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## **A Short Note on Finnish Diphthongs\***

### **Abstract**

This article discusses a gap in the inventory of Finnish diphthongs, viz. the scarcity/absence of *yi*, *öi*, *iy* and *ey*. According to Karlsson (1971, 1983), the gap is due to a so-called labial harmony. Contrary to that, I will argue that it is not connected to labiality, but follows from the conditions on Finnish vowel harmony, which is palatal. The analysis is couched in the framework of Government Phonology (GP) (see Kaye, Lowenstamm & Vergnaud 1985, 1990, Charette & Göksel 1996a, 1996b, Kaye, 2001).

### **1. Element Theory and Finnish**

GP uses a set of privative, independently interpretable primitives, dubbed elements, to describe properties of melody. Elements occur alone or in combination. While Finnish *i* is made up of **I** alone and *u* of **U** alone, both together give *y*. We can say that Finnish *i* is **(.I)** and *u* is **(.U)** and that **(I.U)** is interpreted as *y*. The objects written in parentheses are so-called phonological expressions. The head of a phonological expression is distinguished from its operator(s): Finnish *e* is **(A.I)** with **I** as the head (to the right of the dot) and **A** as the operator (to the left of the dot), while Finnish *ä* is the mirror image, i.e. **(I.A)**. The order of the operators is

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\* This article is dedicated to Fred Karlsson. During my two one-year stays at his department Fred was my local supervisor, and I could not have been luckier than working with him. Since the frameworks the two of us work and think in are quite different, the exchange was always fruitful. I can only hope that this was mutual and that I was not the only one who profited from our discussions. Thanks to Reinhard Bachmaier, Jonathan Kaye and Regula Sutter for discussing some of the issues contained in this article, and to my informants in the course of time: Anu Sickl, Erkki Heinonen, Jani Penttilä, Jasso Leo, Jussi Väistö, Matti Tapio, Markus Koljonen and Riku Johansson. All errors and omissions are my own.

irrelevant and no element can occur more than once in a phonological expression. Neither operator(s) nor heads are obligatory.

With three elements (A, I, U) we can generate 20 expressions.<sup>1</sup> Finnish has fewer vowels than that, viz. eight. The generative power is restricted by language-specific Licensing Constraints. Those Licensing Constraints define licit phonological expressions in individual languages by excluding certain combinations, and they also account for the occurrence of phonological processes: The definition of phonological expressions predicts the possibilities of phonological processes, or, the other way round, phonological processes can be derived from the Licensing Constraints stating what individual phonological expressions are made of.

A quick look at the Finnish vowels and their representations will make this clearer. Kaye (2001: 260) stipulates the following two Licensing Constraints for Finnish:

- (1) a. All expressions are headed.  
b. U must be a head.

(1a) states that there can be no phonological expressions like *\*(A.)*, i.e. expressions where the head remains empty. All expressions must be headed. (1b) requires that if a phonological expression contains U, this U must be the head. Thus, the correct representation for Finnish *y* is *(I.U)*, not *\*(U.I)*. The two Licensing Constraints in (1) restrict the 20 possible combinations to exactly the eight we find in Finnish:

(2)	<i>i</i> ( <b>I</b> )	<i>y</i>	<b>(I.U)</b>	<i>u</i>	<b>(.U)</b>
	<i>e</i> ( <b>A.I</b> )	<i>ö</i>	<b>(IA.U)</b>	<i>o</i>	<b>(A.U)</b>
		<i>ä</i>	<b>(I.A)</b>	<i>a</i>	<b>(.A)</b>

Now, in what sense does a phonological process like vowel harmony follow from the definition of possible representations? We will turn to this issue in the next section.

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<sup>1</sup> In total, GP employs more than three elements. Space restrictions preclude discussion of the other elements; the reader is referred to the indicated literature. The same goes for constituent structure.

