1. INTRODUCTION

• GOAL: to account for vowel reharmonization anomalies in terms of general principles of markedness (de Lacy 2002) rather than by invoking underspecification (Harrison and Kaun 2000)

• Two cases of vowel reharmonization:
  (i) Tuvan “jocular” reduplication
    \[\text{idik} ‘boot’ \rightarrow \text{idik-\=dik} ‘boots and stuff’\]
  (ii) Finnish “knapsack language” word game
    \[\text{nähnyt} ‘seen’ + \text{kontti} ‘knapsack’ \rightarrow \text{kohnut} näntti\]

• When input words have disharmonic vowels in the input, these are NOT reharmonized

• de Lacy’s formalization of markedness readily accounts for this, when adapted to apply to autosegmental (or correspondence-theoretic) representations

2. THE DATA


Tuvan (Turkic; Russia and northwestern Mongolia)

(1) Tuvan vowel inventory

<table>
<thead>
<tr>
<th></th>
<th>Front</th>
<th>Back</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>i</td>
<td>ü</td>
</tr>
<tr>
<td></td>
<td>ü</td>
<td>a</td>
</tr>
<tr>
<td>Non-high</td>
<td>e</td>
<td>ò</td>
</tr>
</tbody>
</table>

All eight vowels also have long counterparts, written as orthographic doubles (ii, ee, etc.)

Vowel harmony in Tuvan: pervasive front/back harmony
see Appendix for notes on rounding harmony

Characteristics of Jocular Reduplication

- full, suffixing reduplication (cf. Alderete et al. 1999 on melodic overwriting)
  \[\text{nom} \rightarrow \text{nom-nam} ‘books and stuff’\]
- first-syllable vowel of RED is fixed as [a] (or [u], if base form already has [a])
  \[\text{seek} \rightarrow \text{seek-saak} ‘mosquitoes and stuff’\]
  \[\text{at} \rightarrow \text{at-at} ‘names and stuff’\]
- front vowels of a base form reharmonize as back vowels after fixed [a] or [u] in RED
- meaning: “intentional vagueness or a special, casual, informal jocular register” (Harrison 2000b:160)

Typical examples of jocular reduplication: (a) front Vs reharmonize as back Vs
(b) back Vs remain back

(2)

<table>
<thead>
<tr>
<th>Base</th>
<th>Base + Reduplicant</th>
<th>Base gloss</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>idik</td>
<td>idik-=dik ‘boot’</td>
</tr>
<tr>
<td>teve</td>
<td>teve-tava</td>
<td>‘camel’</td>
</tr>
<tr>
<td>inek</td>
<td>inek-=anik</td>
<td>‘cow’</td>
</tr>
<tr>
<td>ööreenip</td>
<td>ööreenip-=aarangi</td>
<td>‘study’-CV</td>
</tr>
<tr>
<td>b.</td>
<td>arat</td>
<td>arat-=urat ‘peasant’</td>
</tr>
</tbody>
</table>

Exceptions to reharmonization: disharmonic inputs (typically loanwords)

(3)

<table>
<thead>
<tr>
<th>Base</th>
<th>Base + Reduplicant</th>
<th>Base gloss</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>al=i</td>
<td>al=i-=ul (*-ul) ‘Ali’</td>
</tr>
<tr>
<td>maš=na</td>
<td>maš=na-muš=na (*-muš=na)</td>
<td>‘car’</td>
</tr>
<tr>
<td>b.</td>
<td>rad=y=o</td>
<td>rad=y=o-rad=y=a (*-rad=y=a) ‘radio’</td>
</tr>
</tbody>
</table>

- Base disharmonic front Vs are PRESERVED in RED
  (NB: there is a general restriction on non-high rounded vowels to initial syllables in Tuvan; the change of base [o] to RED [a] may be a result of this restriction, and not of harmony)

- Comparing (2a) and (3a), we see that only DISHARMONIC front Vs of the base are preserved; thus, special faithfulness to [i] will not account for the data

2.2. A Finnish Word Game (Vago 1988)

(4)

