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Vowel reduction in Old English

Overview:

- In Old English, an original unstressed **ō* is in some morphological categories reflected as variation between *u* and *a*.
- The traditional explanation is that **ō* generally developed to *a*, but developed to *u* when the following syllable also had a **u*.
- My hypothesis is that **ō* reduced to *u* in medial syllables due to the short duration of such syllables.
- A statistical study of an Old English corpus strongly supports my new hypothesis, and finds no support for the traditional explanation.

1 van Helten's rule

An original unstressed **ō* generally develops to *a* in Old English:

(1)

Proto-West-Germanic		Old English	
**dagōs*	>	*dagas*	'days'
**glōfōz*	>	*glōfa*	'gloves'
**wundōþi*	>	*wundaþ*	'woundeth'
**tungōni*	>	*tungan*	'tongue'

In the past tense forms of *ō*-verbs, however, both *u* and *a* are found as reflexes of the original unstressed **ō*:

(2)

Pret.	*andswar**u**de*	~	*andswar**a**de*	'answered'
Pret.	*syng**u**de*	~	*syng**a**de*	'sinned'
Perf.	*wund**u**d*	~	*wund**a**d*	'wounded'
Perf.	*bisg**u**d*	~	*bisg**a**d*	'busied'

According to van Helten (1891), the **ō* was raised to *u* when the following syllable also contained a **u*:

(3)

	Proto-West-Germanic		Old English	
Pret.3.sg.	**wundōdē*	>	*wundade*	'wounded'
Pret.3.pl.	**wundōdun*	>	*wundudun*	'wounded'

This process predates Old English, so it applies even if the following **u* should later be lost:

(4)

	Proto-West-Germanic		Old English	
Perf.m.nom.sg.	**wundōdaz*	>	*wundad*	'wounded'
Perf.f.nom.sg.	**wundōdu*	>	*wundud*	'wounded'

(5) All the main grammars of Old English accept van Helten's rule (Bülbring 1902, Luick 1921, Girvan 1931, Kieckers 1935, Campbell 1959, Brunner 1965, Hogg 1992, Hogg & Fulk 2011).

(6) The rigid system predicted by van Helten's rule in (3) and (4) is not what we find in Old English. As seen in (2), there is much variation between *u* and *a*.

(7) The system in (3) and (4) must therefore represent 'very early Old English' (i.e. before the language is attested in manuscripts).

(8) The actual attested variation seen in (2) is due to a later generalization of *u* and *a* within the paradigm (Luick 1921, Girvan 1931, Kieckers 1935, Campbell 1959, Brunner 1965, Hogg 1992, Hogg & Fulk 2011).

2 Testing van Helten's rule

(9) If van Helten's rule is correct, we would expect to find *u* more often in those forms where an original **u* followed than elsewhere.

(10) All past tense forms of *ō*-verbs ($n = 457$) were gathered from the manuscript Hatton 20 (Sweet 1871):

- Written in Old West Saxon ('standard' Old English) around 890.
- The largest early Old English text (67,835 words).

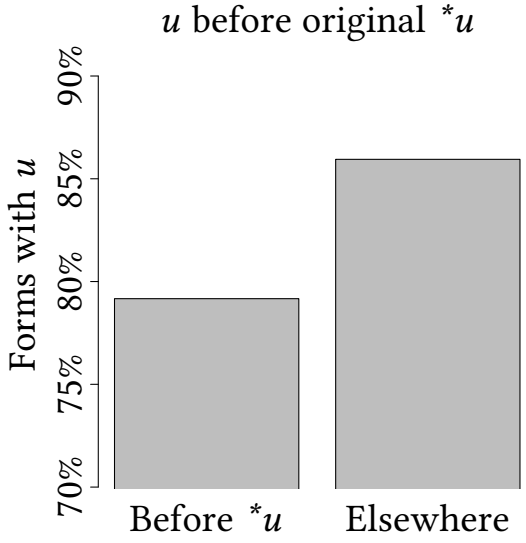

Fig. 1: van Helten's rule

Results:

(11) The *u* is not more common before an original **u* than elsewhere. It is actually *less* common in this position.

(12) This difference is nevertheless not significant (mixed effects logistic regression, $p = .34$).