## 2. Vowel harmony

The Licensing Constraints given in (2) are sufficient to characterise the Finnish vowels and also lend themselves to a simple account of vowel harmony. Notice that the three columns in (2) correspond to the three sets of vowels traditionally set up in analyses of vowel harmony, viz. neutral, front and back. In the theory employed here, this allocation is not accidental, but rather follows from formal properties of the phonological expressions. The neutral vowels have **I** as a head, the front vowels have **I** as the operator and the back vowels contain no **I** at all. The definition of the internal structure of vowels gives, as a by-product, a clear-cut division of the subsets that vowel harmony exploits. Harmony can then proceed along the lines proposed in Kaye (2001: 261):

- (3) If a nuclear expression in a phonological domain contains **I** as an operator, the element **I** must be present (as head or operator) in every nuclear expression in the phonological domain.

Some examples will show how this works. (4) contains nominative nouns and their partitive forms. The partitive suffix is underlyingly simply (**.A**).

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|--|--|
| (4) a. <i>kylä</i> ‘village’ → <i>kylä-ä</i>                               | stem: ( <b>I.U</b> ) ( <b>I.A</b> )                                  |
| b. <i>täti</i> ‘aunt’ → <i>täti-ä</i> ; <i>isä</i> ‘father’ → <i>isä-ä</i> | stems: ( <b>I.A</b> ) ( <b>.I</b> ) and ( <b>.I</b> ) ( <b>I.A</b> ) |
| c. <i>tili</i> ‘account’ → <i>tili-ä</i>                                   | stem: ( <b>.I</b> ) ( <b>.I</b> )                                    |
| d. <i>laji</i> ‘kind’ → <i>laji-a</i> ; <i>sika</i> ‘pig’ → <i>sika-a</i>  | stems: ( <b>.A</b> ) ( <b>.I</b> ) and ( <b>.I</b> ) ( <b>.A</b> )   |
| e. <i>talo</i> ‘house’ → <i>talo-a</i>                                     | stem: ( <b>.A</b> ) ( <b>A.U</b> )                                   |

(4a) and (4b) are straightforward: the domain contains an **I** in operator position (in all cases the **I** of (**I.A**), i.e. *ä*) which, according to (3), has to spread to the only vowel in the domain not containing **I**, viz. the partitive suffix (**.A**), which becomes harmonised and changes to (**I.A**). The examples under (4d) and (4e) are equally simple. None of the bases contains **I** in operator position (though some contain it in the head position) and thus no harmony is observed. The only remaining case is (4c), which poses a problem for Kaye’s analysis, since (3) only refers to **I** in operator position. The noun in (4c) contains no vowels with **I** as an operator, but harmony *does* take place. The statement in (3) obviously needs to be supplemented by something like (5).

- (5) **I** spreads from a head position iff it is linked to all nuclei of the domain as a head. (This causes switching of **I** from head to operator in the harmonised vowel.)<sup>2</sup>

In *tili* ‘account’ **I** is only linked to head positions and can therefore spread to the suffix: (.**A**) harmonises to (**I.A**), with **I** as the operator. This gives *tili-ä*. We will come back to this **I**-switching.

The supplement in (5) seems to imply that vowel harmony has to be split up into two sub-processes in order to make the analysis work, which looks a bit *ad hoc*. As we will see in the following section, however, this split is not unjustified and (5) is in fact the key to understanding certain distributional gaps in the Finnish vowel system.

### 3. When vowel harmony ‘fails’

Karlsson (1971: 65–69) notices that certain vowel combinations are absent from Finnish roots or at least very rare. This concerns combinations of (illabial) *i* or *e* and (labial) *y* or *ö* within the same root: members of the two sets cannot co-occur (in either order), the few counter-examples there seem to be are most probably spurious.<sup>3</sup> Karlsson dubs this labial harmony, which only affects those four vowels and precludes differing values for labiality. This incompatibility holds within roots and carries over to certain derivations.

