

### Opacity in Icelandic: Transparency and OT with Candidate Chains

In Icelandic, two phonological processes known in the literature as glide deletion and [ɤ]-epenthesis interact opaquely (Karvonen and Sherman 1997; K&S). In glide deletion (1), an underlying glide deletes when it is syllabified into a coda that violates the sonority sequencing principle (SSP; Jespersen 1905): complex codas must fall in sonority. In [ɤ]-epenthesis (2), the epenthetic vowel [ɤ] is inserted before [r] to break up a coda cluster, satisfying the SSP. The interaction between the two processes is opaque, as illustrated in (3) under an approach using ordered rules. The environment for glide deletion is not apparent on the surface – as the glide may syllabify as an onset, satisfying the SSP – yet glide deletion still applies. Along with many cases of counterbleeding opacity, the Icelandic interaction is problematic in classic Optimality Theory (OT; Prince and Smolensky 1993): the actual winner cannot win because it is harmonically bounded (4) (K&S 1997). The predicted winner (4c) has fewer constraint violations than the actual winner (4b).

It is proposed that the Icelandic data is actually a case of transparent process interaction. A constraint prohibiting sequences of a glide followed by a high front vowel, called *\*ji*, causes glide deletion. If this constraint is ranked above MAX and DEP in Icelandic, the correct result (output) is transparently yielded, as shown in (5). [mið.jɤr] (5b) loses to [mi.ðɤr] (5c) because the former has a fatal violation of the *\*ji* constraint.

There are at least two reasons to believe that the *\*ji* constraint is indeed active in Icelandic, causing deletion of the glide in this (so-called opaque) interaction. The first is based on the phonetic (acoustic-perceptual) similarity between the glide [j] and high front vowels. These two types of sounds have very similar if not identical acoustic properties (Maddieson and Emory 1985), causing (a high probability of) perceptual confusion and thus neutralization between the two segments when adjacent. Secondly, there appear to be no native Icelandic words, whether monomorphemic or derived, that have such a glide-high front vowel sequence (Einarsson 1945). It thus appears that *\*ji* has played an active role in shaping the Icelandic lexicon.

A transparent analysis of the Icelandic interaction using the constraint *\*ji* should be preferred because it is inherently simple; it solves the problem without any modifications to the principles of classic OT. Additionally, one current modification to OT introduced in order to handle opacity, i.e. OT with Candidate Chains (OT-CC; McCarthy 2007), cannot account for the Icelandic pattern without using *\*ji*.

Analyzed as an opaque interaction, OT-CC fails to account for the Icelandic phenomenon. In OT-CC, candidates are represented as chains of forms linking the input to the output. The first member of a chain adds syllabification to the input. Using the example of /krefj + r/ ‘demand, nom.sg’, the first link in this chain is <kre.fjr...>. Sequences such as [fj] are syllabified as complex onsets in Icelandic (Einarsson 1945). All subsequent links in an OT-CC chain must be harmonically improving (according to a language’s specific hierarchy) and contain only one faithfulness violation. Without the further supplement developed here, OT-CC cannot produce the correct final link in the chain (the winning form), because deletion of the glide is never harmonically improving. In other words, the chains **\*\*<kre.fjr, kre.fr, kre.fɤr>** and **\*\*<kre.fjr, kre.fjɤr, kre.fɤr>** are invalid chains: deleting the [j] is not harmonically improving the chain. This is because MAX outranks *\*COMPLEX* in Icelandic: segments in complex onsets are not deleted (Einarsson 1945). In order to make the chains valid (by making them harmonically improving), the *\*ji* constraint must be used. However, using this constraint renders the problem transparent and thus OT-CC is not needed to account for the Icelandic pattern.

This paper contributes to the body of research on phonological theory by providing a simple (transparent) solution to the problem of glide deletion and [ɤ]-epenthesis in Icelandic. The interaction of these two processes is rendered transparent by invoking a constraint banning sequences of glides followed by high front vowels, *\*ji*. It is argued that the problem must be transparently analyzed with *\*ji* because the transparent analysis is more parsimonious than the opaque analysis. Additionally, the opaque analysis cannot be accounted for in the theory of OT-CC, a theory specifically designed to account for such opaque interactions. Finally, the transparent solution has additional validity because it invokes phonetic grounding and has support from the shape of the Icelandic lexicon.

- (1) Glide deletion:  $/j/ \rightarrow \emptyset / C_{\#}, C\}$   
 Data  
 a. /bɪlj/ → [bɪl] ‘snow storm, acc.sg’  
 cf. /bɪlj + i/ → [bɪlji] ‘snow storm, acc.pl’  
 b. /mɪðj/ → [mɪð] ‘middle, nom.sg.fem’  
 cf. /mɪðj + an/ → [mɪðjan] ‘middle, acc.sg.masc’  
 c. /krefj/ → [kref] ‘demand, 1.sg.pres’  
 cf. /krefj + a/ → [krefja] ‘demand. 3.pl.pres.’

- (2) [ɣ]-epenthesis  $\emptyset \rightarrow [\gamma] / C_{-}[r]\#$   
 Data  
 a. /dag + r/ → [dagɣr] ‘day, nom.sg’  
 b. /stað + r/ → [staðɣr] ‘place, nom.sg’  
 cf. /sno + r/ → [snor] ‘snow, nom.sg’

- (3) Opaque interaction
- |                 |          |             |
|-----------------|----------|-------------|
| UR:             | /mɪðj+r/ | /krefj + r/ |
| Glide Deletion: | mɪðr     | krefr       |
| [ɣ]-epenthesis: | mɪðɣr    | krefɣr      |
| SR:             | [mɪðɣr]  | [krefɣr]    |

(4) Opacity

/mɪðj+r/	SSP	REAL-MORPHEME	DEP	MAX
a. mɪðjr	*!			
b. <sup>◌</sup> mɪðɣr			*	*!
c. <sup>◌</sup> mɪðjɣr			*	
d. mɪðjɣ		*!	*	*

(5) Transparency

/mɪðj + r/	*ji	*C <sub>nuc</sub>	MAX	DEP
a. mɪð.jr		*!		
b. mɪð.jɣr	*!			*
c. <sup>◌</sup> mɪð.ɣr			*	*

\*C<sub>nuc</sub> – syllabic consonants are prohibited

**References**

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