Conclusion:

(13) van Helten's rule does not explain the distribution of *u* and *a* as the reflexes of original **ō*.

3 Vowel reduction

3.1 Vowel duration & position

(14) Unstressed vowels are shorter than stressed vowels (Fry 1955).

(15) Unstressed vowels are shorter in medial syllables than in final syllables (Delattre 1966) :

- ['mak**a**t] > ['mak**a**tan]

3.2 Vowel duration & vowel height

(16) The articulators need to travel a longer distance for low vowels than for high vowels (Lindblom 1967).

(17) High vowels are shorter than low vowels (Lehiste 1970):

- [a] > [u]

3.3 Vowel duration & vowel raising

(18) The shorter the vowel, the less time the articulators have to reach their targets.

(19) Since low vowels require more time to be articulated, unstressed low vowels tend to raise when their duration decreases (Lindblom 1963):

- $\xrightarrow[\text{[ɑ] > [ɔ] > [o] > [u]}]{\text{Less time}}$

4 New hypothesis

Applying the findings in Section 3 to Old English:

(20) Vowels are shorter in medial syllables (15):

- *wund**V̆**de* – *wund**V**d* 'wounded'

(21) Shortened vowels tend to raise (19):

Proto-West-Germanic		'Proto-Old-English'		Old English
**wundōdē*	>	**wundŏde*	>	*wundude*
**wundōdu*	>	**wundod*	>	*wundad*

New hypothesis:

(22) The vowel *u* should be more common in medial syllables than in final syllables.

(23) Distribution of *u* according to syllable position in the same corpus as in (10):

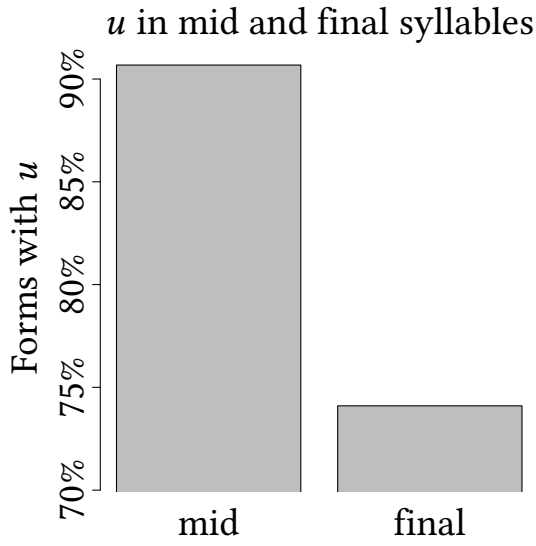

Fig. 2: New hypothesis

Results:

(24) The *u* is significantly more common in medial syllables than in final syllables ($p = .001$).

Conclusion:

(25) The distribution of *u* lends support to the hypothesis that it is the result of vowel raising in shortened medial syllables.

5 Vowel reduction and phonology

How do we explain the connection between vowel shortening and vowel raising?

(26) 'Evolutionary Phonology'

- Articulatory origin: The physiological difficulty of producing shortened low vowels causes the articulators to miss their target (Lindblom 1963).
- Perceptual origin: Listeners are aware that high vowels are shorter than low vowels (Gussenhoven 2004), which causes them to misperceive a shortened vowel as a higher vowel (cf. Hillenbrand et al. 2000).
- Listeners reanalyze the raised vowel as the intended grammatical output (cf. Ohala 1981).

(27) 'Functional Phonology'

- The grammar instructs the speaker to raise shortened low vowels in order to minimize articulatory effort (Flemming 2004).

(28) Both approaches predict that shortened low vowels will show a tendency to raise, so the choice between them should be based on general methodological principles.

6 Conclusion

(29) An original unstressed **ō* generally develops to *a* in Old English. In some cases, however, it gives *u* in variation with *a*.

(30) The traditional explanation (van Helten's rule) is that **ō* developed to *u* when another **u* followed in the next syllable.

(31) I have suggested that the development to *u* is the result of vowel raising in shortened medial syllables.

(32) A statistical analysis of Old English forms strongly supports my hypothesis, and finds no support for the traditional explanation.

(33) The exceptional development of *$\bar{o}$ to *u* in Old English can thus be explained by a well-established connection between vowel shortening and vowel raising.

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