Morpho-phonetic detail can be perceived: Evidence from stems and suffixes

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Recent research has shown that phonologically identical morphological entities in English show systematic differences in their phonetic realization. For example, word-final /s/ is longest in non-morphemic contexts, shorter with suffixes, and shortest in clitics (e.g. Plag et al. 2017, Schmitz et al. 2021) and the stems of morphologically complex words ending in /s/ or /z/('S') have different acoustic properties than stems of monomorphemic words (Seyfarth et al. 2017, Engemann & Plag 2021). However, it is still largely unclear whether listeners can make use of the morphological information that is part of the signal. The perceptual threshold for durational differences in /s/ and /ʃ/ has been estimated for some environments at about 25 to 30 ms (e.g. Klatt & Cooper 1975, Shatzman & McQueen 2006), but there is no study available that tested whether this also holds for final S. The answer to this question is relevant for theories of speech perception, in particular the question whether (or how) subsegmental information may influence lexical access (e.g. Cho et al. 2007, Christophe et al. 2004, Goldinger 1996).

Kemps et al. (2005a, 2005b) and Blazej & Cohen (2015) showed that listeners are sensitive to the acoustic correlates indicating whether a stem is part of a suffixed word or not, but there is no study available that has tested the sensitivity of listeners to differences in suffix durations, or in stem durations, with S final words in English. The problem is two-fold: First, can listeners perceive the small durational differences at all, and if so, what is the threshold? Second, if they can perceive a difference, does this influence lexical processing? This paper tackles the first question only.

To investigate whether listeners are able to perceive morpho-phonetic differences with final S, we conducted two experiments. Using a same-different task, we investigated whether the durational differences in stems (experiment 1) and final S (experiment 2) as found in previous studies are perceivable. The stems were contrasted with stems of the same length, or with stems that were artificially lengthened by 10, 25, 50 or 75 ms. For the contrast with final /s/, the baseline /s/ was artificially lengthened by 10, 20, 35 or 75 ms. Participants listened to a pair of words and had to decide whether they heard the same recording or not.

For the analysis of the data we used mixed effects models in a setup that uses signal detection theory. This type of analysis allows the researcher to discriminate between the real sensitivity of a participant concerning a task and the potential response bias of this participant (see e.g. MacMillan 1993, Stanislaw & Todorow 1999).

With regard to the durations of stems, participants are able to reliably detect a difference already with a lengthening of the stem from 10 to 20 ms. With regard to the suffixes, there is a significant increase in the ability to discriminate differences from 10 to 20 or 35 ms, and from 20 or 35 ms to 75 ms. At 75 ms difference, listeners can reliably distinguish two final /s/'s.

Overall, our results show that, although speakers vary in their sensitivity, all speakers are able to perceive at least some of the subtle differences in duration that have been observed between items of different morphological categories. Differences in stems are easier to be picked up by the listener than differences in final /s/. The ability to detect subtle phonetic differences would allow the processing system to make use of subsegmental information in lexical processing. Follow-up experiments will have to show how the processing system actually makes use of this ability.

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