

# Opacity in Finnish

## *An OT approach*

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### Samandráttur

Eg fari her at vísa á, at tað, við at nýta Optimality Theory, ber til at mynda tað, sum í klassiskari, generativari málgransking verður rópt eitt millumliggjandi lag. Hetta verður gjørt við at nýta Sympathy Theory, og verður hetta víst við dømunum úr finskum.

## 1. Introduction

Finnish has examples of counterbleeding, see Fig. 2, in the inflection of nouns like *vapaus* 'freedom-nom.' ~ genitive singular *vapauden*. The result is an opaque surface alternation between [s] and [d], instead of the regular [t] and [d] alternation seen, for example, *katu* 'street-nom.' : *kadulla* 'on the street-adess.'. The alternation between [s] in *vapaus* and [d] in the genitive singular *vapauden* is opaque, because the consonant gradation rules in Finnish require an alternation between [t] and [d], compare *katu* 'street' above. In the word *katu* 'street' we have a regular phonological alternation between [t] and [d], in the sense that a voiceless stop becomes a voiced stop in a closed syllable.

Following Kiparsky, see Kenstowicz (1994), we will say that deletion of the suffix [i] bleeds<sup>1</sup> assibilation<sup>2</sup> *vapauti* > [deletion] *vapaut*, > giving the wrong surface form \**vapaut*. This output form is the wrong surface form, although it is, from the point of view of the gradation rules in Finnish, the right surface word form with an alternation between [t] and [d], that is \**vapaut* ~ *vapauden*, c.f. *katu* 'street' ~ *kadulla* 'on the street'. The ordering of the rules, in which deletion bleeds assibilation, is shown in Figure 1 below, where UR stands for Underlying Representation, SR for Surface Representation.

### Figure 1

Deletion bleeds assibilation.

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<sup>1</sup> Two rules A and B stand in potentially bleeding relation if the application of A removes inputs to B. If B does not apply, then A is said to *bleed* B; if B does apply, then A and B stand in a *counterbleeding* relation, (Kenstowicz 1994:94).

<sup>2</sup> t > s / \_\_\_i

UR	vapauti <sup>3</sup>
Deletion	vapaut
Assibilation	-----
SR	vapaut

In order to obtain the right surface form (*vapaus*), the rules have to be arranged as in Figure 2, a case of counterbleeding.

**Figure 2**

UR	vapauti
Assibilation	vapausi
Deletion	vapaus
SR	vapaus

Such cases of counterbleeding are handled in Derivational Phonology by stipulating an intermediate level, under the assumption that derivations are cyclic. The intermediate level would be *//vapausi//*, a word-form that never surfaces, but which it is necessary to postulate, in order to get the right output form *vapaus* 'freedom-nom.'

Since phonological processes are supposed to be cyclic in Derivational Phonology, such an intermediate level is not problematic in this framework.

One of the most recent linguistic theories is Optimality Theory see, for example, Prince and Smolensky (2004) for an introduction to OT. In OT any amount of structure may be posited. Different potential output forms are evaluated against an input form: the optimal candidate is the one that is most harmonic with regard to the differently ranked constraints and the input output mapping.

Intermediate levels such as *//vapausi//* are banned in this framework. Major importance is attributed to the surface level in OT in the interaction of constraints; the prediction is that 'no property of any phonological form may depend on information that is not present in the output – either purely or in relation between the input and output' (Kager, R. 1997). The cornerstone of OT is the evaluation of Markedness- and Input-Output constraints, which are ranked so that the most harmonic constraint wins, generating the right phonological output.

The simultaneous evaluation of Markedness constraints and Input-Output constraints on output forms that interact with an input form cannot handle cases of opacity, because there are no intermediate levels in OT as there are in Derivational Phonology: see Tab. A, where we get the wrong output, \*/vapaut/ rather than /vapaus/.

Cases of opacity have been difficult to handle within the theoretical framework of Optimality Theory. This has led some linguistics to reject OT totally, cf. Chomsky (1995).

The recently developed *Sympathy Theory* is an attempt to make up for this, cf. McCarthy J. (Sympathy & Phonological Opacity, ms.)<sup>4</sup>.

## 2. Constraints and constraint ranking

Let us look more closely at the alternation in Finnish, *vapaus* : *vapauden*. We will presume, from looking at the genitive singular form *vapauden*, that the underlying vowel is an underspecified *E*. In the same way, we will say that the consonant is underspecified; using as a reference point the [t] in the Nominative form of *katu* 'street', which alternates with a [d] in *kadulla* 'on the street', we will take the underspecified consonant in the surface word-form *vapaus* 'freedom' to be *T*. This will give us the underlying form //vapauTE//.

Six possible candidates will be evaluated against the input form //vapauTE//. These are *vapaut*, *vapaus*, *vapauti*, *vapausi*, *vapaute* and *vapause*.

The Input-Output constraint DEP[-high]# will rule out a raising of /E/ to /i/, since this constraint says that it is not possible to insert the feature [-high] in word final position. This constraint will rule out the candidates *vapause* and *vapaute*.<sup>5</sup>

Another constraint, \*TI# - that is, 'TI is not allowed in word final position', will rule out *vapauti*.

The assibilation could be accounted for with the constraints MAX[CONT] and DEP[CONT] evoked by Inkleas (1998) account of *tilasi*, (3.sg.) inf. *tilata* 'order'.

