of these contexts, which will be the focus of discussion in the remaining sections, is postvocalic onset position. Here, the majority dialect SD does not allow [Tʰ] at all; instead, we find only unaspirated [T]. Interestingly, however, ND has [Tʰ] wherever SD has [T], as illustrated in (5).

Absence of T:Tʰ contrast in postvocalic onset position

<table>
<thead>
<tr>
<th>SD ([T] only)</th>
<th>ND ([Tʰ] only)</th>
</tr>
</thead>
<tbody>
<tr>
<td>’svrpa</td>
<td>’svrpa</td>
</tr>
<tr>
<td>’he:tja</td>
<td>’he:tja</td>
</tr>
<tr>
<td>’sirkri</td>
<td>’sirkri</td>
</tr>
</tbody>
</table>

Jónsson (1994) handles this by formulating an additional licensing condition for ND, which ensures that /Tʰ/ will also surface intact in the contexts in (5). However, it is important to note that, from the point of view of distribution patterns alone, BOTH dialects are guilty of neutralization (i.e. suspension of contrast). Jónsson’s licensing analysis captures the fact that ND does allow [Tʰ] in this environment, but fails to account for the fact that it allows ONLY [Tʰ] and not [T]. The same is true of the OT analysis in Ringen (1999), where the difference between SD and ND is a matter of constraint ranking. One may of course stipulate that all postvocalic onset stops in the Icelandic lexicon simply happen to be underlyingly /Tʰ/, but this is inadequate in OT, where language-particular restrictions on potential input strings are not allowed (cf. section 2.1 above).

The postvocalic neutralization patterns in (5) will be the focus of the following sections. For the sake of completeness, however, a few comments on the situation in other environments are in order. After a VOICED CONSONANT, the picture is somewhat
complicated. First of all, unaspirated stops are here largely in complementary
distribution with voiced fricatives. The choice depends on the identity of $C_1$ as
well as the place of articulation of $C_2$. Thus, for example, with $C_1 = /r/$ we get $[rv, rð]$
and $[rK]$, whereas $C_1 = /l/$ yields $[lV]$ and $[lt, lk]$ (see Árnason 1990). This may give
rise to a gap on the T side of a potential $T:T^h$ contrast which in itself has nothing to do
with aspiration or its licensing. Secondly, there is considerable variation within ND
with respect to the range of environments where a $T:T^h$ contrast is found (Ír-rínsson
1980, Jónsson 1982, Ír-rínsson & Árnason 1986, 1992); the particular system labeled
‗ND‘ here is a somewhat idealized one. Keeping these caveats in mind, the general
picture is that ND allows a surface $T:T^h$ contrast after voiced consonants (specifically
after /l/, nasals, and /ð/), whereas SD does not, having only T in this environment:

(6) Onset stop after voiced C (aspiration contrast in ND, absent in SD)

<table>
<thead>
<tr>
<th>ND</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>[henta]</td>
<td>[henta]</td>
</tr>
<tr>
<td>[hentða]</td>
<td>([hentå])</td>
</tr>
</tbody>
</table>

henda ‘to throw’

henta ‘to suit’

After VOICELESS CONSONANTS the two dialects agree, neutralizing to [T], as illustrated
in (7). Note that due to a process of sonorant devoicing, words like henta in (6) surface
with [nt] in SD, such that the stop follows a voiceless rather than voiced consonant
in the surface form. The same is true of $r+\{p, t, k\}$ clusters in all dialects, as in the
last example of (7).

(7) Neutralization to [T] after voiceless consonant (all dialects)

| [lífta] | lyfta ‘elevator’ (no *[ . . . ft^h . . . ] allowed) |
| [víxta] | vigta ‘to weigh’ (no *[ . . . xt^h . . . ] allowed) |
| [härpa] | harpa ‘harp’ (no *[ . . . p^h . . . ] allowed) |

For cases like these, Ringen (1999) suggests that the absence of audible aspiration
on the stop is actually due to the sharing of a single [spread glottis] feature between
the two segments in the $C_T$ cluster. When a laryngeal abduction gesture spans both
segments, it does not extend far enough past the stop release to yield postaspiration
in the form of high VOT (cf. Kingston 1990). On this interpretation, the ‘unaspirated’
$p, t, k$ of the examples in (7) do in fact carry a [spread glottis] feature in the surface
representation, despite appearances to the contrary. A surface contrast such as [‘orka]
vs. [‘orka] would, under Ringen’s analysis, be represented as in (8):

(8) Surface ambiguity of ‘unaspirated’ [T] in clusters

a. r k a (orka [‘orka] ‘energy’)
   
   [spr.gl.]

b. r k a (orga [‘orka] ‘to bellow’)

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At the level of phonological representations, there is in a sense a surface ‘contrast’ between the two \([k]\)’s in (8), in that one is \([\text{spread glottis}]\) and the other is not. However, this ‘contrast’ has no audible manifestation on the stops themselves. Given the featural/gestural overlap, it is perhaps more useful to think of the entire clusters as contrastive units, i.e. \([\text{r}k]:[\text{r}k]\). Ringen (1999) argues that the feature sharing in (8a) is driven by a constraint requiring every token of \([\text{spread glottis}]\) to be multiply linked – a constraint which she argues is also responsible for preaspiration. As the focus of this article is (static) distribution patterns rather than (dynamic) alternations, these issues are somewhat orthogonal to it. It is sufficient to note that in the context \(\text{C}_9\), as in (8a), a \(T^h\) contrast is systematically absent. How the attested surface clusters (\([ft]\), \([\text{r}k]\), etc.) are to be represented, and how other alternatives are ruled out (such as \([\text{r}k^h]\) with two separate \([\text{spr.gl.}]\) features), is a separate question.

The distribution of aspirated and unaspirated stops across surface environments in Icelandic is summarized in (9), where \(\text{C} = \text{voiced consonant, } \text{C}_9 = \text{voiceless consonant, and } \text{S} = \text{sonorant (specifically a rhotic, glide or vowel)}\). For simplicity, the overview is limited to those environments where the stop is actually released into a sonorant.

(9) Summary: distribution of \(T\) vs. \(T^h\) in Icelandic (SD and ND varieties)

<table>
<thead>
<tr>
<th></th>
<th># S</th>
<th>V S</th>
<th>C S</th>
<th>C S</th>
</tr>
</thead>
<tbody>
<tr>
<td>SD</td>
<td>(T : T^h)</td>
<td>(T)</td>
<td>(T)</td>
<td>(T)</td>
</tr>
<tr>
<td>ND</td>
<td>(T : T^h)</td>
<td>(T^h)</td>
<td>(T : T^h)</td>
<td>(T)</td>
</tr>
</tbody>
</table>

Of particular interest here is the neutralization in postvocalic presonorant position (\(V_\_S\)), and the fact that the two dialects neutralize in opposite directions, SD to unaspirated \([T]\) and ND to aspirated \([T^h]\). The problems raised by this pattern are discussed in the next section.

### 3.2 Deriving the neutralization patterns

As we have seen, all dialects of Icelandic seem to share the generalization that aspiration contrasts do not occur in \(V_\_S\), where a postvocalic onset is released into a following sonorant, e.g., SD \([\text{l}e:\text{k}a]\) vs. ND \([\text{l}e:\text{k}^h\text{a}]\) \(\text{leka ‘to leak’}\). From the point of view of the surface distribution of aspirated vs. unaspirated stops, this is a case of neutralization. In each of the dialects, one of the two stop categories is systematically and conspicuously absent: aspirated \([T^h]\) in SD, unaspirated \([T]\) in ND. As there are inherently no limitations on what kinds of segments may occur in potential input strings, the phonological grammar of each dialect must be preventing the unattested stop type from appearing on the surface. In other words, the phonology
of SD Icelandic must license [T] in this position but not [Tʰ], and vice versa for the phonology of ND Icelandic.

As outlined in section 2.2, Licensing by Cue (Steriade 1995, 1997, 1999) has as one of its main goals to capture cross-linguistic generalizations about neutralization patterns by making direct reference to the cueing potential that different environments may have with respect to specific featural distinctions. Certain implicational generalizations have been observed, whereby neutralization (lack of contrast) in a relatively cue-rich environment seems to imply neutralization in all environments with lower cueing potential. For example, voicing neutralization before sonorants implies neutralization in word-final position, which in turn implies neutralization before obstruents (Steriade 1997). These implicational hierarchies are translated into fixed constraint rankings (e.g., *[αvoice]/V_# >> *[αvoice]/V_[+son]). Conversely, Licensing by Cue makes explicit predictions about possible neutralization patterns, and it is on the validity of these that the strength of the theory must be judged.

