1 Opacity

Kiparsky 1071, 621-2:

(1) A rule $A \rightarrow B / C \_ D$ is opaque to the extent that there are surface representations of the form
a. $A$ in environment $C \_ D$ or
b. $B$ in environment other than $C \_ D$.

McCarthy (1999a, 1), in prose (emphasis in original):

(2) a. Linguistically significant generalizations are often not surface-true. That is, some generalization $G$ appears to play an active role in some language $L$, but nonetheless there are surface forms of $L$ (apart from lexical exceptions) that violate $G$.
b. Linguistically significant generalizations are often not surface-apparent. That is, some generalization $G$ appears to play an active role in shaping the surface form $F$, but the conditions that lead to $G$’s applicability are not apparent from $F$.

Approaches to opacity:

(3) Serial Derivation
   a. Opacity is predicted and expected
   b. To the extent that opacity is marked/infrequent, it is a result of extragrammatical factors (opaque rules are difficult to learn)

(4) Within Optimality Theory
   b. Output-Output Correspondence (Benue 1999)
   c. Paradigm Uniformity (Kenstowicz 1995)
   d. Reference to levels in constraints (McCarthy 1994)
   e. Sympathy (McCarthy 1999b)
   f. Denial of its existence (anyone?)

Significance of “linguistically significant”:

- Most approaches to opacity in the abstract assume that cases from the literature involve well-established phonological generalizations.
- In many cases, however, the putatively opaque processes are subject to reanalysis. The correct phonological generalizations may not involve opacity.

2 Opacities in Tiberian Hebrew

- Classic generative analysis of Tiberian Biblical Hebrew is that of Prince 1975, who outlines a series of ordered rules for deriving the surface forms of the language.
- Prince’s analysis has been adopted almost without alteration in the subsequent literature, particularly in debates about stress (e.g., Halle and Vergnaud 1987) and opacity (e.g., 1998a, Idsardi 1998b; McCarthy 1999b).
- Here I will re-examine the data and show that the generalizations drawn by Prince are inadequate. The correct generalizations involve very little opacity.
2.1 Segholate Epenthesis

(5) Segholate epenthesis (nouns /CVCC/)\(^1\)

\['king' 'young man' 'grass' 'wild ass'\]

\[X\] mēlek nāḥar désē pērē

\['my X' malkî: nafri: dāsāːi: parfī:\]

- Problem for output-oriented constraints: the output has no cluster, hence no reason for epenthesis to have applied. Faithfulness (however low-ranking) should prevent epenthesis.

- Classic case of rule ordering: epenthesis precedes glottal stop deletion.

(6) Ordered rule derivation (Idsardi 1998a, 4):

<table>
<thead>
<tr>
<th>Stress Assignment</th>
<th>/malk/</th>
<th>/dās/?</th>
<th>/gader/</th>
<th>/sabaʔ/</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretonic Lengthening</td>
<td>–</td>
<td>–</td>
<td>ḡaḏēr</td>
<td>ṣāḇāʔ</td>
</tr>
<tr>
<td>Tonic Lengthening</td>
<td>–</td>
<td>–</td>
<td>ḡaḏēr</td>
<td>ṣāḇāʔ</td>
</tr>
<tr>
<td>Epenthesis</td>
<td>mālek</td>
<td>désēʔ</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Vowel Harmony</td>
<td>mēlek</td>
<td>désēʔ</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Spirantization</td>
<td>mēlek</td>
<td>désēʔ</td>
<td>ḡaḏēr</td>
<td>ṣāḇāʔ</td>
</tr>
<tr>
<td>Š deletion</td>
<td>–</td>
<td>désē</td>
<td>–</td>
<td>ṣāḇāʔ</td>
</tr>
</tbody>
</table>

(7) Sympathy (McCarthy 1999a, 22):

