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Research Article

Gradual or abrupt? The phonetic path to morphologisation

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ABSTRACT

While some sound changes occur in environments defined in purely phonological terms, others may become sensitive to morphological boundaries. In this paper, we investigate the phonetic nature of this latter diachronic development: does it happen through small gradient increments, or is there a categorical shift from one allophone to another? We focus on GOOSE-fronting and /l/-darkening in Southern British English, the interaction of which is sensitive to morphological boundaries. Relatively retracted realisations of the vowel and dark realisations of the /l/ appear before a morpheme boundary, even when a vowel follows (e.g. *fool-ing*), whereas in monomorphemic words (e.g. *hula*), there is more /uː/-fronting, and the /l/ is relatively lighter. We analyse the phonetic realisation of such pairs as *hula* vs. *fool-ing* in 20 speakers of Southern British English using both acoustic and articulatory (ultrasound) instrumental methods. All the speakers express the morphological contrast in some way, although effect sizes vary dramatically. For some speakers, the contrast involves subtle articulatory differences without any clear acoustic consequences, whereas other speakers show robust differences employing multiple phonetic correlates. We therefore argue that the *hula*∼*fool-ing* contrast would be misrepresented if analysed in terms of a small number of either /uː/ or /l/ allophonic categories. Instead, we interpret the results as supporting the predictions of phonological frameworks that incorporate phonetically-gradient morphologisation.

1. Introduction

At some point of their development, sound changes may start showing morphological effects. For example, in most modern-day English dialects, /g/ has been lost from /ŋg/ clusters at the end of the word (*sing*), as well as preceding a morpheme boundary (*sing-er*), yet /g/ is still pronounced before a vowel when no morpheme boundary intervenes (*finger*). Similar cases of morphological conditioning abound in English dialects, affecting for instance, /l/-darkening in American English (Boersma & Hayes, 2001; Lee-Kim, Davidson, & Hwang, 2013) and the Scottish Vowel Length Rule (Aitken, 1981; Scobbie, Turk, & Hewlett, 1999; Scobbie & Stuart-Smith, 2008). What has been a topic of debate is whether morphological effects are pervasive in language, or whether they only emerge at a defined point once a sound change is firmly established.

So far, empirical observations concerning morphological constraints on phonological processes have only been made for relatively advanced sound changes. Some authors explicitly argue that this is not coincidental, and that morphologisation is a late development in sound change (Bermúdez-Otero & Trousdale, 2012; Ramsammy, 2015).[1] This argument grows out of a modular view of grammatical architecture, in which sound change is analysed as a progression through grammatical hierarchy, involving some abrupt categorical shifts. In this architecture, morphological information is not accessible to phonetics, and therefore the prediction follows that a sound change in its earliest phases cannot be sensitive to morphological boundaries, but must be purely phonetic, sensitive to at most a phonological environment. A gradient phonetic process may, however, undergo stabilisation, where it is re-interpreted as a phrase-level categorical rule that computes phonologically distinct allophones. It is then and only then that further change might occur, restricting the domain of the rule application to progressively more narrow domains. For instance, a rule may progress from being phrase-final to being word-final (this change is called domain narrowing I in Bermúdez-Otero & Trousdale's life-cycle model),

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[1] We use the term 'morphologisation' referring to the emergence of morphological effects in sound change, such as the difference between monomorphemic *finger* and morphologically complex *sing-er*. Note that this is different from the terminology used by Bermúdez-Otero and Trousdale (2012) and Ramsammy (2015), who call this change 'domain narrowing II'.

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and subsequently, also to being morpheme-final (domain narrowing II). The second stage of domain narrowing may result in fuzzy contrasts, such as *finger*∼*sing-er*, but crucially, the final /g/ in *sing* must have been subject to categorical deletion before the *finger*∼*sing-er* contrast appears, because phonetics-morphology interactions are necessarily mediated via intermediate phonological representation. Note that this prediction is not unique to the model developed by Bermúdez-Otero and Trousdale (2012) and Ramsammy (2015). Rather, the model is consistent with more general predictions concerning the absence of morphology-phonetics interactions that follow from modular approaches to grammatical architecture (e.g. Levelt, Roelofs, & Meyer, 1999; see also Kiparsky, 1985 for discussion on modularity effects and distinction between lexical and post-lexical phonology).

In contrast, proponents of an alternative, non-modular, view of grammatical architecture have challenged the prediction concerning the absence of direct interaction between morphology and phonetics. Bybee (2001) argues for a model where the phonetic realisation of words can be encoded as a cloud of variants associated directly with each lexical item, which may, moreover, be more or less explicitly compositional in the way it encodes morphological relationships, rather than being computed from a phonological representation derived in its turn by a system of morphological combinatorics. Apparent structural effects follow from connections between related words. For instance, the diachronic deletion of /g/ in *singer* would be attributed to analogy or shared activation (*sing-er* being in the same paradigm as *sing*), rather than to the presence of a morphological boundary. An important aspect of this proposal involves the storage of phonetic detail for individual words. The combination of such concept of storage and the nature of lexical analogy yields a prediction that apparent morphological effects may emerge at any point in sound change. Bybee (2001, p. 68) makes this explicit, stating that "(…) morphologization occurs very gradually and much earlier than generally supposed". Bybee's comment on early morphologisation alludes to the possibility that morphological effects may initially be too small to be immediately observable, in either absolute or relative terms.

