

## **‘When in Doubt...’: Intraparadigmatic Dependencies and Gaps in Icelandic**

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### **1. Introduction**

In this paper I present and discuss some rather striking facts about the phonology and morphology of Icelandic verbs — facts which so far have gone unnoticed in the descriptive and analytical literature.<sup>1</sup> These involve certain peculiar characteristics of imperative stem formation, and in particular the existence and lexical distribution of *paradigm gaps* in that category. This peculiar behavior of imperative forms is shown to have a very principled character, and can be understood as a coherent phenomenon by referring to certain generalizations about the distribution of exceptionality across verbs in the lexicon.

Furthermore, I show what the necessary ingredients would be of a grammar-internal account of the facts, cast within the framework of Optimality Theory (Prince & Smolensky 1993; McCarthy & Prince 1993, 1995 *et passim*). It turns out that an empirically adequate OT account demands that some of the constraints involved have the power of referring directly to distributional patterns across the lexicon, thus evaluating information which we may not want our (freely ranked and violable) phonological constraints to have access to.

Finally, I discuss how these facts may be brought to bear on the broader issue of how to derive ungrammaticality/ineffability (i.e. gaps) in an Optimality-Theoretic model.

#### **1.1. The consonant system of Modern Icelandic**

One of the most fundamental aspects of Icelandic phonology is that a contrast in terms of the feature [spread glottis] pervades the consonant system. I will assume that this feature characterizes not only the pure aspiration contrast in stops as in (1a), but also the voicing contrast in fricatives (1b) and sonorants (1c).

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<sup>1</sup> In part, this study has grown out of an earlier paper (Hansson 1997), presented at the Workshop on Analogy and Morphological Change (UC Berkeley, December 1997). I am grateful to the participants of that workshop for stimulating feedback, especially Andrew Garrett, Paul Kiparsky and Donca Steriade. Many thanks to Sharon Inkelas, Larry Hyman, John Ohala, Andy Dolbey, Ron Sprouse, Laura Downing and Sharon Rose for thought-provoking comments on the present paper and pointers to related literature, as well as to the participants at NELS 29. Needless to say, all errors are my own.



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c. Clipped imperative: Root + {/T/, /T<sup>h</sup>/}

/t <sup>h</sup> ak <sup>h</sup> -T <sup>h</sup> /	<i>takt ÞÚ</i>	[t <sup>h</sup> axt 'θu:]	'YOU take!'
/sin-T/	<i>sýnd ÞÚ</i>	[sint 'θu:]	'YOU show!'

Historically speaking, the full imperative consists of the root imperative plus a cliticized version of the 2Sg pronoun. The clipped imperative, which is only used in conjunction with a contrastively-stressed 2Sg pronoun, is more recent still. Synchronically, it consists of the full imperative minus the clitic pronoun. Moreover, the form of the clipped imperative shows that the coronal ([ð, t, t<sup>h</sup>]) has been reanalyzed as part of the verb form — what I will refer to as the *imperative stem* — rather than belonging to the pronoun clitic.

### 1.3. Past tense formation

As in most Germanic languages, verbs can be grouped into two major classes with respect to past-tense stem formation. On the one hand, there are the strong verbs, whose past stem consists of the bare root, which is subject to various ablaut alternations (mostly vocalic). The other major class is the weak verbs. Although ablaut-like alternations are also found among verbs of this class, the crucial property of weak verbs is that their past stem is formed by adding a coronal suffix.

(5) Past stem formation of weak verbs:

Root + {/T/, /T<sup>h</sup>/} (and, occasionally, root-vowel ablaut)

As illustrated in the following section, the past-tense suffix of weak verbs displays the very same kind of allomorphy alternations as does the imperative suffix. I therefore analyze both suffixes as consisting of {/T/, /T<sup>h</sup>/} in the input.

## 2. Allomorph selection in imperative and past stem formation

The notion of phonologically driven selection of listed allomorphs is by now well established in the phonological and morphological literature (Carstairs 1988, 1990 is among the first to point out the significance of this type of phenomenon). Within OT in particular, allomorph selection is generally treated as output optimization (cf., e.g., Mester 1994, McCarthy & Prince 1995, Tranel 1995, Dolbey 1996, Kager 1996, Anttila 1997).

As mentioned above, Modern Icelandic has two independent morphological categories that make use of the same kind of /T/ vs. /T<sup>h</sup>/ allomorphy: the *past stem* (of weak verbs only) and the *imperative stem* (of all verbs). For the vast majority of verbs, the choice of allomorph is uniquely determined on the basis of the root-final consonant(s).<sup>4</sup> Some examples of environments that condition /T/ rather than /T<sup>h</sup>/ are shown in (6).