<table>
<thead>
<tr>
<th>/dās/?</th>
<th>Max-Complex</th>
<th>Anchor (_{TO}^{*})</th>
<th>Coda-Cond (*? in coda)</th>
<th>Max-(_{TO}^{*})</th>
<th>Dep-(_{TO}^{*})</th>
</tr>
</thead>
<tbody>
<tr>
<td>désē</td>
<td>*!</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>désēʔ</td>
<td>*!</td>
<td>*</td>
<td>√</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>ḡ désēʔ</td>
<td>*!</td>
<td>*</td>
<td>*!</td>
<td>√</td>
<td>*</td>
</tr>
<tr>
<td>ḡ désēʔ</td>
<td>*!</td>
<td>*</td>
<td>*!</td>
<td>*</td>
<td></td>
</tr>
</tbody>
</table>

(8) Criticism:

a. Idsardi (1998a) shows that Sympathy does not work to capture all of the opacities present in a host of segholate examples. These include:

- penultimate stress (usual stress is final)
- lack of tonic lengthening (contrast ḡaḇař ← /dabar/)
- spirantization (mālēk: 'kings of (constr pl)'\(^2\))
- vowel harmony (/malk/ → melek)

b. Ordered rules lack explanatory power (many of them are quite arbitrary, like pretonic lengthening; cf. McCarthy 1981b). We would like to understand why segholates have penultimate stress, and why Tiberian Hebrew has tonic (and pretonic) lengthening, plus usually final stress.

2.2 Prosodic Factors

(9) Prince’s generalizations re: stress, lengthening, reduction:

a. Stress assignment: place stress on the final vowel.

b. Pretonic lengthening: lengthen the vowel of the pretonic syllable if open.

c. Tonic lengthening: lengthen a stressed vowel in an open syllable.

d. Vowel reduction: Prince hypothesizes several different processes of vowel reduction.

Work since Prince’s has recognized the role of prosody in these processes (McCarthy 1979, Rappaport 1984, Halle and Vergnaud 1987).

---

1. Construct left-headed binary feet from right to left for the purposes of stress; a final closed
syllable forms a foot by itself:
\((x)(x)\) \((x)(x)(x)\) \((x)(x)(x)\)
*yiktobu* \(\text{wayyadabberu}^\ast\) \(\text{yaladehem}\)
‘they (M) write’ ‘and they (M) will speak’ ‘their (M) children’
2. Assign main stress to rightmost foot:
\((x)(x)\) \((x)(x)(x)\) \((x)(x)(x)\)
*yiktobu* \(\text{wayyadabberu}^\ast\) \(\text{yaladehem}\)
3. Pretonic lengthening: lengthen pretonic vowel in open syllable
\((x)(x)\) \((x)(x)(x)\) \((x)(x)(x)\)
*yiktobu* \(\text{wayyadabberu}^\ast\) \(\text{yaladehem}\)
4. Construct right-headed binary feet from right to left for the purposes of vowel reduction:
\((x)(x)\) \((x)(x)(x)\) \((x)(x)(x)\)
*yiktobu* \(\text{wayyadabberu}^\ast\) \(\text{yaladehem}\)
\((x)(x)\) \((x)(x)(x)\) \((x)(x)(x)\)
5. Reduce the troughs of these feet if short and in open syllable:
\((x)(x)\) \((x)(x)(x)\) \((x)(x)(x)\)
*yiktobu* \(\text{wayyadabberu}^\ast\) \(\text{yaladehem}\)
\((x)(x)\) \((x)(x)(x)\) \((x)(x)(x)\)
6. Reduced vowels cannot bear stress, so stress shifts:
\((x)(x)\) \((x)(x)(x)\) \((x)(x)(x)\)
*yiktobu* \(\text{wayyadabberu}^\ast\) \(\text{yaladehem}\)
\((x)(x)\) \((x)(x)(x)\) \((x)(x)(x)\)
7. Spirantization and final representation:
[yiktowú:] [wayyadabbarú:] [yaladehém]

- There is no connection between factors inducing pretonic lengthening and vowel reduction.
- There is no connection between conditioning factors for stress and vowel reduction.
- The conditioning factors for stress and PTL, on the one hand, and vowel reduction on the other, are prosodic,
  but require different prosodies.
- Opacity results from ordering:
  (i) PTL precedes and bleeds vowel reduction
  (ii) Vowel reduction causes a stress shift, obscuring “normal” penultimate stress and rendering PTL opaque.

