Tiberian Hebrew: Opaque, or Simply Abstract?
MOT - McGill University - February 6, 1999

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• The traditional analysis (Gesenius 1910, Prince 1975, Malone 1993) of Tiberian Hebrew segholate forms such as [*deše*] 'grass,' which is based on opaque rule ordering, is problematic within derivational theory.
• Optimality Theory, which resists opacity, should suggest a new analysis of these forms.
• This new analysis is a viable approach to Tiberian Hebrew, in either OT or rule-based theory, and has the potential to shed light on other problematic forms in the language.

1. Why *deše* has been problematic in rule-based theory

The rules:

Epenthesis	inserts [e] to break up tautosyllabic consonant clusters
ʔ-Deletion	deletes /ʔ/ from codas
Guttural Lowering	lowers short vowels to [a] when next to gutturals /ħ ʕ ʔ h/

The opacity:

(1)

		'grass'	'king'	'seed'
	UR	/dašʔ/	/malk/	/zarħ/
	Epenthesis	dešeʔ	melek	zereħ
	ʔ-Deletion	deše	——	——
	Lowering	——	——	zeraħ
	SR	[deše]	[melek̲]	[zeraħ]

In the case of *deše*, Epenthesis and ʔ-Deletion apply in counter-bleeding order.

The problem:

In *deše*, ʔ-Deletion appears to bleed Guttural Lowering. This is not true in the verbs:

(2) √*mṣʔ* 'find' Qal Imperfect 3 masc. sg. [*yimṣaː*]

UR	/yamṣoʔ/
Lowering	yamṣaʔ
ʔ-Deletion	yamṣa
Compensatory Lengthening	yamṣaː
SR	[yimṣaː]

Applying this rule ordering to the nouns incorrectly predicts [*deša]; applying the noun ordering to the verbs incorrectly predicts [*yimṣoː].

Analyzing /dašʔ/ → [deše] as epenthesis followed by deletion provides a good account for the segholate nouns; however, the ordering of ʔ-Deletion and Guttural Lowering is not consistent across syntactic categories.

2. Why *deše* has been problematic in Optimality Theory

McCarthy (1998) argues that conventional OT cannot deal with *deše* because it is opaque:

The constraints:

> *COMPLEX   penalizes tautosyllabic consonant clusters
> ANCHOR   The output correspondent (if any) of a root-final input
>   consonant must be final in some syllable.
> CODACOND   penalizes ʔ in coda
> MAXC   penalizes consonant deletion
> DEPV   penalizes vowel epenthesis

The problem:

(3)   Adapted from McCarthy (1998: 22)

/deš ʔ/	*COMPLEX	ANCHOR	CODACOND	MAXC	DEPV
deše				*	*!
☞ *deš*				*	
dešʔe		*!			*
dešeʔ			*!		*
dešʔ	*!		*		

Under any possible ranking of these constraints, [*deše*], which involves epenthesis (violating DEPV) and deletion (violating MAXC) will be less optimal than [*deš*], which violates only MAXC. If the /ʔ/ is not present in the output, there is no need for the [e].

3. What OT should tell us about *deše*

McCarthy lets the opacity analysis of [*deše*] (among others) lead him to add Sympathy theory to OT so that it can mimic the effects of intermediate forms in derivational theory. But why not let the limitations of OT lead us to reconsider the original analysis of [*deše*] as an opaque form? Suppose we add another candidate to the tableau from (3):

(4)

/deš ʔ/	*COMPLEX	ANCHOR	CODACOND	MAXC	DEPV
☞ *deše*					

2

The new candidate, [*deše*], violates none of the constraints, and is therefore optimal under any conceivable ranking of them. Moreover, it happens to be the attested output.

What makes the [*deše*] in (4) better than the [*deše*] in (3)? In (4), the final [e] is in a correspondence relationship with the input /ʔ/. Therefore, there is neither epenthesis nor deletion, only a change in featural specifications. (This change would, of course, violate other faithfulness constraints not shown in (3) and (4).) This analysis is similar to Baković's (1998) treatment of /r/ in Eastern Massachusetts English.

Is this a real analysis, or are we just playing around with correspondence theory?

Motivation:

- • Roots enjoy a privileged status in Tiberian Hebrew (cf. McCarthy's Anchor constraint);
- • However, the features of ʔ are not allowed to surface in coda position;
- • Therefore, final /ʔ/ in forms like [*deše*] must change its features in order to be realized.

In addition, the metamorphosis analysis formalizes the functional explanation for the presence of the final [e] in [*deše*]: recoverability. The presence of the [e] is what alerts hearers to the existence of a third underlying root consonant.