(6) /T/ selected over /T<sup>h</sup>/— some examples:<sup>5</sup>

	Past stem	Imper. stem
a. /haP-/ 'have'	/haP-T-/	[havð-]
/traK-/ 'pull'	/traK-T-/	[trayð-]

<sup>4</sup> Due to lack of space, I cannot give full justification here for the claim that separate allomorphs are in fact needed, rather than a single input form of the suffix. In any case, the peculiar status of imperative formation as discussed in section 3 remains largely orthogonal to that issue.

<sup>5</sup> Where a gap occurs in the past-stem column, this is because the verb in question is a strong verb, thus forming its past stem by other means than the {/T/, /T<sup>h</sup>/} suffix.

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/heir-/ ‘hear’	/heir-T-/	[hěĩrð-]	[hěĩrð-]
/fel-/ ‘hide’	/fVI-T-/	[falt-]	[fəlt-]
/meiT-/ ‘hurt’	/meiT-T-/	[měĩtt-]	[měĩtt-]
b. /nePn-/ ‘mention’	/nePn-T-/	[nəmt-]	[nəmt-]
/neKI-/ ‘nail’	/neKI-T-/	[nəlt-]/[nəy̆ɪt-]	[nəlt-]/[nəy̆ɪt-]
c. /horP-/ ‘watch’	/horP-T-/	[hɔrð-]	[hɔrð-]
/k <sup>h</sup> emP-/ ‘comb’	/k <sup>h</sup> emB-T-/	[c <sup>h</sup> əmt-]	[c <sup>h</sup> əmt-]
/fiIK(j)-/ ‘follow’	/fiIK-T-/	[fiłt-]/[fiɫy̆t-]	[fiłt-]/[fiɫy̆t-]

That the input form here is /T/ and not /T<sup>h</sup>/ can be seen by comparing the situation in (6a-c) to what happens in (7a-c), where roots of similar shape combine with a suffix consisting of a coronal stop which is unambiguously [spread glottis] and has no allomorphy comparable to that found in the past and imperative suffixes. Here the stop triggers certain [spread glottis]-related effects: preaspiration, sonorant devoicing, stop fricativization (not exemplified here), etc.

(7) Comparison with adjectival NSgNeut suffix /t<sup>h</sup>/ (or /T<sup>h</sup>/), with no allomorphy:

NSgNeut		
a. /ljuP-/ ‘tender, sweet’	/ljuP-T <sup>h</sup> /	[ljuft]
/stour-/ ‘big, large’	/stour-T <sup>h</sup> /	[støũrt]
/kYl-/ ‘yellow’	/kYl-T <sup>h</sup> /	[kYłt]
/viT-/ ‘wide’	/viT-T <sup>h</sup> /	[viht]
b. /jaPn-/ ‘even, equal’	/jaPn-T <sup>h</sup> /	[jamt]
c. /ouθarP-/ ‘unnecessary’	/ouθarP-T <sup>h</sup> /	[ouθart] ~ [ouθar̥ft]
/uŋK-/ ‘young’	/uŋK-T <sup>h</sup> /	[uŋt]

The same kind of [spread glottis] effects are also found in past stem and imperative stem formation, provided that the root has a particular phonotactic shape — namely, that it ends in a cluster of sonorant + /T/, as shown in (8). These, then, are the cases where the /T<sup>h</sup>/ allomorph is chosen rather than the /T/ allomorph.

(8) /T<sup>h</sup>/ selected over /T/—examples:

		Past stem	Imper. stem
/sɪnT-/ ‘swim’	/sɪnT-T <sup>h</sup> -/	[sɪŋt-]	[sɪŋt-]
/halT-/ ‘hold’	/halT-T <sup>h</sup> -/	[həl̥t-]	[həl̥t-]
/mɪrT-/ ‘murder’	/mɪrT-T <sup>h</sup> -/	[mɪr̥t-]	[mɪr̥t-]

Finally, there is a considerable number of contexts where the choice of allomorph is indeterminable in the sense that, due to the phonotactic constraints of the grammar, both would give rise to the same output strings:

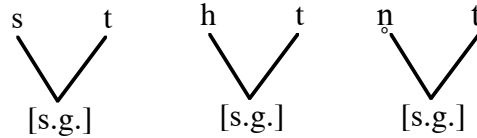
(9) Indeterminate — same output for /T/ as for /T<sup>h</sup>/:

