How real are acoustic differences between different types of final /s/ in English? Evidence from pseudowords

Recent research suggests that homophonous morphemes show systematic differences in their phonetic realization (e.g. Seyfarth et al. 2017, Plag et al. 2017). Such findings contradict basic assumptions of standard feed-forward theories of morphology-phonology interaction (e.g. Kiparsky 1982) in which morphological information is only available at the lexical level. All further phonological processes occur at the post-lexical level, which has no access to morphological information.

A good test case for this distinction is English, which has a number of bound {s} morphemes; plural, genitive, genitive plural, 3rd person singular, the clitics of *is* and *has*, and the pronoun *us*. Previous research on this question found durational differences in the realization of these types of {s}; however, there is no agreement on the nature of these differences. Experimental studies, for example Walsh & Parker (1983) and Seyfarth et al. (2017) for NAE, found non-morphemic realizations to be shorter than plural and 3rd person singular /s/. In contrast, corpus studies on NZE (Zimmermann 2016) and NAE (Plag et al. 2017, Tomaschek et al. 2019) find results of the opposite direction for unvoiced realizations: the duration of /s/ is longest in non-morphemic contexts, somewhat shorter with suffixes, and shortest in clitics. As the aforementioned experimental studies show several flaws, e.g. no use of proper statistical methods (Walsh & Parker 1983) or a lack of differentiation between voiced and unvoiced variants of {s} (Seyfarth et al. 2017), there is need for carefully controlled experimental data to shed more light on the realization of morphemic and non-morphemic {s}.

Previous studies have suffered from the potentially confounding effects of the lexical and contextual properties of the items under investigation, e.g. potential storage effects (e.g. Caselli et al. 2016). To address this concern, the present study uses pseudowords to study the phonetic properties of different types of {s}. We tested whether there are durational differences between non-morphemic, plural, and the *is*-clitic /s/. A production study with forty native speakers of Southern British English was carried out, adopting Berko-Gleason's (1958) pseudoword paradigm. Speakers produced almost 1500 pertinent forms in a sentence production task with carefully controlled stimuli.

Linear mixed effects regression analyses show two main results. First, significant differences in duration between the different types of /s/ are only found in targets followed by a pause. In this environment, non-morphemic /s/ is longest, plural /s/ is shorter, and the *is*-clitic /s/ is shortest. This pattern is the same as that of previous corpus studies, and differs from the previous experimental results.

The results can be interpreted as follows. Differences in duration are subtle and seem to be only strong enough to be clearly observable in environments where final segments are lengthened (as before a pause). Where the differences are observable, pseudowords behave like real words in conversational speech, that is as shown in the corpus studies mentioned above. This means that pseudowords are subject to the same paradigmatic and contextual effects that have been discerned by Tomaschek et al. (2019) for real words.

The present study is the first study to show differences in duration of types of /s/ by utilizing pseudowords. By this, we can show that durational differences of types of /s/ appear to be of a robust morphological nature rather than a by-product of confounding effects of storage.

Hence, morphological information must be accessible in later stages of speech production, calling for a revision of standard feed-forward theories of morphology-phonology interaction.

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