4. What else this analysis could explain

Compensatory lengthening

'Deletion' of ʔ results in compensatory lengthening of a preceding vowel in [*yimṣaː*], as seen in (2) (repeated here as (5)):

(5) √*mṣʔ* 'find' Qal Imperfect 3 masc. sg. [*yimṣaː*]

UR	/yamṣoʔ/
Lowering	yamṣaʔ
ʔ-Deletion	yamṣa
Compensatory Lengthening	yamṣaː
SR	[yimṣaː]

In [*deše*], however, there is no compensatory lengthening of the supposedly epenthetic [e]. These facts are easily explained if epenthesis+deletion is reanalyzed as metamorphosis:

(6)

UR	/dašʔ/	/yamṣoʔ/
Lowering	——	yamṣaʔ
ʔ-Vocalization	dešV	yamṣaV
SR	[deše]	[yimṣaː]

The process of ʔ-Vocalization changes ʔ into an unspecified vowel, preserving only its timing slot. In [*deše*], this V is realized as the unmarked vowel [e]; in [*yimṣaː*], it is realized as a lengthening of the preceding [a]. Note also that the problem of ordering Guttural Lowering and ʔ-Deletion is resolved: ʔ does not lower the final [e] in [*deše*] because it *becomes* the final [e] in [*deše*].

Alternation between y and i

ʔ is not the only root consonant in TH that can turn into a vowel. Note the alternation between [y] and [i] in the forms in (7), which are 3-y analogues of the segholates in (1):

(7)   √*pry*   [*pəríː*]   'fruit'   [*piryóː*] 'his fruit'
         √*ḥly*   [*ḥŏlíː*]   'sickness'   [*ḥolyóː*] 'his sickness'

Like ʔ, y can turn into a vowel if it cannot be syllabified as a consonant. Unlike ʔ, however, the features of y can be realized in the rhyme of a syllable. Thus underlying /y/ in [*pəríː*] and [*ḥŏlíː*] surfaces as its high front vocalic counterpart [i], which can bear stress and be lengthened.

Further C~V alternations

In other cases, the features of /y/ cannot be preserved, as in the imperfect 3 fem. plural forms in (8):

(8)   √ktb 'write'   √*mṣʔ* 'find'   √bny 'build'
Qal   [*tiktóːbnaː*]   [*timṣénaː*]   [*tibnénaː*]
Pual   [*təkuttábnaː*]   [*təmuṣṣénaː*]   [*təbunnénaː*]

In the forms with ʔ and y, the underlying vowel melody (seen in the well-behaved √ktb-forms) cannot be fully inserted for some (morphophonological) reason. In order to be syllabified, ʔ and y must turn into vowels. However, because vowel melody is significant in these forms (as it is not in [*pəríː*] and [*ḥŏlíː*] above), the y cannot retain its vocalic features. Instead, both y and ʔ are realized as the unmarked vowel [e].

The difference between epenthetic vowels and vocalized consonants

Two different forms are attested for the Qal Converted Imperfect 3 masc. sg. of √bny:

(9) a.   *way*   +   *yí*   +   *ben*   *ʔet* -   *niːnwéː*
          and   3m.s.   built   acc.   Nineveh
          'he built Nineveh'   (Genesis 10:11)

     b.   *way*   +   *yi*   +   *bné*   *ʔet* -   *haː* +   *ʕíːr*
          and   3m.s.   built   acc.   def.   city
          'he built the city'   (Joshua 19:50)

The [e] in (9a) behaves like an epenthetic vowel: it appears before a root consonant rather than at the end of the word (recall McCarthy's Anchor constraint), and it does not bear stress. The [e] in (9b), on the other hand, occurs at the end of the word and bears stress (yet does not undergo final lengthening or tonic lengthening).

These two forms represent two different ways of resolving the unsyllabifiable sequence /bny/; they suggest that there is a real difference between vocalization of a root consonant and deletion of a root consonant accompanied by epenthesis of a vowel. In (9a), the /y/ is deleted and an epenthetic [e] is inserted between the /b/ and the /n/, so as to maintain a radical at the right edge of the word. In (9b), the /y/ is instead converted into [e], and as it is the reflex of a radical, it is permitted to end the word.

5. Conclusions

• A non-opaque analysis of consonant-vowel alternations in Tiberian Hebrew explains *deše* and may explain other problems in TH as well.
• Although prompted by the predictions of a strong version of OT, this analysis is equally viable in either a rule-based or a constraint-based phonological framework.
• The representation of abstract characteristics (i.e., the phonetically invisible aspects of phonological entities) is crucial to any analysis of TH.

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