		Past stem	Imper. stem
a. /kɪfT-/ ‘marry’	/kɪfT-T <sup>(h)</sup> -/	[cɪft-]	[cɪft-]
/veɫT-/ ‘tumble’	/veɫT-T <sup>(h)</sup> -/	[pɪr̥t-]	[vɛłt-]
/pɪr̥T-/ ‘publish’	/pɪr̥T-T <sup>(h)</sup> -/	[pɪr̥t-]	[pɪr̥t-]
b. /t <sup>h</sup> aK <sup>h</sup> -/ ‘take’	/t <sup>h</sup> aK <sup>h</sup> -T <sup>(h)</sup> -/	[klěift-]	[t <sup>h</sup> axt-]
/kleiP <sup>h</sup> -/ ‘swallow’	/kleiP <sup>h</sup> -T <sup>(h)</sup> -/	[klěift-]	[klěift-]
c. /iT <sup>h</sup> -/ ‘push’	/iT <sup>h</sup> -T <sup>(h)</sup> -/	[iht-]	[iht-]

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In the following two sections, I show an analysis of how allomorph selection is driven by the ranked constraints of the grammar. First of all, it is necessary to note that I am following Ringen (1998) in assuming that in clusters of a [spread glottis] segment and an “unaspirated” stop, the [spread glottis] feature is actually doubly-linked. This is of crucial importance for the evaluation of faithfulness constraints on [spread glottis].

(10) Phonological (output) representation of phonetic [st], [ht], [ŋt], etc.:



The constraints used in the tableaux are the following:

- PREASP = Cover term for MULTLINK[s.g.], \* $\mu p^{h^t} k^h$ , MAXASP(Stop)
- MULTLINK[s.g.]: The feature [spread glottis] must be linked to more than one consonant. (Ringen 1998).
- \* $\mu p^{h^t} k^h$ : A [spread glottis] stop may not be moraic (Ringen 1998).
- MAXASP(Stop): The output correspondent of an input [spread glottis] stop is [spread glottis] (Morén & Miglio 1998).
- MARKED= Shorthand for a set of high-ranked phonotactics-defining markedness constraints, esp. with respect to the distribution of [+cont] and [-cont] in non-[spread glottis] obstruents (cf. (3) above); also no post-consonantal geminates, no post-consonantal [spread glottis] fricatives except [s], etc.
- IDENT[s.g.]: Correspondent segments in the input and output have identical specifications for the feature [spread glottis] (Ringen 1998; cf. McCarthy & Prince 1995).
- MAX[F]: Every feature (autosegment) in the input has a correspondent in the output (cf. Zoll 1993; Lombardi 1998; cf. McCarthy & Prince 1995).
- DEP[F]: Every feature (autosegment) in the output has a correspondent in the input (ibid.).

### 2.1. Selection of /T/

The ranking that is crucial in favoring selection of /T/ over /T<sup>h</sup>/ is as shown in (11):

(11) MARKED, PREASP >> MAX/DEP[F] >> IDENT[s.g.]

Since the /T/ allomorph does not trigger any [spread glottis]-related effects, the optimal output candidate which is based on that allomorph incurs neither IDENT[s.g.] violations nor MAX/DEP[F] violations. Because of high-ranking PREASP, this is not true of outputs based on the /T<sup>h</sup>/ allomorphs. This is illustrated in the tableaux in (12-13).

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(12) Past stem/Imperative stem for /sin-/ ‘show’:

	/sin, {T, T <sup>h</sup> }/		MARKED	PREASP	MAX/DEP[F]	IDENT[s.g.]
a.	/sin-T/	sinð	*!			
+ b.		sint				
c.	/sin-T <sup>h</sup> /	sint <sup>h</sup>		*!		
d.		sint		*!	*	*
e.		sint̥				*!
f.		siht			*!	*

(13) Past stem/Imperative stem for /sneiT-/ ‘slice’:

	/sneiT, {T, T <sup>h</sup> }/		MARKED	PREASP	MAX/DEP[F]	IDENT[s.g.]
a.	/sneiT-T/	sněiðð	*!			
+ b.		sněitt				
c.		sněiðt	*!			
d.	/sneiT-T <sup>h</sup> /	sněiðt <sup>h</sup>	*!	*		
e.		sněiðt	*!	*	*	*
f.		sněitt		*!	*	*
g.		sněiθt	*!			*
h.		sněiht			*!	*

**2.2. Selection of /T<sup>h</sup>/**

Under certain conditions, the /T<sup>h</sup>/ allomorph is preferred. I assume that this is due to a constraint on the phonological exponence of morphemes:

(14) MORPHEME REALIZATION (MORPHREAL):

Realize morphemes in an overt and detectable manner (Samek-Lodovici 1992; see Gnanadesikan 1997 for a more specific definition).

Similar morpheme realization constraints have been proposed in the literature, e.g. by McCarthy & Prince (1995) and Alderete et al. (1997) (MORPHEME DISJOINTNESS), Rose (1997a,b) (MORPHOLOGICAL EXPRESSION), Walker (1998a,b) (REALIZE-MORPH), Kiparsky (1997) (M-MAX), and others. The formulations proposed by Samek-Lodovici and Gnanadesikan are best suited to the task at hand: “The affixed form of a word [...] should not look like the unaffixed form of a word [...]—zero morphemes are specifically prohibited by this constraint.” (Gnanadesikan 1997:93).