2.3 Critique and New Proposal

Prince’s generalizations are wrong (as are Halle and Vergnaud’s): they miss the prosodic facts.

(11) Real generalizations:

a. Stress: varies between ultima and penult depending on morphological and phonological factors.

b. Pretonic lengthening: misses the fact that alternate syllables are always heavy, and that many pretonic
  vowels reduce rather than lengthen:
  *wayyadabbarú:* *yiqtet:x*
  ‘and they (M) will speak’ ‘he killed you (fs)’

c. Vowel reduction and lengthening are related: alternating pattern typical of iambic stress systems.

(12) Claim: If we examine the surface prosody of Tiberian Hebrew, we find an alternating, iambic pattern that
fits with other iambic systems: lengthening of the head of each foot, and reduction of the trough of each
foot. Once we understand the prosody, we understand why pretonic lengthening takes place where it does
and why pretonic vowels reduce in other contexts.

However, the Segholate nouns do not quite fit into an iambic stress system.

(13) Proposal:
a. Previous treatments of Hebrew (and Semitic generally) have failed to recognize templatic morphology as a driving force behind phonological processes.

b. Previous versions of templatic morphology (e.g., McCarthy 1979, 1981a, 1993) hold templates to be the input to phonological rules; I claim that templates specify output conditions.

c. In the spirit of the Prosodic Morphology hypothesis (McCarthy and Prince 1986, 1988), these output templates are prosodic feet: either iambics or trochees.

d. Templatic feet are the same feet that figure in stress. Changes in syllable structure due to lengthening, reduction, deletion, etc., all drive to best fit the morphologically specified templates.

e. This allows an understanding of vowel lengthening (tonic and pretonic), reduction, deletion, etc. as being driven by the **Iambic-Trochaic Law** (Hayes 1985, 1995; Prince 1990; cf. Kager 1997): iambic feet want to be unbalanced in weight, while trochaic feet want to be balanced.

f. The difference between the Segholates and other nouns is that the Segholates are trochees, while other nouns are iambics. Their phonological differences follow.

g. Side effect: phonological processes turn out to be largely storable as surface-true generalizations.

### 3 Biblical Hebrew Templates: Noun Classes

(14) Vowel System (Malone 1993)

<table>
<thead>
<tr>
<th></th>
<th>1st Declension</th>
<th>2nd Declension</th>
</tr>
</thead>
<tbody>
<tr>
<td>word</td>
<td>‘army’</td>
<td>‘king’</td>
</tr>
<tr>
<td>Sing. abs.</td>
<td>davvăr</td>
<td>šəvə:</td>
</tr>
<tr>
<td>cstr.</td>
<td>davăr</td>
<td>šəvə:</td>
</tr>
<tr>
<td>1s. suff.</td>
<td>dəvər:</td>
<td>šəvə:</td>
</tr>
<tr>
<td>2mpl. suff.</td>
<td>dəvərəxə:</td>
<td>šəvə:</td>
</tr>
<tr>
<td>2mpl. suff.</td>
<td>davarxəm</td>
<td>šəvə:</td>
</tr>
<tr>
<td>Plural abs.</td>
<td>dəvərəm</td>
<td>šəvə:</td>
</tr>
<tr>
<td>cstr.</td>
<td>dəvrə:</td>
<td>švə:</td>
</tr>
<tr>
<td>1s. suff.</td>
<td>davər:</td>
<td>švə:</td>
</tr>
<tr>
<td>2mpl. suff.</td>
<td>dəvərəxə:</td>
<td>švə:</td>
</tr>
<tr>
<td>2mpl. suff.</td>
<td>dəvərəxəm</td>
<td>švə:</td>
</tr>
</tbody>
</table>

---

#### 3.1 The First vs. the Second Declension

- **Final stress**
- **Tonic lengthening**
- **No vowel harmony**
- **Construct**: no pre- or tonic lengthening, V harmonic, reduction

- **Penultimate stress**
- **No tonic lengthening**
- **Vowel harmony**
- **Construct**: no change, Plural: long vowel
- **Suffixed**: no V harmony

### 3.2 Iambicity

- Hebrew stress is usually final (e.g., Prince 1975, McCarthy 1979, Hayes 1980, Rappaport 1984, Halle and Vergnaud 1987, Churchyard 1999), and the final syllable is almost always heavy.