- (6) a. *pääs-y* ‘access’      *läht-ö* ‘departure’  
 b. *pes-u* ‘wash(ing)’    *men-o* ‘going’  
 c. *alk-u* ‘beginning’    *tul-o* ‘coming, arrival’

Labial harmony would be a very unconventional kind of harmony. Take *meno*: the base is *men-* and we expect \**menö* (cf. *menkööt* ‘let them go’ from the same stem), yet this is not what we get. If there was a labial harmony effect barring the co-occurrence of illabial *e* and labial *ö*, we should expect \**mene* as the outcome, which, however, is not correct, either. The correct form *meno* is still disharmonic as regards labiality. What the alleged labial harmony seems to be doing is to ‘move’ the recessive vowel out of the set of vowels taking part in the process. This is not what we

<sup>2</sup> For a more detailed discussion of the notion of switching cf. Charette & Göksel (1996a, 1996b).

<sup>3</sup> The *i* of *syli* ‘lap’ and similar words is not counted as part of the root by Karlsson (1971).

expect of harmony. Furthermore, such non-application of harmony can sometimes also be observed with the vowel *a*:

- (7) a. *iti-kka* ‘bug’, *peni-kka* ‘puppy’  
 b. *imi-kkä* ‘lungwort’, *mesi-kkä* ‘sweetclover’

Here, vowel harmony can apply (7b), but does not have to (7a). This makes clear that labial harmony is a misnomer, the phenomenon we observe has nothing to do with labiality. If it had, the examples in (7a) would be completely unexpected. What is the reason for this failure of vowel harmony then? In section 2 I claimed that vowel harmony has to be understood as a two-part phenomenon. Spreading of **I** as the operator differs from spreading of **I** from a head, which necessarily involves switching to operator position in the harmonised vowel. In order to account for the seemingly aberrant behaviour of vowel harmony, I would like to propose the following:

- (8) **I** does not switch within roots and certain derivations. (Proviso to be added.)

Consider *pesu* again with (**A.I**) and (**.U**). For *e* to harmonise *u*, its **I** would have to move from a head to an operator position, yielding *y*, i.e. (**I.U**). This does not seem to be an option with the examples in (6); it is an idiosyncratic property of those suffixes that they behave like part of the root. Likewise, if a root like \**melö* existed, **I** would be the head in *e* (**A.I**), but one of the operators in *ö* (**IA.U**), which is disallowed. The statement in (8) also predicts that vowel harmony should never fail when it involves an **I** spreading from the operator position, which is correct, cf. (6a) and (9a).<sup>4</sup> As all vowels in Finnish are headed, **I** never needs to switch from an operator into a head position. Thus, not vowel harmony in general fails in (6b) and (7a), but switching. As for the examples in (7), we will have to assume that **A** as a head is special in that it does allow switching (7b), though not always (7a). This property will recur with the diphthongs.

The observed failure of vowel harmony is absolutely restricted to roots and certain (and by far not all) derivations. In other words, the reluctance of **I** to switch roles is a property of lexical entries. It plays no role in inflection, as the examples in (9) show.

<sup>4</sup> I cannot go into the details of disharmonic loans like *amatööri* ‘amateur’ here.

- (9) a. *lähte-nyt* ‘left’, *lähte-kööt* ‘let them leave’, *lähte-ä* ‘to leave’  
 b. *pes-syt* ‘washed’, *pes-kööt* ‘let them wash’, *pes-tä* ‘to wash’  
 c. *tul-lut* ‘come’, *tul-koot* ‘let them come’, *tul-la* ‘to come’

So far I have only been talking about vowel harmony and the conditions it is subject to. In the next section I will argue that those very same conditions account for a gap in the inventory of diphthongs, without having to employ additional theoretical machinery. Again, reference to labiality (i.e. the element U) will be shown to be unnecessary.

#### 4. Finnish diphthongs and a gap

The following table gives the list of Finnish diphthongs as found in Karlsson (1983: 83).