The ranking of MORPHREAL relative to the constraints in (11) is as shown in (15). When selection of the /T/ allomorph leads to an output stem which is identical to the base (the root), this violates MORPHREAL. Since the optimal output candidate based on the /T<sup>h</sup>/ allomorph violates only IDENT[s.g.], and MORPHREAL >> IDENT[s.g.], /T<sup>h</sup>/ is favored over /T/. This is illustrated in the tableaux in (16-17).

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(15) MARKEDNESS, PREASP >> MAX/DEP[F] >> MORPHREAL >> IDENT[s.g.]

(16) Past stem/Imperative stem for /herT-/ ‘harden, strengthen’:

	/herT, {T, T <sup>h</sup> }/ cf. base [herð-]		MARKE D	PREASP	MAX[F]/ DEP[F]	MORPH REAL	IDENT[s.g.]
a.	/herT-T/	herð				*!	
b.		hert	*!				
c.		heṛt			*!		**
d.	/herT-T <sup>h</sup> /	hert <sup>h</sup>		*!			
+ e.		heṛt					*!
f.		hert	*!		*		
g.		herð			*!	*	
h.		heht			*!		*

(17) Past stem/Imperative stem for /henT-/ ‘throw’:

	/henT, {T, T <sup>h</sup> }/ cf. base [hent-]		MARKE D	PREASP	MAX[F] /DEP[F]	MORPH REAL	IDENT[s.g.]
a.	/henT-T/	henð	*!				
b.		hent				*!	
c.		heṅt			*!		*
d.	/henT-T <sup>h</sup> /	hent <sup>h</sup>		*!			
+ e.		heṅt					*
f.		hent			*!	*	*
g.		henð	*!		*		
h.		heht			*!		*

Other than enforcing selection of the /T<sup>h</sup>/ allomorph over the /T/ one (by virtue of outranking IDENT[s.g.]), the constraint MORPHREAL is completely latent in the grammar of Modern Icelandic. In particular, it does not trigger *addition* or *removal* of any features, since it is outranked by MAX/DEP[F].

### 2.3. Lexical exceptions in allomorph selection

As is usually the case with interesting phonological phenomena, the full picture is somewhat more complex than the above analysis might lead one to believe. In particular, there are several weak verbs which idiosyncratically select the “wrong” allomorph. One way of incorporating these into the analysis could presumably be to assume some sort of lexically specified subcategorization requirement.



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To the best of my knowledge, the facts presented in this section have hitherto gone unnoticed and undocumented (or at least have not been commented upon) in the descriptive and analytical literature on Icelandic phonology and morphology. This is perhaps not too surprising, given that imperative formation — other than the archaic root imperative — is as a rule not given much attention in handbooks.

### 3.1. Paradigm gaps in imperative formation

Recall that in *strong* verbs, the imperative stem is the only category where a suffix with  $\{/T/, /T^h/\}$  allomorphy occurs (since these verbs form their past stem by means of ablaut). In the imperative of strong verbs, allomorph selection is governed by the same constraints as in the past formation (and imperative formation) of weak verbs, as expected:

(21) Imperative stem formation in strong verbs:

a.	/soP-/	/soP-T-/	[sɔvð-]	‘sleep!’
	/siŋK(j)-/	/siŋK-T-/	[siŋt-]	‘sing!’
	/stel-/	/stel-T-/	[stelt-]	‘steal!’
b.	/halT-/	/halT-T <sup>h</sup> -/	[haɭt-]	‘hold!’
c.	/les-/	/les-T <sup>(h)</sup> -/	[lest-]	‘read!’
	/piT <sup>h</sup> -/	/piT <sup>h</sup> -T <sup>(h)</sup> /	[piht-]	‘bite!’
	/k <sup>h</sup> rjuP <sup>h</sup> -/	/k <sup>h</sup> rjuP <sup>h</sup> -T <sup>(h)</sup> /	[k <sup>h</sup> rjuft-]	‘kneel!’

The handful of strong verbs whose root ends in  $/...ll/$  or  $/...nn/$ , however, do not behave as expected. These verbs do not select the  $/T/$  allomorph, as dictated by the phonology, nor do they idiosyncratically select the  $/T^h/$  allomorph, as so many *weak* verbs of similar shape do in both imperative and past stem formation. Instead, these strong verbs simply lack an imperative form — in other words, we find a *gap* in their paradigm:

(22) Examples of paradigm gaps in the imperative of strong verbs in  $/...ll/, /...nn/$ <sup>7</sup>

a.	/vinn-/ ‘work’	*[vint-], *[viŋt-]	‘work!’
	/spinn-/ ‘spin (tr.)’	*[spint-], *[spiŋt-]	‘spin (a thread)!’
b.	/fall-/ ‘fall; flunk’	*[falt-], *[faɭt-]	‘fall!; flunk!’