Unfortunately, much more work has been done in this area on voicing than aspiration, both with respect to the range of acoustic cues that may signal these features and on the typology of neutralization patterns. Regarding postaspiration, Steriade (1997:30) states that ‘[i]t seems likely that all the cues to such contrasts are contextual (VOT and burst) and occur exclusively in the vicinity of the release’. She goes on to support this conclusion with evidence from languages which neutralize voicing in a subset of the environments where they neutralize aspiration (voicing cues not tied to the release include closure duration, preceding vowel duration, and F0/F1 transitions).

Steriade (1999) goes into more detail on aspiration contrasts (including preaspiration) and the typology of aspiration neutralization. She derives this typology from considerations of the transitional cues that are, she argues, the primary perceptual correlates of aspiration contrasts, namely the (partial) devoicing of a neighboring segment. In the case of postaspirated stops, the relevant context is then the following segment, into which the closure is released.

Turning now to Icelandic, recall that T:Tʰ contrasts are only ever found in positions where the closure is released into a sonorant (vowel, glide or rhotic). This is obviously an environment where release cues are abundantly available. However, the contrast has a more limited distribution than this, in that it is maintained in #_S position but neutralized in V_#S. These two environments differ only in their left-hand context, which does not directly affect the availability or strength of release cues. Steriade (1999) does not explicitly discuss the possible existence of any non-release-bound cues to postaspiration contrasts, but it seems clear that if any such cues exist, they will be more readily available in the V_#S environment than in #_S. Plausible candidates for such (minor) cues might include closure duration, or even preceding vowel duration. For example, the measurements reported by Indriðason et al. (1990–91) suggest that, in words of the relevant type, preceding vowel duration
is greater before the unaspirated stops of SD than before the aspirated stops of ND. Hence stop duration as a proportion of the V+C sequence is considerably shorter in the former dialect (on average 50% in SD, as compared to 58% in ND). Indriðason et al. do not address this comparison specifically, and it is not clear if the difference is statistically significant or not. Nevertheless, findings such as these suggest that additional cues may well be present in the V_S environment that are not available in the #_S context. In sum, the neutralizing V_S environment should, if anything, be richer in cueing potential than the #_S environment where the T:T contrast is upheld.

It might perhaps be argued that the release cues themselves may be somewhat weaker in V_S than in #_S, in that the latter position typically precedes the stressed vowel, whereas the former follows it (Icelandic has fixed initial stress). It is conceivable that there is less build-up of intraoral pressure during the closure phase in V_S, resulting in a slightly shorter and perhaps attenuated release. The explanation would then be that this release is too ‘weak’ to cue an aspiration contrast in terms of robust VOT differences. Even though an explanation along these lines may have some merit, it does not fit well with the fact that in ND, stops in the supposedly weak-release V_S environment are in fact realized as aspirated. Moreover, they are realized with a fairly energetic release and relatively high VOT (averaging about 60 ms in Indriðason et al. 1990–91). Finally, as the data in (4b–c) showed, the #_S environment is not necessarily at the onset of a stressed syllable.

The Icelandic neutralization pattern thus appears to go against the implicational hierarchy that is embodied in the Licensing by Cue approach. On the assumption that V_S is somewhat richer in cues than #_S, the following fixed ranking should hold: *[αspr.gl.]/#_S >> *[αspr.gl.]/V_S. Since a contrast is maintained in #_S, faithfulness to underlying [spr.gl.] values must outrank the former of these constraints:

(10) Aspiration contrast in initial position (kúla ‘sphere; bullet’)

<table>
<thead>
<tr>
<th></th>
<th>IDENT(SG)-IO</th>
<th>*[αspr.gl.]/#_S</th>
<th>*[αspr.gl.]/V_S</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>kú:la</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b.</td>
<td>ku:la</td>
<td>!</td>
<td>*</td>
</tr>
<tr>
<td>c.</td>
<td>Ku:la</td>
<td>!</td>
<td></td>
</tr>
</tbody>
</table>

The output candidate in (10c) contains a stop that contains no specification for [spr.gl.] whatsoever (‘K’), and lacks an articulatory target with respect to aspiration. Steriade (1997:22–23) argues that neutralization produces precisely such targetless representations, which ‘place no perceptual burden on the hearer and require no articulatory effort from the speaker’. Accordingly, the context-sensitive *[αspr.gl.]
constraints equally prohibit distinctively unaspirated stops as well as distinctively aspirated ones.3

Unfortunately, the fixed ranking *[αspr.gl.]/#_S >> *[αspr.gl.]/V_ _S entails that the very same contrast will then also be preserved in the V_ _S environment, as the derivation in (11) illustrates. The correct output is (11c), which loses out on faithfulness:

(11) Contrast wrongly maintained in V_ _S (leka ‘to leak’)

<table>
<thead>
<tr>
<th>UR: /le:kʰa/</th>
<th>IDENT(SG)-IO</th>
<th>*[αspr.gl.]/#_S</th>
<th>*[αspr.gl.]/V_ _S</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. le:kʰa</td>
<td></td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>b. le:ka</td>
<td></td>
<td>*!</td>
<td>*</td>
</tr>
<tr>
<td>c. le:Kα</td>
<td></td>
<td>*!</td>
<td></td>
</tr>
</tbody>
</table>

A second problem concerns the fact that the SD and ND varieties realize neutralized stops in the V_ _S environment in different ways, ND with postaspiration and SD with no aspiration. If, as is claimed by Steriade (1997), neutralization produces stops entirely lacking in articulatory targets for the features at hand, then this should apply to SD and ND alike. Taking the derivation in (11) as an example – adjusted so that the neutralization candidate (11c) does in fact win – the output representation will then be [le:Kα] in both dialects. The fact that, in ND, neutralized ‘K’ is realized with an active glottal abduction gesture timed so as to produce high VOT at the release, whereas in SD it is not, will therefore have to be the responsibility of a separate component of ‘phonetic implementation’, which interprets phonological output representations in terms of real-time articulatory gestures. However, this would be in direct conflict with the philosophy which lies at the heart of the Licensing by Cue approach, namely to integrate low-level phonetic properties into the machinery of the phonological grammar itself.

The ‘targetlessness hypothesis’ may need to be abandoned, in which case the context-sensitive licensing constraints can be restated as prohibiting occurrences of privative [spr.gl.] specifications (i.e. aspiration as such) in particular environments. The neutralized stops are then interpreted at face value, e.g., as [le:ka] rather than [le:Kα] in SD. However, this does not make the problem go away: we must still account for the fact that neutralization in ND is in favor of an ASPIRATED stop – i.e. one that contains [spr.gl.] on the surface. Given Richness of the Base (see sections 2.1 and 4), the phonology of ND must have the power to change (hypothetical) unaspirated input stops to aspirated ones, by somehow forcing the INSERTION of a [spr.gl.] feature in the neutralization environment. The constraints proposed so far – even when revised along the lines just mentioned – are insufficient to achieve this, regardless of ranking:
The cornerstone of Licensing by Cue is the assumption that neutralization in a particular position is driven by the relative paucity of acoustic cues to the relevant feature in that position. Accordingly, it should be impossible for segments in that environment to be forcibly realized with the very feature whose impoverished cues motivate the neutralization in the first place. But this is exactly what we find in ND.

To sum up, there are two main problems with the Icelandic data from the perspective of Licensing by Cue: (i) neutralization targets a relatively cue-rich environment while leaving environments with equal or poorer cueing potential unaffected; and (ii) neutralization goes in the ‘wrong’ direction in ND, favoring aspirated over unaspirated stops.

There is a way in which the former of these two problems can be overcome, by abandoning the notion that ALL neutralization is based on the availability of cues (a move which severely undermines Licensing by Cue, rendering it effectively unfalsifiable). One solution is to appeal to the notion of positional faithfulness (Beckman 1999), in this case to segments in absolute root-initial position. The gist of an analysis along these lines is that aspiration is disfavored across-the-board (*[spr.gl.] >> IDENT(SG)), but that the special faithfulness constraint for root-initial position can trump this (IDENT(SG)/[RT— >> *[spr.gl.])). The example in (13) shows how neutralization is enforced in positions other than the root-initial one, i.e. where top-ranked IDENT(SG)/[RT— is irrelevant. (Note that ‘[RT’ in the label of this constraint signifies a morphological boundary, rather than a prosodic one, as the root-initial segment need not be word-initial, nor at the onset of a stressed syllable.)