(10)		<i>iu</i>	<i>kiusa</i> ‘annoyance’	<i>ie</i>	<i>tie</i> ‘road’
		<i>iy</i> <sup>o</sup>	<i>Kiysaari</i> (place name) <sup>5</sup>		
<i>ei</i>	<i>reisi</i> ‘thigh’	<i>eu</i>	<i>neula</i> ‘needle’		
		<i>ey</i> <sup>o</sup>	<i>leyhkä</i> ‘breeze’		
<i>yi</i> <sup>o</sup>	<i>lyijy</i> ‘lead’			<i>yö</i>	<i>työ</i> ‘work’
<i>öi</i> <sup>o</sup>	<i>töitä</i> ‘works’	<i>öy</i>	<i>köyhä</i> ‘poor’		
<i>äi</i>	<i>päivä</i> ‘day’	<i>äy</i>	<i>jäyhä</i> ‘austere’		
<i>ui</i>	<i>luihu</i> ‘deceitful’			<i>uo</i>	<i>suo</i> ‘swamp’
<i>oi</i>	<i>toivo</i> ‘hope’	<i>ou</i>	<i>outo</i> ‘weird’		
<i>ai</i>	<i>aito</i> ‘genuine’	<i>au</i>	<i>rauha</i> ‘peace’		

Finnish is rich in diphthongs, but care has to be taken in what is counted in, as the list also contains some problematic cases. Three types have to be distinguished.<sup>6</sup>

- (11) a. “plain” ones, occurring in underived/non-inflected forms: *aito* ‘genuine’  
 b. vowel shortening/loss before *i* of suffix: *puu* ‘wood’ → *pu-inen* ‘wooden’  
 c. deletion of *k* by consonant gradation: *laki* ‘law’ → *lait* ‘laws’

<sup>5</sup> The mark <sup>o</sup> will be explained below.

<sup>6</sup> This point would also need a detailed discussion of constituent structure, which is impossible here due to space restrictions. Finnish seems to have both *iu* and *ui* with the same structural properties, which makes them problematic candidates for branching nuclei: branching constituents usually show a fixed order and not this flip-flop behaviour (see Kaye, Lowenstamm & Vergnaud 1990). Also, the diphthongs with *i* or *u/y* as their second part behave quite differently from *ie/uo/yö*. Space restrictions preclude discussion of those issues.

(11b) is always and only the result of morphological concatenation and should as such be excluded when establishing phonological generalisations (see Kaye 1995). (11c) is not really a diphthong but a vowel sequence that happens to resemble a real diphthong; the phonological behaviour, however, is different. (11b) and (11c) do in fact blur the picture. When we abstract away from them, (10) reveals an interesting gap: *yi*, *öi*, *iy* and *ey* (marked with °) are special in several respects. Let us turn to them in order.

The few occurrences of *yi* and *öi* we find can be divided into three groups.

- (12) a. onomatopoetic words: *hyi*, *fyi* (both roughly ‘ugh’) etc.  
 b. morphologically complex: *hy-inen* ‘icy’, *sy-i-tä* ‘reasons’;  
*ö-inen* ‘nightly’, *tö-i-tä* works etc.  
 c. before *j*: *lyijy* ‘lead’, *ryijy* ‘rug’; *röijy* ‘cardigan’, *köijätä* ‘to drag’ (dial.)

The words in (12a) can be discarded as onomatopoetic right away.<sup>7</sup> The complex forms in (12b) always involve a suffix beginning with *i*, e.g. *sy-i-tä* ‘reasons’ from *syy* ‘reason’ *-i* (plural) *-tä* (partitive), and should be excluded from our sample. What is left is (12c), where *yi/öi* could not be morphologically complex or due to gradation. However, the diphthongs are always followed by *j*. It seems natural to conclude that the *i* of *yi/öi* in (12c) is not basic, but receives its I from (or is backed up by) the following *j*. Consequently, not a single instance of *yi/öi* survives as a *bona fide* diphthong.

The diphthongs *iy* and *ey* do not fare that much better. Little is left after taking out complex forms: *iy* only occurs in the place name *Kiysaari* and the dialectal form *tiryis*; *ey* is only found in *leyhyä* ‘to wave’ (and words derived from it) and dialectal *keyri* (standard *kekri* ‘All Saints’ Day’). Those instances cannot be explained as morphologically complex, nor does (part of) the diphthong seem to receive its melodic material from neighbouring positions. That is, *ey* and *iy* are possible, but highly marginal.