To make things even more complicated, there exists one strong verb in  $/...nn/$  which *does* have an imperative form — the one predicted by the output optimization analysis presented earlier:

(23) An exception to the exception: a strong verb in  $/...nn/$  with no gap

/finn-/ ‘find’	[fiŋt-] (*[fiŋt-])	‘find!’
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<sup>7</sup> It may seem hard to imagine that no imperative exists for a verb like ‘work’. However, note that this is only true of the 2Sg imperative, not the unremarkable 2Pl one (to which none of the issues in sections 2-4 apply, cf. footnote 3 above). Furthermore, the (archaic) root imperative does exist. More importantly, there are of course numerous ways of carrying out a speech act of command or request that do not involve a morphological imperative form. Finally, it might also be noted that, in Modern Icelandic, a negated command/request is usually expressed by the negative adverb (*ekki*) followed by the *infinitive* form of the verb, not the imperative. Thus, ‘don’t work!’ is straightforwardly rendered as *ekki vinna* [ɛhɕi vɪnna].

The explanation for the special behavior of this particular verb appears to lie in the fact that it has a unique root allomorphy, such that the (sub)string [f...nt] does occur elsewhere in its paradigm. This is not true of any of the other verbs in /...nn/.<sup>8</sup>

(24) Idiosyncratic root allomorphy in ‘find’: {/fVnn-/ , /fVnT-/}

/finn-/	[finn-ʏr]	‘finds (23SgPrsInd)’
/fann-/	[fann]	‘found (13SgPstInd)’
/fʏnT-/	[fʏnt-ʏm]	‘found (1PIPstInd)’
/finT-/	[fint-ir]	‘would find (2SgPstSubj)’

Note that although the *existence* of the root allomorph /fVnT-/ appears to license the existence of an imperative form with [fint-], it does so only indirectly. In other words, the observed imperative form *cannot* be based on that alternative root allomorph:

(25) Imperative [fint-] is not based on root allomorph /finT-/:

/finT, {T, T <sup>h</sup> }/	would yield *[fint-]	(cf. (17) above)
/finn, {T, T <sup>h</sup> }/	correctly yields [fint-]	

Apparently, the imperative form predicted by the phonology — which fails to occur for the other strong verbs in (22) — is salvaged in this verb (and this verb only) due to fortuitous surface correspondence with other forms occurring within the same paradigm.

### 3.2. Imperative stem vs. Past stem formation

The allomorph selection analysis presented in section 2 fails to account for the various dependencies and asymmetries that hold between imperative stem formation and (weak-verb) past stem formation. These are summarized briefly in (26).

(26) Generalizations yet to be captured:

- a. *The imperative stem never contains a different allomorph from the past stem.*  
In weak verbs, which have {/T/, /T<sup>h</sup>/} in both past and imperative stems, allomorph selection — even idiosyncratic selection as in (18-19) — is *always* the same in both stems. Mere subcategorization does not predict this.
- b. *The imperative stem is only exceptional when there is an exceptional past stem.*  
In strong verbs, which have {/T/, /T<sup>h</sup>/} only in the imperative stem, exceptional selection — subcategorizing for either /T/ or /T<sup>h</sup>/ specifically — is *never* found. The imperative can thus only be exceptional by being “parasitic” on a past stem.
- c. *Paradigm gaps are found in imperative formation, never in past formation.*  
This asymmetry is unaccounted for in the analysis so far.
- d. *Paradigm gaps do not occur where a potentially “supporting” surface string occurs elsewhere in the paradigm.*  
Imperative gaps are never found in weak verbs (where the past tense forms can provide “support”). Nor do they occur in strong verbs where the (otherwise expected) surface string happens to occur independently in other inflected forms (as in (24) above).

<sup>8</sup> Historically, this goes back to a Verner’s Law alternation between \*nθ (> nn) and \*nð (> nd > [nt]).

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Taken as a whole, this is indeed a striking pattern. It strongly suggests that imperative stem formation is special, and in some way *dependent* on what — if anything — is happening elsewhere in the paradigm with respect to the occurrence of stem-final coronal obstruents ([ð], [t] or [t<sup>h</sup>]). A satisfactory analysis will need to capture all of the generalizations in (26a-d). But there is yet another striking fact which also needs to be accounted for:

- (27) *Paradigm gaps only emerge when the verb root has a phonotactic shape which usually is indicative of exceptionality in allomorph selection (/...ll/, /...nn/).*

As stated in (26d), imperative gaps never occur in weak verbs, because the past tense forms are able to act as a “supporting model”. But gaps are also *never* found in strong verbs with other root shapes than /...ll/ and /...nn/, in spite of the fact that *all* strong verbs lack the “potentially supporting” past tense forms. Instead, for all roots which are not /...ll/ or /...nn/, the choice between /T/ and /T<sup>h</sup>/ is entirely governed by the ranked constraints of the phonology, just as it is in past stem formation of most weak verbs.