<table>
<thead>
<tr>
<th></th>
<th>High</th>
<th>Mid</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front harmonic:</td>
<td>ü</td>
<td>ò</td>
<td>a</td>
</tr>
<tr>
<td>Back harmonic:</td>
<td>a</td>
<td>i</td>
<td>e</td>
</tr>
</tbody>
</table>

Many thanks are due to Sharon Inkelas and Larry Hyman for helpful discussion.
The game: **kontti kieli** ‘knapsack language’

- take any word and add **kontti** after it
- swap the initial CV sequences of the two words (see McCarthy 1986 for more details)
- make sure Vs of the first word (re)harmonize with the new first syllable *ko*

(5)  Input | kontti | Output of game | Input gloss
|:----|:-----|:-------------|:-----|
| nähnäyä | kontti | kohnäntti | ‘seen’ |
| pysähtyä | kontti | konglönntti | ‘to stop’ |

Exceptions to reharmonization: disharmonic inputs again

(6)  Input | kontti | Output of game | Input gloss
|:----|:-----|:-------------|:-----|
| a. manööveri | kontti | konööveri mantti | ‘maneuver’ |
| b. hydrosääri | kontti | kodrosääri hyntti | ‘hydrosphere’ |

- In (6a) and (6b), input disharmonic front Vs are preserved in the output
- In (6b), the input disharmonic back V [o] remains in the output, but is no longer disharmonic

3. The Question: What makes harmonic and disharmonic vowels different?

### 3.1. The Underspecification Proposal

Harrison and Kaun (2000) argue that, in languages with pervasive front/back harmony:

- only the first vowel of a harmonic word is underlyingly specified for backness
- subsequent vowels receive their backness specification via spreading (ALIGN[BK])

For Tuvan *idik* ‘boot’, the representation must be that in (7a), not in (7b) (Harrison and Kaun do not mention the possibility of a representation like that in (7c), to which we will turn below):

(7)  a. idik  b. * idik  c. idik
    \[ \text{\textasciitilde Bk} \text{ \textasciitilde Bk} \]  \[ \text{\textasciitilde Bk} \text{ \textasciitilde Bk} \]

Continuing the underspecification argument:

- disharmonic vowels are underlying **SPECIFIED** for backness
- reharmonization targets only vowels that are underlyingly **UNDERSPECIFIED**
- the ranking: **IDENT-I/R >> ALIGN[BK] >> IDENT-B/R**

(8)  | ‘idik, RED/ | **IDENT-I/R** | **ALIGN[BK]** | **IDENT-B/R** |
|----|:-----|:-------------|:-----|
| \[ \text{\textasciitilde Bk} \] | | | |
| a. idik-adik | * | ! | * |
| b. idik-adik | * | | ** | * |

• if all harmonic vowels were underlyingly specified, we would get a ranking paradox
  • the form (7b) would make (8a) the winner; (8b) would violate **IDENT-UR** twice
  • if **ALIGN[BK]** were ranked highest, disharmonic input Vs would reharmonize :-(

Problems with underspecification:

- predicts the possibility of lexical exceptions; i.e., fully harmonic words could contain an underlyingly specified vowel that would fail to undergo reharmonization: unattested
- the analysis is ad hoc; even if it works, we don’t understand why it should be so

What about (7c)?

- idik  \[ \text{\textasciitilde Bk} \]

The virtues of (7c):

- allows full specification of underlying forms
- conforms to the obligatory contour principle (OCP)
- is readily modeled in de Lacy’s very restrictive theory of markedness

### 3.2. Interlude: Background on de Lacy (2002)

- Objective: limit the types (and thereby numbers) of faithfulness and markedness constraints that can exist in grammars
- Central idea: natural harmonic scales
- For any scale, all constraints must make reference to the most marked end of the scale, and may refer to any contiguous stretch of the scale starting from the most marked end (cf. Kiparsky 1994)

A sample scale: Place of Articulation

- Claim: dorsal (K) is universally more marked than labial (P), which is universally more marked than coronal (T), which is universally more marked than glottal (ʔ)
- A constraint like *{KP} means “penalize all dorsals and labials, wherever they occur”; it does not require that they be adjacent, nor that a segment of each type must exist in a word for a violation to be incurred