(13) Neutralization in non-root-initial position (SD varieties)

<table>
<thead>
<tr>
<th>UR: /leːkʰa/</th>
<th>IDENT(SG)/[RT—</th>
<th>*[spr.gl.]</th>
<th>IDENT(SG)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. leːkʰa</td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. leːka</td>
<td></td>
<td>*</td>
<td></td>
</tr>
</tbody>
</table>

For root-initial stops, the situation is reversed, with faithfulness to underlying [spr.gl.] specifications now outranking the markedness constraint militating against such specifications:
An analysis along these lines is in principle not incompatible with the cue-based *α[spr.gl.] constraint hierarchies of Licensing by Cue – we may freely substitute the two constraints *α[spr.gl.]/#_S >> *α[spr.gl.]/V_ _S for the ‘*α[spr.gl.]’ of the above tableaux without affecting the predictions in the least. Nevertheless, the combination of cue-based positional Markedness constraints with positional Faithfulness constraints is an unhappy marriage at best, since the two have largely been developed as alternative strategies for dealing with the same range of phenomena (positional neutralization). Be that as it may, the above analysis appears sufficient for solving one of the problems, namely how neutralization can target a comparatively cue-rich environment. Moreover, it is able to capture the SD pattern, where neutralization results in deaspiration.

However, the second problem remains. Neutralization in ND appears to require obligatory ASPIRATION, contrary to the predictions made by theories appealing to the availability of acoustic cues. It is also inconsistent with theories that tie neutralization and licensing to intrasegmental complexity (e.g., Harris 1997). Aspirated stops are generally taken to be more complex than unaspirated ones; hence licensing of the former in a given position should entail licensing of the latter as well.

In conclusion, laryngeal neutralization in Icelandic presents significant problems for OT accounts of neutralization which are based on low-level phonetic properties, in particular Licensing by Cue. Other cases have also been reported which contradict the predictions of this approach (e.g., Yu 2000). Such problem cases tend to have a diachronic explanation – the unexpected synchronic pattern being the fortuitous result of historical processes which in and of themselves have nothing to do with contrast neutralization. This is true of Icelandic as well. The contrasting Th vs. T series go back to Proto-Germanic ‘fortis’ vs. ‘lenis’ stops (*p, *t, *k vs. *b, *d, *g). The latter, however, were more or less in complementary distribution with voiced fricatives (*β, *ð, *ɣ), and occurred only in word-initial position, when geminated, and after certain sonorants. For this reason, a contrast between two series of stops was limited to precisely those positions. In other environments, e.g. intervocally, the only stops that occurred were *p, *t, *k. The Modern Icelandic pattern is ultimately a distant reflection of this state of affairs in Proto-Germanic. The systematic neutralization pattern in the (synchronous) phonotactics of Icelandic is not the result of any historical merger of /T/ and /Tʰ/ ever taking place. Rather, it reflects the fact that
Proto-Germanic *b, *d, *g – the ancestors of the unaspirated /T/ series – had never arisen in that particular context.

Be that as it may, the insight behind the Licensing by Cue approach is a genuine one: the correlation between the typology of neutralization contexts and the strength/number of perceptual cues available in those contexts is quite strong, if imperfect. If this correlation is to be elevated to a general principle – as is done in the Licensing by Cue approach – that principle may have greater validity when interpreted from a diachronic rather than a synchronic perspective. On such a reinterpretation, the availability and salience of acoustic cues defines the environments in which MERGER – the collapse of a pre-existing contrast – is likely to take place through listener-based sound change (Ohala 1993). ‘Impossible’ neutralization patterns can and do arise (in the form of static distributional generalizations), but typically through diachronic routes other than merger. As a diachronic principle governing sound changes of a specific kind, Licensing by Cue thus stands a better chance of remaining a powerful predictive hypothesis.

### 3.3 Loanwords and incipient aspiration contrasts

The picture presented in section 3.2 is in fact not entirely accurate as a representation of Icelandic AS SPOKEN TODAY, in that it presents a somewhat idealized picture. Modern-day Icelandic contains a number of proper names and loanwords which have been borrowed from various sources (mainly Danish and English) especially during the last century or two. Many of these are mostly confined to colloquial (or at least informal) speech, but a significant number have by now become thoroughly integrated into the Icelandic lexicon. Importantly, such words do not always conform to the patterns laid out in descriptive treatments of Icelandic phonology. As an example, gardìna [kartina] ‘curtain’, Ferdìnand [fertiñant], and many more like them, are exceptions to the otherwise complete absence of [rt] clusters in favor of [rð] (cf. the [t]/[ð] alternations observable, e.g., in the past tense suffix in þol-d-i [θɔlI] ‘s/he endured’ vs. þor-ð-i [θɔðI] ‘s/he dared’).

A significant number of borrowings contain orthographic b, d, g in the V_S (postvocalic presonorant) environment, which are pronounced as [p, t, k]. What is most striking is that these stops are consistently unaspirated not only in SD, but in ND as well:

(15) Borrowings with unaspirated T in postvocalic position (all dialects)

| a. [tʰupa]   | tūba  | ‘tuba’ |
| [souта,vahtн] | sōдavatn | ‘sparkling water, soda’ |
| [le:kou]     | legó   | ‘lego blocks’ |
| b. [sɛ:praہestyr] | sebrahestur | ‘zebra’ |
| [ɛ:tru]      | edrù   | ‘sober’ ( < Dan. ødru) |
| [mι:kreni]   | mígreni | ‘migraine’ |
The incorporation of these loanwords into the lexicon of Icelandic is of no particular consequence to the analysis of SD, since that variety already allows unaspirated [p, t, k] in this position. In ND, on the other hand, the addition of such words has drastic consequences for the phonotactics. As we have seen earlier, ND allows only $T^h$ in this position in etymologically native words. In spite of the regularity and systematicity of that pattern, there appears to be no tendency whatsoever to ‘nativize’ these newcomers by shifting their postvocalic stops from $T$ to $T^h$. As a consequence, an incipient $T:T^h$ contrast is gradually becoming established in postvocalic position in ND, as can be seen from minimal and near-minimal pairs like those in (16).

(16) Incipient $T:T^h$ contrast in ND due to borrowings

   a. [\textit{rat\textcopyright ar}] \hspace{1cm} \textit{ratar} \hspace{1cm} ‘knows the way (3sg.)’
   [\textit{ratar}] \hspace{1cm} \textit{radar} \hspace{1cm} ‘radar’
   b. [\textit{li\textcopyright ka}] \hspace{1cm} \textit{lika} \hspace{1cm} ‘also’
   [\textit{si\textcopyright ka\textcopyright rehta}] \hspace{1cm} \textit{sígaretta} \hspace{1cm} ‘cigarette’
   c. [\textit{ti\textcopyright pra\textcopyright ra}] \hspace{1cm} \textit{dýpra} \hspace{1cm} ‘deeper (neut.)’
   [\textit{vi\textcopyright pra\textcopyright fo\textcopyright ð topp}] \hspace{1cm} \textit{vibrafómm} \hspace{1cm} ‘vibraphone’

One is tempted to conclude, then, that unaspirated stops ARE in fact permissible in this position in ND after all – since there does not seem to be any pressure to nativize these words any further than has already been done. If this is the case, some of the problems discussed in the previous section appear to go away. There simply is no neutralization to $T^h$ in the $V__S$ environment in ND: the absence of words with $T$ in this position was merely apparent, and that gap disappears once recent loanwords are taken into account in addition to the etymologically native part of the lexicon. We are then left with the simple fact that SD has neutralization to $T$ in this position – which may perhaps, as outlined in section 3.2, be handled by appealing to positional faithfulness.

At first glance, then, the facts in (15)–(16) appear to undo the case made in the preceding section, where it was argued that the ND neutralization pattern was fundamentally problematic. However, note that the loanwords in question are almost all quite recent, having entered the language only in the last century or two. This means that the problematic ‘gap’ in ND – the systematic absence of postvocalic onset [p, t, k] – most definitely WAS there at an earlier stage of the language. What is more, that stage lasted for several centuries, possibly reaching back all the way to the Old Icelandic period. As there are never any limits on what constitutes a possible input (cf. sections 2.1 and 4), something in the phonology of ND AT THIS EARLIER STAGE must have been preventing inputs containing $/\ldots VT\ldots$/ from surfacing intact, while at the same time letting inputs with $/\ldots VT^hV\ldots$/ pass through unmodified. This brings us right back to the same problem as before: how is it possible, in the same relatively
cue-rich intervocalic environment, for one dialect to neutralize in favor of unaspirated stops and another in favor of aspirated ones?