As stated, (27) is an informal attempt to capture the fact — which cannot be accidental — that the root shapes that are the ones that lead to paradigm gaps among strong verbs are identical to those which show a remarkably high incidence of exceptionality in allomorph selection among weak verbs.

#### **4. Encoding the generalizations in the grammar**

Given that the gaps and exceptions in the imperative have a principled distribution, it is justifiable to attempt to have them fall out from properties of the synchronic phonological grammar. Within the context of Optimality Theory, there have been several proposals which can be brought to bear on the issue of handling dependencies and gaps.

##### **4.1. Deriving gaps with MPARSE or CONTROL**

The “standard” way of dealing with paradigm gaps in OT has been to make use of the constraint MPARSE (Prince & Smolensky 1993; Raffelsiefen 1996). The Null Parse violates no constraints but MPARSE, and no other output candidates violate MPARSE. Ranking some constraint(s) above MPARSE entails that if no *overt* output candidate can satisfy the higher-ranked constraint(s) (here symbolized as ‘??’), then the Null Parse emerges as the winner — which is to say, a paradigm gap is found.

- (28) The MPARSE model

input → GEN/CON/EVAL → Null Parse

?? >> MPARSE >> MARKEDNESS, FAITHFULNESS

In an alternative model, the optimal output candidate (selected by EVAL) is checked against the *non-violable* constraints that reside in a separate component, called CONTROL (Orgun & Sprouse 1997). If a violation occurs, there simply is no output — i.e. any conceivable output candidate is ungrammatical.

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## (29) The CONTROL model

input → GEN/CON/EVAL → CONTROL → no output

<b>CON:</b>	<b>CONTROL:</b>
MARKEDNESS,	??
FAITHFULNESS,	
ALIGNMENT,	
etc.	

If we want to account for the paradigm gaps in Icelandic imperative stem formation with either of these models, the content and effect of the mystery constraint ‘??’ in (28) and (29) will need to be defined. This problem is addressed in the next section.

First, though, we can take care of the other aspects of the dependent status of imperative stem formation that were listed in (26), i.e. the ones that do not involve gaps, by positing the following constraint:

(30) Dependency *not* giving rise to paradigm gaps:<sup>9</sup>

IDENT[s.g.]O-O

The output correspondent (of the suffix {/T/, /T<sup>h</sup>/}) must agree in terms of the feature [spread glottis] with a stem-final coronal obstruent in *some* closely related form. (In weak verbs, this will be a past-tense form; in strong verbs, a form with an alternative root allomorph, if it exists.)

The constraint in (30) must be relativized to *imperative* formation, either by definition or by positing a separate imperative-stem co-phonology, where IDENT[s.g.]O-O is ranked higher than elsewhere in the grammar. The required ranking is:

## (31) MAX &gt;&gt; IDENT[s.g.]O-O &gt;&gt; MORPHREAL

Ranking IDENT[s.g.]O-O above MORPHREAL ensures that the imperative stem will never disagree with a (weak) past stem, even in MORPHREAL-violating situations such as (18c). Moreover, the ranking in (31) still enables the imperative of non-coronal-obstruent-final strong verbs to surface with a [ð], [t] or [t<sup>h</sup>] suffix, in spite of the fact that this consonant has no correspondent in other related forms. Since MAX is higher-ranked, the suffix consonant will never be deleted to circumvent an IDENT[s.g.]O-O violation.

By either establishing a separate imperative cophonology with the ranking in (31), or incorporating (31) into the general constraint ranking by restricting IDENT[s.g.]O-O to the imperative stem, the generalizations in (26a-b), and in part (26d), can be taken care of.

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<sup>9</sup> This constraint is defined here in terms of Output-Output Correspondence (Benua 1995, 1997), though in a somewhat unconventional fashion, in that correspondence with *any* form will do. The same effect could presumably also be achieved by appealing to the notions of Paradigm Uniformity or Uniform Exponence (Flemming 1995; Steriade 1996; Kenstowicz 1996). The notion of Sympathy (McCarthy 1998), which can often deal with prima facie cases of transderivational correspondence (cf. Itô & Mester 1997), is not applicable here, since reference to *actually occurring* forms is crucial, not merely failed output candidates.

## 4.2. Defining the mystery constraint

We still need to capture the generalizations in (26c) and (27)—the latter without losing the “escape hatch” of (26d). Since these involve the distribution of *paradigm gaps*, it is here that the mystery constraint ‘??’ comes into play (by outranking MPARSE or by residing in CONTROL).