MAX[CONT], 'do not delete the feature [-continuant]', is violated in *vapaus*, *vapausi* and *vapause*, since these candidates do all contain a continuant /s/.

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<sup>3</sup> The underlying representation will be modified later to //vapauTE//.

<sup>4</sup> I only have this article in a copy, which I obtained from S.R. Anderson at Yale University during my stay there.

The constraint DEP[+high]#, which says ‘do not insert the feature [+high] in word final position,’ rules out *vapauti* and *vapausi*, since these candidates have a high vowel in word final position. Another constraint is the IO faithfulness constraint MAX[VOW], ‘no deletion of input vowels in the output.’ This constraint will rule out *vapaut* and *vapaus*. Finally, we have the constraint DEP[CONT], ‘no insertion of the feature [+continuant].’ This constraint will rule out *vapaus*, *vapausi* and *vapause*. Note that MAX[CONT] is actually superfluous: see Tab. C.

The ranking of the constraints is as follows:

DEP[-high] >> \*TI# >> MAX[CONT] >> [DEP[+high]# >> MAX[VOW]. >> DEP[CONT]

The pointing finger in Tab. A shows that *vapaut* is the winning candidate. This is precisely the result one would expect based on the consonant gradation rules of Finnish (*katu ~ kadulla*). The result shows that the above ranking of the constraints is correct. The problem is, however, that the actual surface form in Finnish is *vapaus*, hence the ♣. ✓ indicates a possible sympathetic candidate, see the next section.

The losing candidates all violate higher ranked constraints (\* shows violation of a constraint), while the winning candidate only violate the constraint MAX[VOW] - a low ranked constraint.

**Tableau A**

	vapauTE	DEP[-high]#	TI#	MAX[CONT]	DEP[+high]#	MAX[VOW]	DEP[CONT]
a. ☞	vapaut					*	
b. ♣	vapaus			*		*	*
c.	vapauti		*		*	✓	
d.	vapausi			*	*	✓	*
e.	vapaute	*				✓	
f.	vapause	*		*		✓	*

More work is needed in order to explain the opaque alternation *vapaus ~ vapauden*. In the remainder of this short paper, we will show that this can be done within the framework of Sympathy Theory (McCarthy, ms.)<sup>6</sup>.

<sup>5</sup> Note that DEP constraints do now allow insertion of a feature. MAX constraints do not allow deletion of a feature.

<sup>6</sup> The use of ✓ will become clear later.

### 3. Selection of the Sympathetic Candidate

I will not go into details with regard to how the sympathetic candidate, the  $\otimes$ -candidate, is found. For details, see McCarthy *Sympathy & Phonological Opacity* (ms).

The most sympathetic candidates are *vapauti*, *vapausi*, *vapaute* and *vapause*. They are indicated by ✓ in Tab. A. They can all be the  $\otimes$ -candidate, because there is no deletion of any vowel in these candidates, but since *vapause*, *vapaute* and *vapauti* are ruled out by other, higher ranked constraints, *vapausi* is the sympathetic candidate. This form is non-empty with regard to the input form *vapauTE*, in that it does not violate MAX[VOW] ‘No deletion of input vowels in the output’.

When the sympathetic constraint has been found, one will have to look at the constraint that enforces faithfulness to the sympathetic candidate (*vapausi*).

The constraint that enforces faithfulness to the sympathetic candidate is DEP[CONT]; this is the sympathetic constraint. It is chosen because of the feature [+continuant], which is present in both *vapaus* and *vapausi*.

A high ranking of DEP[CONT]<sub>MAXVOW</sub>, will rule out the incorrect winning candidate *vapaut* and yield the right output, *vapaus*.

**Tableau B**

	vapauTE	DEP[-high]#	TI#	DEP[CONT] MAXVOW	MAX[CONT]	DEP[+high]#	MAX[VOW]	DEP[CONT]
a.	vapaut			*			*	
b. ☞	vapaus				*		*	*
c.	vapauti		*	*		*		
d.	♻️ vapausi				*	*		*
e.	vapaute	*		*				
f.	vapause	*			*			*

DEP[+high] # ‘No insertion of the feature [+high] in word final position’ rules out *vapausi* as opposed to *vapaus*.

*Vapausi* and *vapaus* (and also *vapause*) do not violate the sympathetic constraint, since there is no violation of the constraint that enforces faithfulness to the sympathetic candidate (*vapausi*). However, all three candidates violate the low ranked Input-Output constraint DEP[CONT].

Ad. 1. One could actually get the same result without reference to the constraint MAX[CONT]. An account using only DEP[CONT] would give the same result as one involving both MAX[CONT] and DEP[CONT]:

**Tableau C**

	vapauTE	DEP[-high]#	TI#	DEP[CONT] MAXVOW	DEP[+high]#	MAX[VOW]	DEP[CONT]
a.	vapaut			*		*	
b. ☞	vapaus					*	*
c.	vapauti		*	*	*		
d.	♻️ vapausi				*		*
e.	vapaute	*		*			
f.	vapause	*					*

It has been demonstrated that it is possible to give an account of cases of counterbleeding using an OT approach. Nor is it by any means established beyond any doubts that a derivational approach, one that

makes use of underlying, intermediate levels, is the way a language works. Further research, presumably in cognitive sciences, will perhaps shed some light on these matters sometime in the future.

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