- Iambicity clear in verbs and in First Declension nouns (taking into account final closed syllables).

(16) Verbs:

- (qsə: j)((tąlō: j) ‘she killed’
- (qsəyal j)((tēn j) ‘you (fp) killed’
- (yiq j)((səlu: j)(xēm j) ‘they (m) will kill you (mp)’

---
(17) First Declension nouns:
   a. (da.vɔ.: i)(rì: i) ‘my word’ LH iamb
   b. (da.vɔ.: i)(tə-xɔ.: i) ‘your (ms) word’ LH iamb
   c. (da.var i)(xɛm i) ‘your (mp) word’ LH iamb

(18) Descriptive algorithm for constructing iambs:
   a. A final closed syllable is its own foot.
      qaṭal: ‘she killed’ qaṭal(ten) ‘you (fp) killed’
   b. Build binary right-headed feet from right to left.
      (qa)(talɔ:) ‘she killed’ (qaṭal)(tən) ‘you (fp) killed’
   c. Now reduction and lengthening = trough and head; main stress right.
      (qɔ:)(tɔlɔ:) ‘she killed’ (qaṭal)(tɛn) ‘you (fp) killed’

The Iambic-Trochaic Law (1985, 1995; Prince 1990; cf. Kager 1997) explains alternating reduction and lengthening:

(19) The Iambic-Trochaic Law
   a. Iambic Scale: LH ≫ H, LL, HH
   b. Trochaic Scale: LL, H ≫ HH ≫ HL, LH

Iambs want to be maximally unbalanced: a reduced (lighter than light?) vowel followed by a heavy syllable.

3.3 Analysis: First Declension Nouns

(20) There is a difference between nouns and verbs:
   a. Verbs parse from H to L, such that stem varies in patterns of reduction and lengthening under suffixation:
      /qaṭal/ → (qɔ:)(tɔl:ɔ:) but (qaṭal)(təxɔ:)
      ‘kill’ ‘they killed’ ‘he killed you (ms)’
   b. But 1st and 2nd declension nouns don’t:
      /dabar/ → (da.vɔ:)(rì: i) *(da:)(va:ri: i)
   c. Compare 3rd declension: (qɔ:)(tɔli: i) ‘my killing’ ← /qɔ:tel/

Proposal: 1st declension nouns must conform to an iambic template:

(21) First Declension Noun Template = F_{T}

(22) LEFT ANCHOR: the left edge of the stem must align with the left edge of the prosodic template.

Now right-to-left construction of iambs must be subordinated to templatic requirements.

(23) Optimality-Theoretic Analysis:
   a. TEMPLATE SATISFACTION: A morphological template must be realized in the output.
   b. PARSE SYLLABLE: All syllables in the output must be parsed into feet.
   c. ALIGN FOOT RIGHT: All feet must align with the right edge of the prosodic word. (Assign one violation for each syllable intervening between the right edge of a foot and the right edge of a word.)
   d. WEIGHT-RY-POSITION: A final closed syllable must be parsed as a foot.
   e. TEMPSAT, LEFT ANCHOR, WBP ≫ PARSE-σ ≫ ALIGN-Ft-R

(24) 

<table>
<thead>
<tr>
<th>/dabar/ ‘word’</th>
<th>Temp Sat</th>
<th>Left Anchor</th>
<th>WBP</th>
<th>Parse σ</th>
<th>Align Ft-R</th>
</tr>
</thead>
<tbody>
<tr>
<td>⇒(da:)(vɔ:ri:)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>*</td>
</tr>
<tr>
<td>(da:var:i)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
</tbody>
</table>

(25) 

<table>
<thead>
<tr>
<th>/dabar+i:i/ ‘my word’</th>
<th>Temp Sat</th>
<th>Left Anchor</th>
<th>WBP</th>
<th>Parse σ</th>
<th>Align Ft-R</th>
</tr>
</thead>
<tbody>
<tr>
<td>⇒(da:var:i)(ri: i)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>*</td>
</tr>
<tr>
<td>(da:)(vɔ:ri: i)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>**</td>
</tr>
<tr>
<td>(da:)(var:i)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>***</td>
</tr>
</tbody>
</table>