- (32) What properties must ‘??’ have?
- a. ‘??’ must be relativized to *imperative* formation; no gaps elsewhere. (= (26c))
  - b. When IDENT[s.g.]O-O is unavoidably violated (as in most strong verbs), ‘??’ is violated *only* if the phonological shape of the root is such that *most verbs in the lexicon with that shape* are exceptional (in taking /T<sup>h</sup>/). (= (27) and (26d)).

The phrasing of (32b) suggests that we might replace the mystery constraint with a (locally) *conjoined* constraint (Smolensky 1995):

- (33) IDENT[s.g.]O-O &<sub>L</sub> ‘??’

If IDENT[s.g.]O-O is defined so as to be restricted to imperative stem formation, as suggested earlier, then the conjoined version will automatically carry the same restriction, hence taking care of (32a). But what kind of constraint is the ‘??’ part in (33)? In order to capture the true generalization in (32b), it must be able to make reference to the *statistical distribution of exceptionality across the lexicon*. This raises the non-trivial question whether we really want our *grammar*, i.e. our *phonology*, to contain such constraints. Furthermore, if this is a constraint on a par with other phonological constraints, why aren’t constraints of this sort more pervasive or more common in the languages of the world?

## 4.3. Indirect evidence for CONTROL?

The CONTROL model of gaps and ungrammaticality differs from the MPARSE one in that in the former, there is nothing *inherent* in the model which demands that the constraints in the CONTROL component be of the same nature as those in the “genuine” phonology (CON). In fact, Orgun & Sprouse (1997) themselves note that, in their example cases, the constraints involved in CONTROL “all refer to morphological information”, but they decide to “leave for further research the question of what types of constraints can be in CONTROL”. Given that the CONTROL model—unlike the MPARSE one—makes no inherent claim that the constraints in CONTROL be phonologically “well-defined”, I suggest that it can include parochial and even slightly bizarre constraints such as the ‘??’ of (32b) and (33), which make sweeping reference to the entire lexicon and gradient patterns of irregularity found therein.

## 4.4. Passing a ‘wug test’

Faced with the task of producing a novel morphologically complex form, e.g. in a ‘wug test’ (Berko 1958), a speaker generally has two different strategies available:

- (34) a. Arrive at a result deductively (computing the output of the grammar).  
 b. Analogize across the lexicon (looking up similar-sounding/rhyming words).

It has been claimed that, in the production of morphologically complex words, both strategies are in fact utilized simultaneously (Anshen & Aronoff 1988). Consequently, I propose that the relevant constraint in CONTROL — our mystery constraint ‘??’ — is something along the following lines:

- (37) **DOUBLECHECK<sub>IMPER</sub>**.  
When computing the imperative of a verb, use both methods available (the grammar **and** analogical computation). The results of the two *must be mutually supporting*.

This accounts for the relevant facts, while at the same time keeping the “phonology proper”, CON, free of constraints that make global reference to the lexicon. Whether this is a plausible analysis (from a psycholinguistic point of view) remains to be seen.

## 5. Conclusions

The data from Modern Icelandic presented here show how paradigm gaps and other dependent behavior of particular morphological constructions can be sensitive to what, in the usual conception of an OT grammar, would count as *extragrammatical* information. This may include the general distribution and frequency of individual idiosyncracies and exceptionality in the (actual) lexicon.

To the extent that such patterns have a synchronically principled character, they should be accounted for in any formal model that aspires to empirical adequacy. I have argued that it may be possible to achieve this in an OT framework, without “contaminating” CON by allowing various highly unusual and powerful constraints. This may be taken as indirect (and tentative) support for the CONTROL model rather than the MPARSE model for handling gaps and ungrammaticality in Optimality Theory.

## References

- Alderete, J., J. Beckman, L. Benua, A. Gnanadesikan, J. J. McCarthy & S. Urbanczyk. (1997) “Reduplication with Fixed Segmentism,” ms., UMass, Amherst. ROA-226.
- Anshen, F. and M. Aronoff (1988) “Producing morphologically complex words.” *Linguistics* 26, 641-655.
- Anttila, A. (1997) “Deriving variation from grammar,” in F. Hinskens et al., eds., *Variation, Change and Phonological Theory*, pp. 35-68. Amsterdam: John Benjamins.
- Benua, L. (1995) “Identity effects in morphological truncation,” *UMOP* 18, 77-136. ROA-74.
- Benua, L. (1997) *Transderivational Identity: Phonological Relations Between Words*, Doctoral dissertation, UMass, Amherst. ROA-259.
- Carstairs, A. (1988) “Some implications of phonologically conditioned suppletion,” *Yearbook of Morphology* 1:, 67-94.
- Carstairs, A. (1990) “Phonologically conditioned suppletion,” in W. Dressler et al., eds., *Contemporary Morphology*, pp. 17-23. Berlin: Mouton de Gruyter.
- Dolbey, A. (1996) “Output optimization and cyclic allomorph selection,” in *Proceedings of the West Coast Conference on Formal Linguistics* 15.
- Flemming, E. (1995) *Auditory representations in phonology*, Doctoral dissertation, UCLA.
- Gíslason, J. (1996). *Beygingarflokkun veikra sagna* [The inflectional classification of weak verbs]. M.A. thesis, Univ. of Iceland.
- Gnanadesikan, A. (1997) *Phonology with ternary scales*. Doctoral dissertation, UMass, Amherst. ROA-195.
- Hansson, G. Ól. (1997) “Morphological structure vs. surface similarity in analogical change,” paper presented at the Workshop on Analogy and Morphological Change, UC Berkeley, December 1997.
- Inkelas, Sharon. (1994) “The Consequences of Optimization for Underspecification”. *NELS* 25. ROA-40.