Secondly, even the eventual filling of this ‘gap’ by words like the ones in (15) in modern-day ND creates a dilemma from the OT perspective. Let us assume that the synchronic phonology of (earlier) ND was indeed preventing postvocalic unaspirated stops from surfacing as such. How are we then to explain the fact that once loanwords with unaspirated stops started to impinge on the Icelandic lexicon, they were immediately incorporated without any modification into ND just as they were in SD? Such questions ultimately hinge on Richness of the Base. The next section explores the implications of the Icelandic data for the validity and interpretation of this principle.4

4. RICHNESS OF THE BASE, LOANWORDS, AND CHANGES IN DISTRIBUTION PATTERNS

As formulated in (1), Richness of the Base (Prince & Smolensky 1993:191; Smolensky 1996) precludes the possibility that the input, i.e. lexical representations, may be the locus of any systematic generalizations about the sound patterns of a given language. The principle dictates that all systematic differences in surface inventories (not merely of segments but also of segment sequences, syllable and foot types, etc.) arise not from different input sets but from different constraint rankings alone. The actual lexicon of a language is merely a sample of the universal set of possible inputs, and any systematic properties that may hold across that lexicon are an indirect product of the grammar. Needless to say, Richness of the Base places quite severe restrictions on the analysis of static distributional regularities, such as the ones involved in the Icelandic neutralization patterns, by forcing the analyst to make these regularities follow as an inevitable consequence of the proposed constraint ranking.

As noted by Smolensky (1996), the main motivation for Richness of the Base is theoretical restrictiveness. It reduces the locus of cross-linguistic variation to constraint ranking alone, in addition to avoiding the well-known ‘duplication problem’ (cf. Kenstowicz & Kisseberth 1977) of having to encode individual restrictions in the lexicon as well as in the grammar. But aside from purely theoretical considerations of simplicity and restrictiveness, Richness of the Base is standardly interpreted as having certain empirical implications as well – in particular with respect to loanword adaptation (see, e.g., Gussenhoven & Jacobs 1998:50, from whom the following illustration is borrowed).

As an example of a general distributional regularity, consider the fact that all morphemes in Hawaiian consist of concatenations of open syllables without complex onsets (maximally CVV). The standard assumption is that complex onsets do not merely happen to be absent from the lexicon, but that the phonology of Hawaiian
actually PROHIBITS their occurrence, by way of high-ranked *COMPLEX. But since no lexical input representations contain potential violations of *COMPLEX anyway, there is no DIRECT evidence for this constraint being ranked high rather than low. This is where Richness of the Base comes in, forcing us to capture the output pattern by having the phonology of Hawaiian ‘repair’ any and all hypothetical inputs containing the non-occurring structures (complex onsets). Without this assumption, there would be no principled way of arriving at distinct constraint rankings for the syllable structure of Hawaiian and, say, English (where *COMPLEX violations are rampant). Given an OT architecture, Richness of the Base thus seems to be an essential assumption if we are to distinguish – as we surely must – between such radically different languages in a systematic, non-arbitrary manner.

This much is based solely on methodological and theoretical concerns, but a further prediction of Richness of the Base is that when unattested input structures ARE fed through the phonology, these will be repaired so as to fit the pre-existing pattern. This is presumed to be exactly what happens in loanword adaptation, when lexical items undergo phonological adjustments to fit the phonotactics of the borrowing language – e.g., avoiding complex onsets by epenthesis, deletion, or the like. In other words, ‘nativization’ of loanwords provides the crucial evidence that the constraint ranking is indeed as dictated by Richness of the Base.

To the best of my knowledge, loanword adaptation is the only source of overt evidence for Richness of the Base. But recall that the principle requires ALL DISTRIBUTIONAL REGULARITIES in a language to follow from the constraint ranking. This makes the strong prediction that all regularities of this kind WILL be enforced in the process of loanword adaptation. Indeed, if a certain type of distributional regularity fails to be enforced in this way, this should constitute strong evidence against Richness of the Base – at least as applying to regularities of that particular type. As we have seen, however, this strong prediction is blatantly contradicted by ND Icelandic, where loanwords are undoing a neutralization pattern which had existed for centuries. Examples such as [vɪˈprəɹɔʊtʏn] ‘vibraphone’ are especially telling in this respect. That word has been made to conform to Icelandic phonology (and morphology) in practically all respects – stress, vowel length, individual vowel and consonant qualities, addition of nom.sg. /-r/, the rendering of /n+/t/ as [tɬ] (by assimilation followed by ‘dissimilation’ in rule-based accounts), and so forth. The sole exception is the unaspirated [p], occurring in a context where only aspirated [pʰ] is otherwise allowed.

It is of course a matter of definition what counts as a ‘distributional regularity’ in the first place. How many individual exceptions does it take to undo such a regularity? Assuming that the answer is more than one (as most generalizations have some idiosyncratic exceptions, especially when proper names and borrowings are taken into account), just how strong does the statistical bias have to be in order for the pattern to still count as a regularity? Does the regularity perhaps
also need to be ‘phonetically natural’ in order to count, and if so, how is THAT notion to be defined? These are certainly non-trivial issues, which will ultimately need to be addressed if the role of Richness of the Base is to be properly defined.

Be that as it may, the Icelandic case involves a distributional regularity that is about as systematic as they come. For several centuries, postvocalic onset stops of the relevant category (unaspirated T in ND) were completely and conspicuously absent from surface forms – just as complex onsets have been for centuries in Hawaiian. In spite of the pervasiveness of this regularity, the phonology appears to have exerted no pressure whatsoever to enforce it – by aspirating postvocalic stops in borrowings from Danish and English once these started to trickle into the lexicon.

It is perhaps useful to distinguish between a strong vs. weak interpretation of Richness of the Base. The stronger interpretation, whereby every (pervasive) distributional regularity needs to fall out from the grammar, forces us to a rather awkward set of conclusions: (i) while the ‘gap’ in ND was there, it did have a synchronic explanation, being enforced by the constraint ranking; and (ii) as soon as loanwords with unaspirated stops began to appear, the constraint ranking changed in such a way that it no longer enforced that gap. The conclusion is that at the earlier stage – when there was no overt evidence available bearing on the issue – the constraint ranking had the power to actively produce neutralization, whereas by the time a potential source of overt evidence finally became available, the ranking had evidently changed so as not to have any such effect.

A weaker interpretation of Richness of the Base would allow SOME (pervasive) distributional regularities to go unaccounted for in the synchronic grammar. This amounts to acknowledging that certain generalizations, however ‘systematic’ they may seem, should nevertheless be treated as ‘accidental gaps’. On this view, Richness of the Base is not contradicted by the Icelandic data. The drawback of the weaker interpretation, however, is the indeterminacy inherent in it. Until such a point in time that the relevant type of borrowings start appearing (if they ever do), how are we to decide, for a given case, whether the phonological grammar is responsible for it or not?

In resolving this dilemma, cross-linguistic studies on loanword adaptation patterns – in particular the extent to which neutralization patterns are enforced in borrowings – would be a valuable source of evidence. Such findings might help elucidate the empirical scope of the Richness of the Base principle. It may well turn out to be a matter of empirical evaluation on a case-by-case basis whether a particular regularity is to be captured by the phonology or interpreted as an ‘accidental’ property of the lexicon. The Icelandic neutralization pattern would presumably have to fall in the latter category. But under the strong interpretation usually afforded it (and evident from Prince & Smolensky 1993 and Smolensky 1996), Richness of the Base is clearly contradicted by evidence such as the Icelandic data.
5. ASPIRATION IN FAROESE: INTERACTION WITH SURROUNDING VOWELS

Faroese, the closest relative to Icelandic, has much in common with it as regards laryngeal phonology. For example, both languages have preaspiration of stops—though with some differences in distribution and phonetic realization. More importantly, Faroese displays the same neutralization of T:T\textsuperscript{h} contrasts in V_ _S environments as Icelandic does (again *modulo* recent loanwords). However, it differs in interesting ways with respect to the surface realization of stops under neutralization.