(Note that final closed syllables are special metrically: force a single foot, but final consonants must be non-moraic (as in other Semitic languages) in order to get vowel lengthening.)
3.3.1 Properties of First Declension Nouns

(26) 1st Declension | 2nd Declension
IAMB | ?
--- | ---
Final stress | Penultimate stress
Tonic lengthening | No tonic lengthening
Pretonic lengthening | No pretonic lengthening
Vowel reduction | No vowel reduction (stressed)
No vowel harmony | Vowel harmony
Construct: no pre- or tonic lengthening | Suffix: no V harmony

(27) Explanations now available:
   a. Final stress: stress is iambic, with main stress on the final foot.
   b. Tonic lengthening: realization of iambicity: the head of each foot must be heavy.
   c. Pretonic lengthening: same explanation. Occurs pretonically only when the final syllable is closed and forms a monosyllabic foot; hence head of penultimate foot abuts head of final foot.
   d. Vowel reduction: troughs of iambic feet reduce as a realization of iambicity.

3.3.2 The Construct

Construct State: noun bears a close syntactic, semantic, and phonological relation to a following noun. Semantic relation: possession/genitive. Phonological: the construct noun is part of the stress domain of the following word:

(28) dāvār ham-nālēx
    word the-king
    ‘the word of the king’

Part of the stress domain = part of the same phonological word.

(29) Weight-by-Position: A final closed syllable must be parsed as a foot.

(30) Final = Final within the phonological word.

(31) | CONSTRUCT | Temp | Left | WBP | Parse | Align |
    | /dabar/ ‘word’ | Sat | Anchor | | σ | Ft-R |
    ┏━━━━┳━━━━┳━━━━┳━━━━┓
    ┃ ⇒(davar) | √  | √   | −   | √  | √   |
    ┗━━━━┻━━━━┻━━━━┻━━━━┛
    | (davar) | √  | √   | −   | √  | *!  |

(Note that now the final consonant counts for weight, since it is no longer final within the prosodic word.)

3.4 Analysis: Second Declension ‘Segholates’

(32) | 1st Declension | 2nd Declension |
    | ‘word’ | ‘army’ | ‘king’ | ‘wonder’ |
    Sing. abs. | dāvār | šāvo | méļeļ | pēļe |
    cstr. | dāvār | šāvo | méļeļ | pēļe |
    1s. suff. | dāvārī | šāvoʔi | malki | pilʔi |
    2ms. suff. | dāvārəxī | šāvoʔəxə | malkaxə | pilʔəxə:/ |
    2mpl. suff. | dāvaxəm | šāvoʔəxəm | malkaxəm | pilʔəxəm |

| IAMB | TROCHEE |
| Final stress | Penultimate stress |
| Tonic lengthening | No tonic lengthening |
| Pretonic lengthening | No pretonic lengthening |
| Vowel reduction | No vowel reduction |
| No vowel harmony | Vowel harmony |

There is evidence that the second vowel in the second declension (the Segholates) is epenthetic (Prince 1975); for example, it’s absent when CC cluster heterosyllabic: mal.ķi: ‘my king’. Underlying form for ‘king’ is then /malk/.
3.4.1 Penultimate Stress and Lack of Tonic Lengthening

We saw that verbs and 1st declension nouns seem to be iambic. In contrast, the Segholates look like a bisyllabic LL trochee:

\[(m\text{\textae}le<\text{x}>)(p\text{\textae}le)\]

**Proposal:** Second declension nouns must conform to a trochaic template, mapped according to LEFT ANCHOR:

\[(34) \quad 2\text{nd Declension Noun Template } = F_T\]

- By the Iambic-Trochaic Law, the optimal trochee is (LL) or (H). We do not expect lengthening since it would result in an unbalanced trochee (HL).