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- Itô, J. and A. Mester (1997) "Sympathy Theory and German truncations," in V. Miglio and B. Morén, eds., *Proc. of the Hopkins Optimality Workshop/Maryland Mayfest 1997*, pp. 117-138. UMWPL 5. ROA-211.
- Kager, R. (1996) "On Affix Allomorphy and Syllable Counting," in Kleinhenz (1996), pp. 155-171. ROA-88.
- Kenstowicz, M. (1996) "Base-Identity and Uniform Exponence: alternatives to cyclicity," in J. Durand and B. Laks, eds., *Current Trends in Phonology: Models and Methods*, vol. 1, pp. 363-393. Univ. of Salford. ROA-103.
- Kiparsky, P. (1997) "LP meets OT," lecture handouts from the Scandinavian Summer School in Generative Phonology, Hvalfjarðarströnd, Iceland.
- Kleinhenz, U. ed. (1996) *Interfaces in Phonology*, Studia Grammatica 41, Akademie Verlag, Berlin.
- Lombardi, L. (1998) "Evidence for MaxFeature constraints from Japanese," ms., Univ. of Maryland, College Park. ROA-247.
- McCarthy, J. J. (1998) "Sympathy and phonological opacity," ms., UMass, Amherst. ROA-252.
- McCarthy, J. J. and A. Prince (1993) *Prosodic Morphology I: Constraint Interaction and Satisfaction.*, ms., Univ. of Massachusetts, Amherst and Rutgers University.
- McCarthy, J. J. and A. Prince (1995) "Faithfulness and reduplicative identity," *UMOP* 18:249-384. ROA-60.
- Mester, R. A. (1994) "The Quantitative Trochee in Latin." *NLLT* 12:1-62.
- Morén, B. and V. Miglio (1998) "A Unified Account of Icelandic Preaspiration and Spirantization," paper presented at the Xth Conference of Nordic and General Linguistics, Reykjavík, Iceland.
- Orgun, C. O. and R. Sprouse (1997) "From MPARSE to CONTROL: deriving ungrammaticality," ms., Univ. of California, Berkeley. ROA-224.
- Prince, A. and P. Smolensky. (1993) *Optimality Theory: Constraint Interaction in Generative Grammar*, ms., Rutgers Univ. and the Univ. of Colorado, Boulder.
- Raffelsiefen, R. (1996) "Gaps in word formation," in Kleinhenz (1996), pp. 194-209.
- Ringen, C. O. (1998) "Preaspiration in Icelandic," paper presented at the Xth Conf. of Nordic and General Linguistics, Reykjavík, Iceland.
- Rose, S. (1997a) *Theoretical issues in comparative Ethio-Semitic phonology and morphology*, Doctoral dissertation, McGill University.
- Rose, S. (1997b) "Multiple Correspondence in Reduplication.," paper presented at the 23rd meeting of the Berkeley Linguistics Society.
- Samek-Lodovici, V. (1992) "A Unified Analysis of Cross-Linguistic Morphological Geminataion", in *Proceedings of CONSOLE-1*. Utrecht. ROA-149.
- Steriade, D. (1996) "Paradigm Uniformity and the Phonetics-Phonology Boundary. Paper presented at the 5th Conference in Laboratory Phonology, Evanston, Ill.
- Tranel, B. (1995) Exceptionality in Optimality Theory and final consonants in French. *LSRL* 25. ROA-61.
- Walker, R. (1998a), "Minimizing RED: Nasal Copy in Mbe. Paper presented at WCCFL. ROA-264.
- Walker, R. (1998b), *Nasalization, Neutral Segments, and Opacity Effects*. Doctoral dissertation, UC Santa Cruz.
- Zoll, C. (1993) *Parsing below the segment in a constraint-based framework*. PhD diss., UC Berkeley. ROA-143.

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