It should be noted that dialect differences within Faroese are considerable, and far greater than in Icelandic (Barnes & Weyhe 1994, Petersen et al. 1998). Some of the more important dialect differences have to do precisely with the laryngeal properties of plosives. The relevant dialect split is a North-South division, with the dialect of the capital Tórshavn and its environs having a somewhat special status among the Northern dialects:

(17) Faroese: Dialect groups with respect to laryngeal phonology

a. Southern dialects (south of Skopunarfjørður, e.g. Suðuroy, Sandoy)
   b. Northern dialects (north of Skopunarfjørður)
       i. Tórshavn dialect (southern part of Streymoy)
       ii. other Northern dialects (rest of Streymoy, Vágar, Eysturoy, Norðoyar)

The Northern dialects will be the focus of this section although relevant comparisons with Southern dialects will be noted. Taking the former as our point of departure, the surface inventory of obstruent segments is roughly as shown in (18). (Omitted here are retroflex stops, which are optional after rhotics, e.g., *hoyrdu* \[h\tilde{u}\tilde{u}\] \(\sim\) \[h\tilde{u}\tilde{u}\] ‘they heard’.)

(18) Surface obstruent inventory of Northern Faroese (based on Petersen et al. 1998)

\[
\begin{array}{cccc}
  p^h & t^h & tf^h & k^h \\
  \tilde{p} & \tilde{t} & \tilde{t}f & \tilde{k} \\
  p & t & tf & k \\
  f & s & \tilde{s} & \tilde{j} & h \\
  v & \end{array}
\]

The main thing to note here is the existence of a series of preaspirated plosives, \[^h p\], etc. Preaspirated stops in Faroese differ from their Icelandic congeners in two main respects (cf. Hansson 1997, Þráinsson 1998). Firstly, Faroese preaspiration appears to be a genuinely sub-segmental property (like postaspiration), whereas in Icelandic it is clearly a full-fledged moraic segment \([h]\). Thus, for example, orthographic geminates like \(pp\) are most accurately transcribed as \[^h p:]\ in Faroese (note the long closure phase) but as bisegmental \([hp]\) in Icelandic. Secondly, the Northern dialects
of Faroese permit preaspiration of singleton plosives, even in intervocalic position, as will be discussed in greater detail below.

5.1 Neutralization and pre- vs. postaspiration in Faroese dialects

In all crucial respects, the distribution of laryngeal contrasts in plosives is the same in Faroese as in Icelandic. An aspiration contrast T:Tʰ is maintained in absolute initial position, neutralized after voiceless consonants, and so forth. Where Faroese differs from Icelandic in this regard is in the phonetic realization of plosives in certain positions of neutralization. More specifically, the relevant environment is precisely the one where Icelandic neutralizes to T or Tʰ depending on dialect (cf. section 3), namely in postvocalic presonorant position, V_ _S. Just as in Icelandic, the plosive is parsed as an onset in such contexts, rendering the preceding syllable open, as is evidenced by vowel length (cf. [si:.ta] sita ‘to sit’, [kʰəka] koka ‘cake, flatbread’).

The various dialects of Faroese differ considerably in how plosives are realized in this environment (Petersen et al. 1998). Southern Faroese is not unlike SD Icelandic, in that plosives are invariably unaspirated in this position. However, they may also sporadically be realized with voicing (full or partial), e.g., [kʰəga]. In Northern dialects, on the other hand, voicelessness is the norm. In the variety of Northern Faroese spoken in and around the capital Tórshavn, plosives in this environment are typically unaspirated (as they are in SD Icelandic), but they may occasionally be realized as postaspirated (as in ND Icelandic), e.g. [kʰəka] ~ [kʰəkʰa]. In the remainder of the Northern dialects, on the other hand, they are more or less consistently pronounced as voiceless preaspirated singletons: [kʰəka]. These dialect differences are summarized in (19).

(19) Plosives in V_ _S position across Faroese dialects (Petersen et al. 1998)

<table>
<thead>
<tr>
<th>Southern dial. T (~ D)</th>
<th>Tórshavn dial. T (~ Tʰ)</th>
<th>Northern dial. T³T</th>
</tr>
</thead>
<tbody>
<tr>
<td>pʰəpɪ (~ pʰəbɪ)</td>
<td>pʰəpɪ (~ pʰəpʰɪ)</td>
<td>pʰəpʰɪ</td>
</tr>
<tr>
<td>pʰətʊ (~ pʰədʊ)</td>
<td>pʰətʊ (~ pʰətʰʊ)</td>
<td>pʰətʰʊ</td>
</tr>
<tr>
<td>pʰəkə (~ pʰəgə)</td>
<td>pʰəkə (~ pʰəkʰə)</td>
<td>pʰəkʰə</td>
</tr>
</tbody>
</table>

The Tórshavn dialect represents, in a manner of speaking, a combination of the Icelandic SD and ND systems in free variation. The other Northern dialects with their preaspirated singletons are quite unique, however, and will be the focus of the remainder of this section.

Perhaps the most remarkable feature of these Northern dialects is that the realization of plosives in the environment at hand is in fact dependent on the quality of
the preceding vowel. A preaspirated plosive, as in (19), appears only after NON-HIGH vowels. After high vowels, including diphthongs with high offglides, we instead find the same realization as in the Tórshavn dialect, namely an unaspirated stop with optional POSTaspiration:

(20) Vowel height and preaspiration in Northern Faroese dialects

a. If preceding V is non-high, then [ʰT]

- [staʰtwi] statur ‘state’
- [teʰpa] drepa ‘to kill’
- [oʰpi] opin ‘open’
- [veʰku] vakur ‘beautiful’
- [pœaʰtu] bátur ‘boat’

b. If preceding V is high, then [T] (∼ [Tʰ])

- [sita] (∼ [sintʰa]) sita ‘to sit’
- [lutur] (∼ [luntʰu]) lutar ‘thing’
- [kʰvuitu] (∼ [kʰvuitʰu]) hvítur ‘white’
- [iaita] (∼ [iaitʰa]) reita ‘to irritate’
- [mjuku] (∼ [mjukʰu]) mjúkur ‘soft’
- [œutin] (∼ [œutʰn]) rótin ‘the root’

This dependence of preaspiration on vowel height is quite striking, and does not appear to be attested elsewhere, neither in any of the other preaspirating dialects/languages of north-western Europe (Hansson 1997, 2001) nor, it seems, in other parts of the world where preaspiration has been reported (Hansson 1997, Helgason 2002, Silverman 2002).

It is by no means unheard of for aspiration in general to interact with vowel height, for what are ultimately well understood aerodynamic reasons (see, e.g., Ohala 1981, 1983, Chang 1999 and references cited there). When a voiceless stop is released into a segment with a relatively narrow oral constriction – including a high vowel or glide – this tends to enhance the length of the release burst, thus facilitating the development of aspiration (e.g., in Ikalanga; Mathangwane 1999). However, the factors that contribute to this correlation between vowel height and (magnitude of) POSTaspiration concern oral pressure buildup during the closure, and hence do not carry over to the case of PREaspiration.

There is nevertheless a way in which constriction degree and aspiration interact that is more directly relevant to the Faroese case. The narrower oral constriction in a high vowel will, other things being equal, give rise to a higher particle velocity of the airflow through that constriction during any voiceless transition phase into or out of the vowel (Ohala 1983). With increased velocity comes greater turbulence, which in acoustic-auditory terms translates into FRICTION NOISE. As a result, the aspiration
or release burst of a stop, when coinciding with a high vowel or glide, frequently develops into a spirant (cf. the affrication in Japanese \[\text{ts}\text{t}i\] /\text{ti} ‘ground’).

This effect applies to high vowels and glides in any position where these are (partly or completely) devoiced, and is thus directly relevant to preaspiration as well. As the aspiration phase overlaps the articulatory gestures of the preceding vowel, its phonetic realization is, by definition, a devoiced version of that vowel. Hence Faroese \[\text{\text{v}a\text{a}ta\text{um}}\] \text{vátur} ‘wet’ may be more accurately transcribed as \[\text{\text{v}a\text{a}ta\text{um}}\]; an analogous example from Icelandic would be \[\text{\text{v}a\text{h}t\text{v}r} = [\text{\text{v}a\text{a}h\text{t}v\text{r}}] \text{vottur} ‘witness’ (cf. Dráinsson 1978, Sigurjónsdóttir 1988–89, where this interpretation is directly encoded in an autosegmental analysis). After a high vowel, the same is obviously also true, as in Icelandic \[\text{ni\text{h}t} = [\text{ni\text{h}t}] \text{nýtt} ‘new (neut.)’. But because of the increased-turbulence effect just noted, \[\text{[i]}\] has a great deal of frication noise – far greater than \[\text{[ç]}\] or \[\text{[a]}\] – and is in fact more or less indistinguishable from the palatal fricative \[\text{[ç]}\]. The same applies, \text{mutatis mutandis}, to devoiced \[\text{[u]}\], which is similarly equivalent to the fricative \[\text{[w]}\]. This is certainly true for Icelandic, where there is little phonetic difference between the preaspiration in \[\text{ni\text{h}t} \text{nýtt}\] and the initial \[\text{[ç]}\] of words like \[\text{[çe\text{r}]}\] \text{hér} ‘here’; an even more appropriate transcription would thus be \[\text{[niçt]}\]. When the preceding vowel is a (short) diphthong, the preaspiration/frication phase may even engulf most of the offglide, e.g., \[\text{[m\text{açt}]} \sim [\text{maçt} \text{mœt‌ti} ‘s/he met’.

