Phonotactically probable word shapes represent attractors in the evolution of sound patterns

Keywords: word frequencies, cultural evolution, open syllable lengthening, Middle English, sound change

Speakers are sensitive to the relative frequency of phonotactic patterns in the lexical inventory (Wedel 2006, Blevins 2009, Mailhammer et al. 2015). When words have phonotactically probable sound shapes, they are recognised (Kelley & Tucker 2017) and learnt more easily (Storkel 2001) and produced more accurately (Goldrick & Larson 2008). Thus, we hypothesize that word forms with highly probable shapes have a selective advantage, function as attractors in the cultural evolution of sound patterns (Blevins 2009), and favour sound changes that (re-)produce these shapes.

We tested if this hypothesis correctly predicted the implementation pattern of Middle English Open Syllable Lengthening (OSL; Luick 1914-20), a sound change lengthening short vowels. Crucially, OSL is consistently reflected only in originally disyllabic words that had non-high vowels such as /a/, /o/ or /e/, and that lost their second syllables due to unstressed-vowel loss. Typical examples are *name* or *hope*, which changed from /namə/ to /naːm/ and from /hopə/ to /hɔːp/. We investigated the hypothesis that OSL made the newly emerging monosyllables conform, in terms of syllable weight and prosodic structure, to the most frequent and thus most probable monosyllabic word forms that already existed at the time of the change. Therefore, we predicted that the majority of pre-OSL monosyllables should have been 'heavy', i.e. have a long vowel (e.g. /mo:d/ *mood*) or end in a consonant cluster (e.g. /lænd/ *land*). Conversely, only a minority of words should have been 'light' and have a short vowel (e.g. /god/ *god*).

To test this, we used Early Middle English corpus data from the LAEME corpus (Laing 2013), which covers the relevant period (1100-1350) and is lemmatised and grammatically tagged at high detail. First, we extracted all monosyllabic nouns, verbs and adjectives that were not outputs of OSL (n = 10,263). Then, we categorized them with regard to their metrical weight and prosodic structure into words of (a) the /mo:d/-type, (b) the /lænd/-type, and (c) the /god/-type. Next, we (a) identified the height of their vowels, and (b) counted their type and token frequencies.

We found that light /god/-type forms were indeed significantly less frequent than heavy /mo:d/-type and /lænd/-type forms (proportions with 95% confidence intervals below 50%; Fig. 1). If only /mo:d/-type and /god/-type items are compared, the same holds true, but crucially only for words with non-high vowels. If their vowels were high (as in /sin/ *sin*), /god/-type items were not less frequent than /mo:d/-type items (Fig. 2).

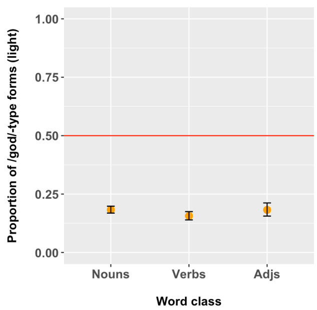

Figure 1. Proportion of /god/-type forms (light) vs. /mo:d/-type and /lænd/-type (heavy) forms. Error bars represent 95% confidence intervals.

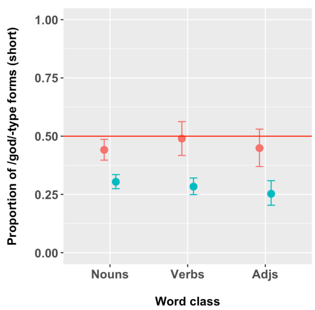

Figure 2. Proportion of /god/-type (short) vs. /mo:d/-type (long) forms among words with high vowels (red) and non-high vowels (green). Error bars represent 95% confidence intervals.

The consistent lengthening of non-high vowels – but not of high ones – in the emerging monosyllables thus increased the number of words with phonotactic patterns that had already been in the majority before. This suggests that learning and production biases in favour of phonotactically probable word shapes select for majority types in the cultural evolution of sound patterns. If the high probability of a sound pattern results from selection itself, however, it is difficult to disentangle the selective effects of its probability from the effects of the factors that increased its probability initially. This is interesting for further research.

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