- A monosyllabic heavy syllable is also a well-formed trochee, as in the suffixed forms, where the template is still visible on the left:

\[(35) a. \quad (T \text{ mal})(k\text{i}: i) \text{‘my king’} \quad (T \text{ pil})(\text{i}: i) \text{‘my wonder’} \]
\[b. \quad (T \text{ mal})(k\text{a}:x\text{i}: i) \text{‘your (ms) king’} \quad (T \text{ pil})(\text{a}:x\text{i}: i) \text{‘your (ms) wonder’} \]
\[c. \quad (T \text{ mal})(k\text{a}:x\text{e}m\text{i}: i) \text{‘your (mp) king’} \quad (T \text{ pil})(\text{a}:x\text{e}m\text{i}: i) \text{‘your (mp) wonder’} \]

- The suffix forms an iambic foot on the right edge (general iambicity of Hebrew).

- Main stress goes on the head of the rightmost foot. If most suffixes are footed as iambics while 2nd declension nouns are trochees, we explain unsuffixed penultimate stress and suffixed final stress.

\[(36) \quad *\text{COMPLEX: No complex onsets or codas.}\]

\[(37) \quad \supset \text{ DEP-V: A vowel in the output has a correspondent in the input.}\]

\[
\begin{array}{|c|c|c|c|c|c|c|}
\hline
/\text{malk}/ & ‘\text{king}’ & \text{Temp} & \text{Sat} & \text{Left} & \text{Anch} & \text{Parse} & \text{σ} & \text{Align} & \text{Ft-R} & *\text{Complex} & \text{Dep V} \\
\hline
\Rightarrow (m\text{\textae}l\text{\textae}x) & \checkmark & & & & & & & & & * & \\
\Rightarrow (m\text{\textae}l\text{\textae}x) & \checkmark & & & & & & & & & * & \\
\hline
\end{array}
\]

\[
\begin{array}{|c|c|c|c|c|c|c|}
\hline
/\text{malk+}i:/ & ‘\text{my king}’ & \text{Temp} & \text{Sat} & \text{Left} & \text{Anchor} & \text{Parse} & \text{σ} & \text{Align} & \text{Ft-R} & *\text{Complex} & \text{Dep V} \\
\hline
\Rightarrow (m\text{\textae}l\text{\textae}x) & \checkmark & & & & & & & & & * & \\
\Rightarrow (m\text{\textae}l\text{\textae}x) & \checkmark & & & & & & & & & * & \\
\hline
\end{array}
\]

3.4.2 Epenthesis Even With Glottal Stop Deletion

\[(39) \quad \text{Epenthesis on this view is driven by two factors:}\]

a. \text{*COMPLEX}

b. Prosody: the trochaic template and foot wellformedness

\[(40) \quad \text{The Trochaic Scale: LL, H } \supset \text{ HH } \supset \text{ HL, LH}\]

\[(41) \quad \text{FOOT-MIN: A foot is minimally bimoraic.}\]

\[(42) \quad \text{WT-IDENT (McCarthy 1995):}\]

a. Monomoraic input vowels are monomoraic in the output.

b. Bimoraic input vowels are bimoraic in the output.

\[(43) \quad \text{WT-IDENT } \supset \text{ DEP-V:}\]

\[
\begin{array}{c}
/d\text{abar+xen/ } \rightarrow \text{davarxen ‘your (fp) word’ but}\n/s\text{ot+xen/ } \rightarrow \text{so\textot\texte\texten *so\textot\texten}\n\end{array}
\]

\[(44) \quad \text{CODACOND: No glottal stop in codas.}\]

\[
\begin{array}{|c|c|c|c|c|c|c|c|c|}
\hline
\Rightarrow (\text{pele}) & \checkmark & \checkmark & \checkmark & \checkmark & & & & \\
\Rightarrow (\text{p\textae}l\text{\textae}l) & \checkmark & \checkmark & \checkmark & \checkmark & & & & \checkmark \\
\hline
\end{array}
\]
• (LL) and (H) are both optimal trochees, but (L) is not a valid trochee. Given glottal stop deletion, we must either lengthen the remaining vowel or insert another one. If epenthesis is cheaper in Hebrew than vowel lengthening, epenthesis occurs even in forms with a final glottal stop.