Comparing preaspiration after high vowels to that after non-high vowels, the former is thus quite ‘noisy’ and fricative-like (\[\text{[çt]}\], \[\text{[wk]}\], etc.), unlike the latter (\[\text{[çt]}\], \[\text{[ak]}\], etc.). A corollary of this difference is that in the former case, the presence of preaspiration is significantly more salient in auditory-perceptual terms. Other things being equal, preaspiration should be more easy to perceive when superimposed onto a high vowel than on a mid or low vowel. Could perceptual salience then explain the Northern Faroese differentiation between, say, \[\text{[e\text{t}a]} \text{eta} ‘eat’ and \[\text{[s\text{i}ta]} \text{sita} ‘sit’? Unfortunately, the Faroese pattern is the exact opposite of what one ought to expect, leading to an apparent paradox. If a preceding high vowel makes preaspiration more salient, and hence perceptually more robust, why is this precisely the environment where it is absent? This problem is addressed in more detail in the following section.

5.2 Deaspiration and perceptual salience: resolving the paradox

The complementarity of \[\text{[T]}\] and \[\text{T}\] in Northern Faroese cannot be directly attributed to factors of perceptual salience, as preaspiration is maintained precisely where its perceptual cues are at their weakest, and suppressed where they are the strongest. Faroese is thus yet another problem case for Licensing by Cue (Steriade 1995, 1997, 1999; cf. section 2.2).

The general relevance of perceptual cues and their salience should be particularly acute in the case of preaspirated stops. As several researchers have pointed out,
preaspiration is severely disadvantaged for auditory, acoustic and aerodynamic reasons, which make it far less perceptually reliable than postaspiration (Bladon 1986, Kingston 1990, Silverman 2002; though see Helgason 2002 for a dissenting opinion). For one thing, preaspiration involves a transition from modal voicing to voicelessness (or non-modal breathy voice). Its detection is thus completely dependent on the detection of spectral offsets, whereas the auditory nerve responds far more strongly to onsets of spectral activity than their offsets (Bladon 1986). The main aerodynamic disadvantage to preaspiration is that it is not associated with a robust burst. There is no preceding build-up of oral pressure to increase airflow during the aspiration (Silverman 2002), and consequently, the acoustic energy in the aspiration phase of the speech signal is severely attenuated in preaspirated stops vis-à-vis postaspirated ones.

On the basis of these disadvantages, Silverman (2002) concludes that preaspiration should be diachronically highly unstable, and finds evidence supporting this conclusion from a typological survey of languages where preaspiration has been reported. Preaspiration is frequently lost, especially in unstressed syllables, or reinterpreted as contrastive vowel length; another common phenomenon is for preaspiration to develop into an oral constriction (pre-frication) in order to enhance the noise characteristics of the aspiration, e.g., [ʰp, ʰt, ʰk] > [fp, çt, xk], thus making it more perceptually salient.

In the environment where preaspiration follows a high vowel or glide, it is inherently associated with a narrow oral constriction. Thus it is effectively already realized as an ‘oral’ segment – a voiceless fricative such as [ç] or [ʌ], as explained earlier. This undoes many of the acoustic-auditory disadvantages inherent in preaspiration, whereas these handicaps remain in those contexts where preaspiration follows a non-high vowel. Given the diachronic instability of preaspiration, this would lead us to expect to find cases where preaspiration is present after high vowels and glides, but absent in other environments – the exact opposite of Northern Faroese. Such cases would be analogous to those where preaspiration is found after stressed vowels (where its perceptual cues are more robust) but not after unstressed ones.

From the point of view of synchronic phonology, the ‘insensible’ pattern of Northern Faroese needs to be explained: why does preaspiration fail to surface in output forms precisely in positions of high salience? Diachronically, the problem is similar: assuming that preaspiration was once present regardless of vocalic context, why was it lost in those environments where it was most salient but not elsewhere? It is clear that Licensing by Cue and related approaches can be of no help in this particular case.

It is possible to put forward a speculative socio-historical scenario for how preaspiration might have been lost in those positions where it was most perceptible. The greater perceptual salience that preaspiration has after a high vowel presumably
implies that it is more noticeable in this position, not merely to the listener but also to the speaker him/herself. Note also that preaspiration of singletons is a regional trait, and that several dialects (including the one spoken in the capital Tórshavn) do not have it as a regular feature. Let us hypothesize, for the sake of the argument, that speakers of Northern Faroese showed some tendency to suppress certain distinctly Northern features, including singleton preaspiration, as a kind of dialect accommodation. It would then not be surprising to find that the speakers did so precisely in those environments where preaspiration in their own speech was salient enough for THEMSELVES to notice it (as a regional ‘peculiarity’ worth suppressing). In other words, the very salience of preaspiration after high vowels might have made it more vulnerable to this kind of (semi)deliberate adaptation.6 Be that as it may, a diachronic explanation along these lines, however plausible in principle, remains pure speculation until it can be supported by independent sociolinguistic or historical evidence.

If we are instead to account for the lack of preaspiration after high vowels in terms of the synchronic grammar of Northern Faroese, we must phrase the problem differently: what might be the CONSTRAINT(S) that would force preaspiration to be suppressed in this environment? The logical assumption is that some Markedness constraint is militating against preaspiration specifically after high vowels. This leads us to ask if there might be some ‘cost’ attached to the increase in perceptual salience—some less advantageous side effects not necessarily relating to preaspiration itself and its robustness, but perhaps other parts of the signal and the lexical string it represents.

The implementation of preaspiration unavoidably involves articulatory overlap with the preceding vowel. In Faroese in particular, where it is of significantly shorter duration than in Icelandic, preaspiration can be thought of as a kind of gestural asynchrony (cf. Helgason 2002). The glottal opening gesture associated with the stop is initiated ‘prematurely’, and part of the preceding vowel is thus ‘taken over’ by preaspiration. Using an autosegmental formalism, this can be represented as the spreading of the stop’s Laryngeal node (dominating [spr.gl.]) onto the preceding vowel. As the devoicing is only partial, it is reasonable to assume that the vowel’s own Laryngeal node is not itself delinked, and the result is then effectively a contour segment, i.e. \([\tilde{a}\tilde{a}t]\) for /aʰt/, \([\tilde{u}\tilde{u}t]\) for /uʰt/, etc.7

In most cases, the spectral quality of the vowel remains relatively clear into the devoiced (aspiration) phase.8 But in the case of high vowels, the increased turbulence due to the narrow oral constriction means that preaspiration creates far greater acoustic ‘distortion’ of the vowel it overlaps. In effect, the voiceless part of an \([\tilde{i}\tilde{i}]\) is not so much a devoiced vowel as an obstruent, the fricative \([\varsigma]\), as mentioned earlier. The effect may be even more severe for a diphthong such as [ai]; here preaspiration overlaps most if not all of the offglide, resulting in pronunciations like Icelandic \(\text{[maʰt\'i]}\) meiti ‘s/he met’. 
It is not unreasonable to suppose that it is precisely this distortion – effectively, the transformation of (part of) an underlying vowel into an obstruent fricative – that Northern Faroese manages to avoid by prohibiting preaspiration after high vowels. As non-high vowels are not as ‘threatened’ by the aerodynamic and acoustic effects of devoicing as high vowels are, they do not trigger the suppression of preaspiration. In sum, avoiding the (partial) devoicing of high vowels takes priority over the need to realize aspiration on the stop. This kind of interaction can easily be interpreted in terms of ranked OT constraints, as the following analysis shows.