Karlsson (1971: 66, 1983: 84) accounts for those (near) gaps by appealing to labial harmony: *ö* and *i*, say, could not co-occur in a diphthong for the same reason they could not co-occur within the same root. After all, we have taken pains to make sure the diphthongs we are dealing with are

<sup>7</sup> Onomatopoetic expressions often contradict otherwise rigid phonotactic constraints, cf. English *boink* or *oink* with a diphthong before a non-coronal word-final cluster, a situation clearly exceptional in English.

properly contained in roots and not the result of morphological concatenation. It seems blatantly obvious that the same mechanism is at work.

Can we claim the same in terms of the switching behaviour of **I**? Let us have a look at the segmental composition of the diphthongs in (12), repeated here as (13) and translated into their elemental representation.

(13)		<i>iu</i>	(.I) + (.U)		<i>ie</i>	(.I) + (A.I)
		<i>iy</i> <sup>o</sup>	(.I) + (I.U)			
	<i>ei</i>		(A.I) + (.I)		<i>eu</i>	(A.I) + (.U)
					<i>ey</i> <sup>o</sup>	(A.I) + (I.U)
	<i>yi</i> <sup>o</sup>		(I.U) + (.I)		<i>yö</i>	(I.U) + (IA.U)
	<i>öi</i> <sup>o</sup>		(IA.U) + (.I)		<i>öy</i>	(IA.U) + (I.U)
	<i>äi</i>		(I.A) + (.I)		<i>äy</i>	(I.A) + (I.U)
	<i>ui</i>		(.U) + (.I)		<i>uo</i>	(.U) + (A.U)
	<i>oi</i>		(A.U) + (.I)		<i>ou</i>	(A.U) + (.U)
	<i>ai</i>		(.A) + (.I)		<i>au</i>	(.A) + (.U)

In all the problematic diphthongs **I** has to switch roles. Take *yi* as an example: *y* is (I.U) with **I** as the operator, while *i* is (.I) with an **I**-head. Since (8) is about the properties of roots, we should expect it to hold true with diphthongs as well. This seems to be correct and can also be extended to *öi*, *iy* and *ey*. There is a difference between *yi/öi* and *iy/ey*, however. While the first set is non-existent, the second can be attested in a few forms. This difference is reflected in (13). Ungrammatical *yi/öi* involve a switch from operator to head (going from the head of the diphthong on the left to its recessive position on the right), while for *iy/ey* **I** has to switch from head to operator. It seems that “upgrading” from operator to head is completely out (*\*yi/\*öi*), while “downgrading” from head to operator is possible but absolutely marginal in roots. Remember that the same “downgrading” happens all the time in vowel harmony in inflectional forms, thus *\*tili-a* → *tili-ä* ‘of an account’.

A last detail remains: *äi* also involves switching of **I**, even from operator to head, yet *äi* is in no way marked in Finnish. Recall from (7b), however, that **A** in a head position seems to support **I**-switching. The same can be expected in diphthongs, and thus *äi* parallels the data in (7b).<sup>8</sup>

<sup>8</sup> The special properties of **A** clearly deserve further research. Notice that again they seem to be restricted to the root and certain derivations: a form such as *sika-na* ‘as a pig’ could never come out as *\*sika-nä*, with one of the *a*’s licensing a switch. Likewise, the *a* in *ai* would not license the **I** in the *i* to spread ‘backwards’ and change *ai* into *äi*.

## 5. Conclusion

I have shown that the structure of vowels as dictated by the Licensing Constraints not only accounts for vowel harmony, but also sheds light on another facet of Finnish phonology, viz. labial harmony. Failure of vowel harmony and a gap in the distribution of the diphthongs all boil down to the reluctance of I to switch roles within roots. In other words, Licensing Constraints, phonological processes like vowel harmony and phonotactic restrictions more and more seem to become different sides of the same coin. The notion of switching, which the analysis builds on, is still only poorly understood, but I am confident that future research in this area will be extremely fruitful and yield exciting results.

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