• The conditioning factors are apparent on the surface: prosody. No opacity here.

3.4.3 Epenthesis is Prosodic and Prosody is Morphological

If epenthesis were driven purely by breaking up clusters, we would not expect the existence of forms like the following:

(47) héť ‘sin’ hetʔi: ‘my sin’ hétɔ:ʔim ‘sins’ /hetʔ/

Being underlyingly of the same form as /daʃʔ/ and /pilʔ/, /hetʔ/ should surface in exactly the same way.

(48) héť is simply a member of the first declension, and must conform to an iambic template rather than a trochaic one.

   a. The difference here (not phonological in any relevant respect) shows that surface forms are dictated by arbitrary properties of noun classes: /daʃʔ/ is a member of the class specified to be a trochee, while /hetʔ/ is a member of the first declension, which must be an iamb.

   b. The ordered rule approach would have to divide nouns into declensions and mark the first as being exceptions to epenthesis.

   c. We see both possible responses to Foot-Min: epenthesis and lengthening, conditioned by other factors:

   d. Templatic: The segholates are trochees, while /hetʔ/ is iambic. The best iamb it can form is a single H syllable (lengthening):

(49) DEP-V: A stressed vowel must have a correspondent in the input.

(50)

<table>
<thead>
<tr>
<th></th>
<th>Temp</th>
<th>Left</th>
<th>Dep</th>
<th>Foot</th>
<th>Coda</th>
<th>Parse</th>
<th>Align</th>
<th>Wt-Ident</th>
<th>Dep</th>
</tr>
</thead>
<tbody>
<tr>
<td>/hetʔ/ ‘sin’</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>→ (het)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>(hetɔ:)</td>
<td>✓</td>
<td>✓</td>
<td>*!</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

3.4.4 Vowel Harmony

Hypothesizing the foot structures above, we might expect to find phonological processes that are sensitive to them.

One possibility is vowel harmony.

• Malone (1993) lists processes like the following, all of which amount to regressive vowel harmony:

(51)

   a. General Raising [-high] → [+high] (before [-low])

   e → i

   piro: ‘my fruit’ vs. peryax: ‘thy fruit’

   a → i

   divrè: ‘words (constr)’ vs. dɔ:vɔr: ‘word’

   ə → u

   hukqi:mm ‘statutes’ vs. ḥaq ‘statute’

   b. Middling Assimilation (before ə)

   a → e

   meqex ‘king’ vs. malki: ‘my king’

   c. Checked Middling

   a → e (seems to always be followed by e → i)

(52) Idsardi (1998a): spread [front] and [round] (a → e).

• These processes (which I will not attempt to formalize) all seem to be dependent on foot structure: vowel harmony is confined to spreading of features within a single foot (cf. McCarthy 1979, Idsardi 1998a, who postulate feet different from those used in stress).

(53)

   a. (məqqab) (bəreθ) ‘speaking (fs)’ ← /midabbart/ (transcription from Malone 1993)

   b. (way) (yəreθ) ‘and he exiled’

(54) Since the segholates (second declension nouns) all consist of a single foot in the absolute singular, we see vowel harmony:
a. /malk/ → (mē.lex) ‘king’

b. /rēz/ → (rō.yez) ‘anger, excitement’

But not in the suffixed forms, where a foot boundary is hypothesized to intervene:

a. (mal)(kī:) ‘my king’

b. (ray)(zī:) ‘my anger’

For the same reason, we never see vowel harmony in the first declension singulars and suffixed forms:

3.5 Further Evidence that Feet are Morphological

What we’ve explained so far:

a. Stress: iambic in the 1st declension but trochaic in the 2nd.

b. Tonic lengthening in the first but not in the second declension. Tonic lengthening is nothing more than the desire to create a well-formed foot, which must be heavy if monosyllabic; or to optimize an iamb, which is optimally LH.

c. Patterns of reduction in the first declension: the desire to create an optimal unbalanced iamb.

d. Pretonic lengthening: also a desire for an unbalanced iamb.

e. Lack of vowel harmony in the first declension: foot boundary.

f. Vowel harmony in the second declension: a single trochaic foot.

g. Lack of vowel harmony in suffixed forms (first and second declensions): foot boundary.