We have already mentioned that morphological effects have so far only been reported for relatively advanced sound changes. However, it is not entirely clear whether this is really a matter of morphological effects first appearing, or morphological effects becoming big enough for native speakers, or linguists, to notice. The majority of the documented cases of morphologisation rely on transcription data, which are limited by the categorical nature of segmental broad transcription, by categorical speech perception and meta-phonological awareness. Therefore, we must also consider the possibility that morphological structure may interact with small-scale phonetic processes, but that those interactions are not very prominent, and as such they are missed by linguistic descriptions.

A considerable body of research has developed in this particular area, but the results so far remain inconsistent. There is some evidence that the presence of a morphological boundary may increase acoustic duration of the preceding rhyme, although Sugahara and Turk (2009) only observe this effect in slow speech. Similarly, the duration of the plural suffix in English has been reported to differ from the duration of word-final /s,z/ in monomorphemic words. Note, however, that while Song, Demuth, Evans, and Shattuck-Hufnagel (2013) report increased duration for the suffix, Plag, Homann, and Kunter (2015) find the opposite effect. For Korean, Cho and Keating (2001) report increased variability in gestural timing in morphologically complex words compared to monomorphemes. Beňuš (2012) presents evidence that yer vowels in Slovak, i.e. vowels that alternate with zero within the morphological paradigm, are phonetically weaker than non-yer vowels that are not subject to similar alternations. Song, Demuth, Shattuck-Hufnagel, and Ménard (2013) find evidence of tongue lowering during /k/ in monomorphemic *box*, compared to bimorphemic *rocks*, a difference they ascribe to increased anticipatory co-articulation in tautomorphemic clusters. However, it has to be noted that pairs such as *box* and *rocks* also differ in their lexical frequency (*rocks* is overall more frequent), in orthography (*rocks* is spelled with more letters), and in their onset consonant. All of these factors may exert subtle effects on articulation. In an articulatory study that controlled for frequency, spelling and segmental effects through use of nonce words, Mousikou, Strycharczuk, Turk, Rastle, and Scobbie (2015) do not find evidence for increased coarticulation in tautomorphemic clusters compared to heteromorphemic ones, although the authors express reservations about the validity of their null result, given some limitations in statistical power.

Potential confounds make it challenging to study the effect of morphology on pronunciation, especially since the putative morphological effects may be very small. Sound change in progress is an important source of evidence in this context, since effect sizes are by definition on an increasing trajectory in sound change. In addition, competing theories of grammatical architecture make diverging predictions concerning the phonetic nature of ongoing morphologisation. We shall illustrate this, using an example from GOOSE-fronting before /l/ which leads to a difference in the degree of fronting in words such as monomorphemic *hula* and morphologically complex *fool-ing*.[2] The GOOSE vowel has been undergoing fronting in numerous dialects of English, including the varieties treated as standard in England (Bauer, 1985; Hawkins & Midgley, 2005; McDougall & Nolan, 2007; Harrington, 2007, Harrington, Kleber, & Reubold, 2008; Chládková & Hamann, 2011). However, this fronting process has apparently not occurred in words where the GOOSE vowel is followed by a coda /l/, such as *fool*. Furthermore, similar blocking of GOOSE-fronting has also been noted preceding morpheme-final /l/, e.g. in *fool-ing* (see below). In contrast, GOOSE-fronting has affected words where the following /l/ is not morpheme-final, e.g. in *hula*.

According to non-modular views of grammatical architecture, the morphologically-conditioned difference in the degree of GOOSE-fronting between *hula* and *fool-ing* may be present as soon as any degree of GOOSE-fronting occurs in *hula*. This is because vowel fronting in *fool-ing* will be partially limited through analogy to *fool*, where the fronting does not apply, due to presence of a dark /l/ in the syllable rhyme. In terms of segmental and prosodic context however, *fool-ing* is more similar to *hula* than to *fool*, as the /uːl/ sequence occurs word medially before a vowel. These opposing influences may create intermediate fronting in morphologically

[2] Although we use the specific example of GOOSE-fronting, the predictions hold for the development of any phonetic category, and they also extend to /l/-darkening, which we shall discuss in more detail in Sections 3 and 4. Note that the interaction between /l/-darkening and GOOSE-fronting makes the *hula*∼fool-ing case more complex than cases like *finger*∼*sing-er* or other morphologically-conditioned contrasts we are familiar with.