(9)  a. Markedness constraints  | Faithfulness constraints
    *{K}  | **IDENT{K}**
    *{KP}  | **IDENT{KP}**
    *{KPT}  | **IDENT{KPT}**
    *{KPTʔ}  | **IDENT{KPTʔ}**

  b. Impossible constraints  
    *{T}  | **IDENT{T}**
    *{Pʔ}  | **IDENT{Pʔ}**
    *{KPʔ}  | **IDENT{KPʔ}**  etc.
Consequences of the theory:

• Markedness constraints may penalize marked structures without penalizing unmarked structures, but never the reverse
• Faithfulness constraints may preserve marked structures without preserving unmarked structures, but never the reverse

3.3. The Markedness of Autosegmental Linking

Scale-referring constraints of the type proposed by de Lacy can be used to refer to autosegmental representations of the links between vowels and backness nodes.

First, we need to construct a scale:

Recall the three representations shown in (7)

(7) a. idik b. idik c. idik
     |     |     V
     Bk Bk Bk

Lexicon Optimization (Prince and Smolensky 1993) “heavily favors fully specified inputs” (Harrison and Kaun 2000:2)

Therefore, (7a) is out on independent grounds

of the two options with full specification, (7c) is less marked than (7b)

• (7c) contains less structure (i.e., violates *Struc fewer times) than (7b)
• (7c) conforms to the OCP; (7b) violates it

this suggests that multiply linked nodes are less marked than singly linked nodes:

The Scale: MULT-LINK is less marked than SG-LINK

For this scale, we can describe the following constraints:

(10) Markedness constraints
    *{SG-LINK} Penalize any node linked to a single vowel
    *{SG-LINK, MULT-LINK} Penalize any node linked to a single vowel and penalize any node linked to multiple vowels

Faithfulness constraints
IDENT{SG-LINK} Preserve any node linked to a single vowel
IDENT{SG-LINK, MULT-LINK} Preserve any node linked to a single vowel and preserve any node linked to multiple vowels

Applying the constraints to the reharmonization data from Section 2:

• assume some undominated constraint (RED-V) that forces the fixed segment to surface
• observe that the markedness constraints in (10) always favor multiply linked representations, no matter what their ranking relative to each other: Local Harmonic Bounding (de Lacy 2002, McCarthy 2001)

• in order for a singly linked node to surface, some faithfulness constraint must intervene

• IDENT{SG-LINK, MULT-LINK} preserves all base/input autosegmental links; if this is ranked highest, reharmonization will never occur
• IDENT{SG-LINK} preserves only singly linked nodes; singly linked nodes, in turn, occur only with DISHARMONIC vowels

• a sample disharmonic word from Tuvan:

(12) mašina
    +Bk −Bk +Bk

• recall from (3c) that the disharmonic [i] fails to reharmonize: mašina-mušina
• ranking IDENT{SG-LINK} above the markedness constraints produces this effect:

(13) mašina-RED
    +Bk −Bk +Bk

    IDENT{SG-LINK} *{SG-LINK} *{SG-LINK, MULT-LINK}

a. maši
     +Bk −Bk +Bk

b. maši
     +Bk −Bk +Bk

c. maši
     +Bk −Bk +Bk

The complete ranking:

(14) Tuvan and Finnish ranking of constraints on autosegmental representations

IDENT{SG-LINK} >> *{SG-LINK}, *{SG-LINK, MULT-LINK} >> IDENT{SG-LINK, MULT-LINK}
Why are only disharmonic vowels preserved in the reduplicant/output?
- only they have a singly linked autosegmental representation
- for fully harmonic words, the low ranking of IDENT[SG-LINK, MULT-LINK] means that they will undergo reharmonization (rather than maintain singly linked front vowels that would violate the markedness constraints)
- i.e., for idil in (11), IDENT[SG-LINK] does not apply; it must be represented as in (7c)
- recall that there is no constraint IDENT[MULT-LINK]

The Tuvan and Finnish data support de Lacy’s proposal that faithfulness constraints may asymmetrically preserve marked structure but not unmarked structure