One way of interpreting the crucial constraint is as a Markedness constraint militating against voiceless (i.e. devoiced) high vowels, formalized here as prohibiting the cooccurrence of [spread glottis] with the feature specifications [−cons, +high, +ATR], as in (21). A high vowel which is either fully or partially devoiced ([u], [u]) will violate this constraint, as its root node simultaneously dominates [−cons, +high, +ATR] and [spr.gl.] – the latter via the Laryngeal node spread from the following stop.

(21) *HIGHTENSEV
If a segment is [−cons, +high, +ATR], it must not also be [spread glottis].

It is reasonable to suppose that analogous constraints like *HIGHLAXV, *MIDV and *LOWV also exist, but that the fixed ranking *HIGHTENSEV >> *HIGHLAXV >> *MIDV >> *LOWV holds, in that devoicing is less compatible with vocoids the narrower their degree of constriction.

The requirement that aspiration be preserved in the output, and realized specifically as preaspiration, is in the hands of the following two constraints, which crucially interact with *HIGHTENSEV:

(22) IDENT(SG)-IO
If an input segment is associated with a [spread glottis] feature, its output correspondent must also be associated with a [spread glottis] feature.

(23) LAR-TIMING
If a stop dominates a Laryngeal node, that node must be simultaneously dominated by the immediately preceding segment.

The function of LAR-TIMING is roughly analogous to that of SG-TIMING in Steriade (1997), although the latter is defined in non-structural terms. It is also somewhat reminiscent of Ringen’s (1999) constraint MULTLINK(SG), though it drives partial rather than full devoicing of the preceding segment.

In the following tableaux, output candidates are shown in phonetic transliteration, rather than autosegmental notation, for reasons of space. To make it clear that aspiration involves partial devoicing of a neighboring vowel – through sharing of its Laryngeal node (containing [spr.gl.]) with that vowel – I have refrained from...
using the aspiration symbol ‘h’ as in (20) above, opting instead for [V[V[T] and [T[V[V] for pre- and postaspiration, respectively.

The first two constraints are crucially ranked as *HIGH TENSEV \text{>> IDENT(SG)-IO}, which rules out the preaspiration candidate (24b). Note that in order to rule out aspiration ‘flop’, yielding postaspiration as in (24c), the ranking LAR-TIMING \text{>> IDENT(SG)-IO would also need to hold. However, the fact that postaspiration may occur sporadically as a variant pronunciation ([siṭa] \sim [siṭʰa]) might perhaps indicate that LAR-TIMING and IDENT(SG)-IO are variably ranked relative to one another; hence the dotted line in (24).

(24) Tableau for *sita* ‘to sit’

<table>
<thead>
<tr>
<th>UR: /s i t a/</th>
<th>*HIGH TENSEV</th>
<th>LAR-TIMING</th>
<th>IDENT(SG)-IO</th>
</tr>
</thead>
<tbody>
<tr>
<td>[sg]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. sītta</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. sīṭta</td>
<td>*!</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(c) c. sīṭṭa</td>
<td>*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

When the preceding vowel is non-high, devoicing it does not violate *HIGH TENSEV; the relevant constraints are *MIDV or *LOWV, which are lower-ranked, as argued above. Given a ranking LAR-TIMING, IDENT(SG)-IO \text{>> MIDV}, the latter fails to prevent aspiration (devoicing). Regardless of the ranking of the former two constraints relative to one another, the winner is the preaspiring candidate, as it violates neither of the two – preserving the input [spr.gl.] feature and realizing it as pre- rather than postaspiration:

(25) Tableau for *eta* ‘to eat’

<table>
<thead>
<tr>
<th>UR: /e t a/</th>
<th>*HIGH TENSEV</th>
<th>LAR-TIMING</th>
<th>IDENT(SG)-IO</th>
<th>MIDV</th>
</tr>
</thead>
<tbody>
<tr>
<td>[sg]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. eṭta</td>
<td></td>
<td></td>
<td>*!</td>
<td></td>
</tr>
<tr>
<td>b. eṭṭa</td>
<td></td>
<td></td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>c. eṭṭa</td>
<td></td>
<td>*!</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In both of the preceding tableaux it has been assumed that the stop in question is underlyingly aspirated, i.e. specified as carrying a [spread glottis] feature. An input representation containing an unaspirated stop, on the other hand, is going to surface intact, since none of the constraints can force the insertion of [spr.gl.] in the output.
Recall, however, that this environment (V_ _S) is a position of neutralization, just as in Icelandic, in that minimal or near-minimal pairs showing a $^{b}$T:T contrast are systematically absent. Following Richness of the Base, an OT analysis should be expected to reflect this fact by forcing aspiration on the surface in (25) even if no [spread glottis] feature were present underlyingly—a move which would necessitate major modifications to the above proposal. However, such an attempt would be problematic in exactly the same way as the analogous treatment of neutralization to T$^{b}$ in ND Icelandic, as discussed in section 3.2. The alternative is to consider the absence of unaspirated stops in environments such as (25) to be an accidental gap in the Faroese lexicon, rather than an automatic consequence of its constraint ranking. Moreover, just as in Icelandic (cf. section 3.3), a small number of recent loanwords and names now exist in Faroese which appear to have consistently unaspirated stops in the environment in question (e.g., Adam, compounds with radio-, etc.), giving rise to an emerging (pre)aspiration contrast where none existed before.

Although the OT analysis developed above is sufficient to account for the realization of stops in the V_ _S environment, it is inadequate in one respect. It remains to be explained why preaspiration in other environments (roughly those where preaspiration is attested in Icelandic) is not sensitive to vowel height in the same way. These are cases where the aspirated stop is geminated, or else followed by a nasal or (in the case of t) a lateral. To see why such cases pose a problem, consider the tableau in (26) which attempts to derive [ɹaiÓt] ‘s/he irritated [s.o.]’ from underlying /ɹaiÓt-/12

(26) Tableau (preliminary) for reitti ‘s/he irritated [s.o.]’

<table>
<thead>
<tr>
<th>UR: /ɹ ai t - t - t/</th>
<th>*HIGHTENSE\V</th>
<th>LAR-TIMING</th>
<th>IDENT(SG)-IO</th>
</tr>
</thead>
<tbody>
<tr>
<td>[sg] [sg]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. ţäiít:t</td>
<td></td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>b. ţäiít:t</td>
<td>!</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. ţäiít:t</td>
<td>!</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The correct output is (26b), with preaspiration, but the predicted winner is (26a), where aspiration has been suppressed just as in (24) above (cf. also the infinitive reita /ɹaiÓt-a/ ‘to irritate’, which is realized as [ɾaiita] rather than *[ɾaiptta], with preaspiration suppressed).

Why preaspiration is here retained regardless of vowel height becomes clearer when we consider what would be the consequences of the deaspiration in (26a). Unlike singletons in V_ _S position, stops in these environments actually do contrast
for aspiration, and the native lexicon contains a great number of minimal and near-minimal pairs with pre- vs. unaspirated stops:

(27) Preaspiration contrast in geminates and in stop + nasal/liquid clusters

a. ['staOprI] stappi ‘I stuff’
   ['stapIrI] stabbi ‘block’
   ['ruOka] rukka ‘wrinkle’
   ['rukka] rugga ‘to rock’

b. ['fjo0lpr5i0tnI] fjølbroyni ‘diversity’
   ['5itnI] oynni ‘the island (dat.)’
   [tOvaOtlI] tvætla ‘to chatter’
   [vætlI] valla ‘hardly’

Suppressing preaspiration after high vowels in these contexts would have the effect of collapsing a great number of lexically contrasting items. It is tempting to conclude that this is why deaspiration is prevented from applying. The singleton V_S context is precisely the environment where an aspiration contrast is NOT utilized by the Faroese lexicon (aside from the small number of recent borrowings mentioned earlier). In sum, deaspiration after high vowels applies where possible, but is overridden by the demand not to collapse lexical contrasts.

As intuitive as this explanation may seem, it is not straightforwardly implemented using the standardly assumed constraints of OT. Contrast preservation is generally taken to be a matter of Faithfulness, e.g. IDENT(SG)-IO. However, as we saw in (24), this constraint is crucially outranked by *HIGHTENSEV. Moreover, Faithfulness does not directly demand preservation of LEXICAL CONTRASTS as such; it does so only indirectly, by striving to preserve lexical [spread glottis] SPECIFICATIONS. What is needed here is a high-ranked constraint preventing those distinctions that are actually utilized in the lexicon from being conflated on the surface. Deaspiration in (26) would cause such conflation, and is therefore blocked by the constraint in question. Deaspiration of singleton onsets, as in (24), does not have the same potential effect; the lexicon of Faroese simply HAPPENS not to contain any contrasts to be conflated in that environment. This constraint will here be referred to as NOCOLLAPSE(F) and tentatively formulated as in (28).