Further evidence that footing is morphological (templatic) and specified for each noun class comes from the plurals:

Plurals:

<table>
<thead>
<tr>
<th>1st Dec.</th>
<th>2nd Dec.</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘word’</td>
<td>‘king’</td>
</tr>
<tr>
<td>‘army’</td>
<td>‘wonder’</td>
</tr>
<tr>
<td>Plural abs.</td>
<td>Plural abs.</td>
</tr>
<tr>
<td>davāri:m</td>
<td>malōxi:m</td>
</tr>
<tr>
<td>šāvōʔoʔθ</td>
<td>pāləʔoʔm</td>
</tr>
<tr>
<td>csrt.</td>
<td>csrt.</td>
</tr>
<tr>
<td>divrē:</td>
<td>malxe:</td>
</tr>
<tr>
<td>šīʔoʔθ</td>
<td>pilʔe:</td>
</tr>
<tr>
<td>Is. suff.</td>
<td>Is. suff.</td>
</tr>
<tr>
<td>davaʔay</td>
<td>maləxay</td>
</tr>
<tr>
<td>šīʔoʔθəy</td>
<td>pələʔəy</td>
</tr>
<tr>
<td>2ms. suff.</td>
<td>2ms. suff.</td>
</tr>
<tr>
<td>davaʔəxə:</td>
<td>maləxexə:</td>
</tr>
<tr>
<td>šīʔoʔθəxə:</td>
<td>pələʔəxə:</td>
</tr>
<tr>
<td>2mpl. suff.</td>
<td>2mpl. suff.</td>
</tr>
<tr>
<td>divre:xem</td>
<td>malxe:xem</td>
</tr>
<tr>
<td>šīʔoʔθəxem</td>
<td>pilʔe:xem</td>
</tr>
</tbody>
</table>

Long vowel Long vowel
Vowel harmony (constr) No vowel harmony

Prince (1975) hypothesizes a rule inserting -a- into the segholates in the plural. This misses the generalization that the first and second declensions are conforming to the same template in the plural.

It is evident that the plural imposes an iambic template with a long vowel as second syllable (compare Arabic broken plural; McCarthy and Prince 1990).

The first and second declensions fall together in the plural to the exclusion of the third, indicating again that it is noun classes that are relevant:

The third declension

a. koʔhēn ‘priest’

b. koʔh*ēn:m

c. qoʔtēl ‘killing’

qoʔtēl:m

c. maqaddēs ‘sanctifying’

maqaddē:s:m

4 Conclusion

Advantages of the proposal:

a. Realizing that phonological processes are driven by a desire to optimize foot structure provides an account of those processes as arising from the Iambic-Trochaic Law (Hayes 1985, 1995; Prince 1990):

b. Patterns of reduction and lengthening are all driven by well-formedness conditions on feet: that iamb be unbalanced and trochees balanced.
c. Once we understand the foot structure, we see that reduction and lengthening mostly optimize iambics by making them unbalanced. Conversely, lengthening does not occur where trochees must be optimized.
d. Crucial differences between declensions follow from their being specified to be different types of feet in the output.
e. The correct foot structure explains other segmental processes that are sensitive to metrical feet, such as vowel harmony.
f. There is no need to postulate different planes of metrical structure, as in McCarthy (1979), Rappaport (1984), and Halle and Vergnaud (1987). The postulated feet figure in all processes: stress, reduction, lengthening, deletion, vowel harmony.

(65) Opacity:

a. Once we recognize the templatic nature of Hebrew, we see that ephenthesis in the segholates is driven not just by breaking up illicit clusters, but by the desire to achieve an optimal foot (the template). Thus the context for ephenthesis is always surface true in Hebrew.
b. Vowel harmony, reduction, lengthening, and stress assignment are all governed by surface footing. The context for these processes are also surface true in Hebrew.
c. Conclusion: A reanalysis of "linguistically significant" phonological generalizations can lead to a deeper understanding of the forces at work, and can even (as here) lead to opacity vanishing.

References


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