4. FURTHER ISSUES

4.1. The Autosegmental Typology

i. *{SG-LINK}, *{SG-LINK, MULT-LINK} >> IDENT{SG-LINK}, IDENT{SG-LINK, MULT-LINK}
Harmony will be pervasive; no disharmonic vowels will be preserved in reharmonization

ii. IDENT{SG-LINK, MULT-LINK} >> *{SG-LINK}, *{SG-LINK, MULT-LINK} >> IDENT{SG-LINK}
Reharmonization will never occur

iii. IDENT{SG-LINK} >> *{SG-LINK}, *{SG-LINK, MULT-LINK} >> IDENT{SG-LINK, MULT-LINK}
Tuvan and Finnish: reharmonization targets everything except disharmonic vowels

4.2. Agreement by Correspondence

The scale-referring constraints described in (10):
- apply to autosegmental representations
- can they be translated into the Agreement by Correspondence formalism? (Walker 2000, Hansson 2001, Rose and Walker 2004)

The equivalent constraints:

(15) Markedness constraints

<table>
<thead>
<tr>
<th>Faithfulness constraints</th>
<th>Preserve non-correspondence between segments</th>
</tr>
</thead>
<tbody>
<tr>
<td>IDENT{NO-CORR}</td>
<td>Preserve non-correspondence between segments and preserve correspondence between segments</td>
</tr>
</tbody>
</table>

Much depends on how the correspondence relation is defined, and what types of segments can intervene between items in correspondence.

A thought experiment: if vowels could be in correspondence across an intervening vowel (a configuration generally disallowed in autosegmental theory), the predictions about reharmonization would be different.

- For the hypothetical Tuvan word mišane, it matters a great deal whether the i and the e are in correspondence or not:

(16) Autosegmental tableau (the two front vowels do not share a node)

(17) Agreement by Correspondence tableau (the two front vowels are in correspondence)

The available evidence appears to favor the autosegmental approach:

(18) Base + reduplicant (Harrison and Kaun 2000:9)

If Correspondence CANNOT be established across an intervening vowel, then the predictions of the two approaches are the same (of course, we would want independent criteria for talking about the nature of Correspondence here in the first place)
• Note that an underspecification analysis makes the same prediction as the Correspondence analysis:
  • ziguli is a front-harmonic word with a disharmonic back vowel
  • for Harrison and Kaun, the word-final [i] should be underlyingly underspecified
  • preservation of [i] is puzzling, then
• Thus, there is no reason to maintain underspecification
  • general principles of the type proposed by de Lacy can be used to account for the behavior of the final vowel in ziguli or in the hypothetical mišane in any case
  • the question of whether the final vowel reharmonizes or not may be used to evaluate autosegmental representation vs. agreement by correspondence

6. CONCLUSION
• de Lacy’s restrictive theory of markedness appears to make correct predictions about the vowel reharmonization anomalies in Tuvan and Finnish: we see PRESERVATION OF THE MARKED
• This approach helps us relate the phenomenon to more basic proposals about the architecture of Optimality Theoretic grammars and the general principles that govern them
• The underspecification analysis is ultimately unexplanatory; it merely restates the problem
• Question for future work: How generalizable are (i) the harmonic scale proposed for autosegmental links/correspondence relations and (ii) the constraints that refer to it? What happens with geminates, nasals, and everything else that is analyzable in terms of such structures?

APPENDIX: Rounding Harmony in Tuvan
Do the autosegmental scale-referring constraints described above apply to rounding harmony?
Caveat: the data on rounding harmony are scanty and there is the specter of “more general restrictions” on the distribution of rounded vowels in the language.
The data in (19) suggest a ranking paradox for rounding nodes:

(19) Base Base + reduplicant
a. ziguli ziguli-ziguli (Harrison and Kaun 2000:9)
b. dersu dersu-dars (repeated from (3a) above)

• In (19a), we appear to have preservation of the singly linked [+round] u
• In (19b), we appear to have reharmonization of the singly linked [+round] u

Is IDENT{SG-LINK} highly ranked for rounding (19a), or does a markedness constraint outrank it (19b)?

Note that the paradox cannot be overcome by assuming that constraints referring to rounding autosegments are independent of those referring to front/back autosegments; the paradox is internal to the analysis of rounding reharmonization.

References