(28) NOCOLLAPSE(F)

An input-output mapping [αF] → [−αF] is permissible iff NO ITEMS IN THE LEXICON show [−αF] → [−αF] input-output mappings in the same environment.

The main difference between NOCOLLAPSE(F) and ordinary Faithfulness constraints is that it makes direct reference to the ACTUAL lexicon – and the distributional patterns
it contains – rather than to the input level as such, where ‘anything goes’ as dictated by Richness of the Base. The tableau in (29) shows how NoCollapse(SG) prevents geminate deaspiration in reitti (cf. reiddi ‘s/he prepared’ with unaspirated [tː]). In the case of singleton onsets, as in reita in (30), no lexical contrasts are available to block deaspiration.

(29) Tableau (revised) for reitti ‘s/he irritated [s.o.]’

<table>
<thead>
<tr>
<th>UR: /ɹaɪtːt - t - ɪ/</th>
<th>NOCOLLAPSE(SG)</th>
<th>*HIGHTENSEV</th>
<th>ID(SG)-IO</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. ɹaɪtːti</td>
<td>*!</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>b. ɹaɪ retrieve</td>
<td>*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(30) Tableau for reita ‘to irritate [s.o.]’

<table>
<thead>
<tr>
<th>UR: /ɹaɪtːa - a/</th>
<th>NOCOLLAPSE(SG)</th>
<th>*HIGHTENSEV</th>
<th>ID(SG)-IO</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. ɹaɪta</td>
<td></td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>b. ɹaɪ retrieve</td>
<td></td>
<td>*!</td>
<td></td>
</tr>
</tbody>
</table>

This completes the discussion of aspiration in Faroese. The analysis proposed above captures the relevant facts in terms of the ranked and violable constraints of OT. It rests on the assumption that the devoicing inherent in preaspiration has a more damaging ‘distortion’ effect on a preceding high vowel than on a non-high vowel, which translates into a relatively high-ranked constraint *HIGHTENSEV. Furthermore, closer inspection has revealed the need for a special kind of ‘faithfulness’ to lexical contrastivity (rather than merely to input specifications), in order to confine deaspiration to those contexts where neutralization (i.e. suspension of contrast) holds. In short, the deaspiration-driving constraint *HIGHTENSEV must outrank Faithfulness to input [spr.gl.] values, but must in turn be outranked by the need to preserve [spr.gl.] contrasts in those environments where such contrasts ACTUALLY occur in the Faroese lexicon. The need to separate actually-occurring contrasts from ‘virtual’ or hypothetical contrasts – the latter presupposed by Richness of the Base – raises further questions about the validity of that principle, adding to the concerns voiced in section 4.
6. CONCLUSIONS

This article has attempted to show how certain aspects of laryngeal neutralization in Icelandic and Faroese can be brought to bear on important issues in current phonological theory. In particular, serious doubt has been cast on the validity of Licensing by Cue as a falsifiable theory of possible vs. impossible synchronic neutralization patterns. It was suggested that one way of salvaging the notion of Licensing by Cue might be to interpret it as a diachronic principle that governs neutralizing sound changes rather than synchronic patterns of contrast distribution. In addition, the phonetic manifestation of postvocalic onset stops in Faroese was shown to be at odds with the predictions of cue-based approaches, requiring additional constraint machinery (or, alternatively, an unconventional diachronic explanation).

Aside from issues relating to cue-based licensing, several of the facts related here have implications for Richness of the Base, a central tenet of Optimality Theory. The strong interpretation of this principle – standardly assumed in the OT literature – was shown to be incompatible with the Icelandic data. The facts suggest that some of the most pervasive and systematic neutralization patterns are in fact ‘accidental gaps’, rather than products of the phonological constraint ranking, raising important questions about how Richness of the Base should be properly interpreted. Faroese also turns out to be problematic, in that an adequate analysis of the facts appears to require direct reference to the lexicon per se, and the contrasts attested in it – rather than the ‘virtual’ contrasts found in the universal set of inputs presupposed by Richness of the Base (this distinction is also discussed by Hansson 2002). The need to refer to distributional patterns in the lexicon seriously undermines the validity of this principle as a necessary ingredient of OT.

ACKNOWLEDGEMENTS

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NOTES

1. One referee objects to this usage of the term ‘neutralization’ – which s/he takes to imply the existence of alternations (i.e. mergers in the input-output mapping) – suggesting ‘suspension of contrast’ instead. However, that is in fact the original (pre-generative)
meaning of ‘neutralization’. In any case the distinction becomes meaningless in OT, where the two notions are analytically indistinguishable. For example, in a language which allows only coronal codas, but which contains no overt evidence (alternations) illustrating the fate of forms where underlying non-coronals find themselves in coda position, an OT analysis must assume that if such forms were to exist, the non-coronals WOULD change to coronals.

2. The parentheses around the glottal stop signify that it is not phonemic, and occurs only sporadically (at the beginning of vowel-initial words). As for [j], it is probably more appropriately categorized as a glide than as an obstruent.

3. As noted by Steriade, this runs counter to the common assumption that features such as [voice] or [spread glottis] are universally privative – an issue too complex to go into here.

4. As it turns out, even the SD pattern with neutralization in favor of unaspirated [T] – which is unproblematic for OT and non-OT analyses alike (cf. the treatments in Jónsson 1994 and Ringen 1999) – appears to be challenged by loanword data. Certain words and names are regularly pronounced with intervocalic [Tʰ], even in SD (e.g., [Ìtʰálía] Ìtálía ‘Italy’). In other words, even the ‘sensible’ neutralization pattern has failed to be enforced completely in loanword adaptation.

5. Petersen et al. (1998) are quite explicit in stating that the pattern in (19) abstracts away from a considerable degree of variation. For example, preaspirated singletons do in fact occur in the Tórshavn area, even though they are far less common there than in the other Northern dialects (cf. also Helgason 2002).

6. Pálsdóttir (1993) found suggestive evidence that Icelandic learners of English tend to ‘get rid of’ preaspiration after high vowels earlier than after other vowels, presumably for the very same reasons; unfortunately her data are too limited to be statistically significant.

7. As feature geometry is inherently a rather crude way of encoding the phonetic interplay of phonological features, a more satisfactory representational system might be the gestural scores of Articulatory Phonology (e.g., Browman & Goldstein 1989, 1992; see also Gafos 2002). The proposed analysis is easily translatable into such frameworks.

8. Moreover, as noted by several researchers (e.g., Kingston 1990, Helgason 2002) a good portion of the preaspiration phase is taken up by non-modal voicing, i.e. breathy voice. This affects the spectral properties of the overlapped vowel even less than full voicelessness.

9. Donca Steriade (pers. comm.) suggests a possible contributing factor: high vowels are typically shorter in duration than non-high vowels, and preaspiration would thus overlap a greater portion of a high vowel than of, say, a low vowel. It is not impossible that this factor plays a role, but note that the relevant vowels are all long/bimoraic (as opposed to those preceding geminate pp, tt, kk, where we find preaspiration even after a high vowel).

10. The reason for including [+ATR] here is to target the tense high vowels [i u] (as well as diphthongs like [ai, uu], etc.) to the exclusion of the lax high vowels [i u] of unstressed syllables. The fact that postaspiration is (at least sporadically) allowed in forms like [luttu] ~ [lurtu] luttur ‘thing’ indicates that the conflict between aspiration/devoicing and narrow constriction is less severe in the case of lax [u] than for the preceding tense [u].
11. **LAR-TIMING** may perhaps be decomposed into two separate constraints, one requiring that [spr.gl.] be realized overtly through spreading to a neighboring segment, and the other one (crucial here) preferring leftward over rightward spreading of [spr.gl.] (i.e. preaspiration over postaspiration).

12. Note that in the input representation, each /Ót/ carries its own [spread glottis] specification, as the two stops belong to separate morphemes (verb root and past-tense suffix, respectively). I am assuming that in the output candidates (26b) and (26c), both root nodes of the surface geminate are linked to a single [spr.gl.] feature. The analysis does not attempt to explain how the two underlying [spr.gl.] features are forced to merge; in the present context it is only relevant that IDENT(SG)-IO is satisfied – since each half of the output geminate IS linked to a [spr.gl.] feature both in (26b) and in (26c).

**REFERENCES**


