

Subphonemic detail affects morphological processing

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In language comprehension research there is a debate whether (or if so, how) subsegmental information may influence lexical access (e.g. Cho et al. 2007, Christophe et al. 2004, Goldinger 1996). Recent evidence from studies investigating the phonetic realization of complex words suggest that this debate needs to be extended to the role of subphonemic information in morphological processing. 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 corresponding stems of monomorphemic words (Seyfarth et al. 2017, Engemann & Plag 2021).

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. The present paper tests for plural and simplex words ending in S whether listeners make use of the subtle morphological information that is part of the signal.

We used a mouse-tracking setup comparable to that of Blazej & Cohen-Goldberg (2015). Two kinds of spliced stimuli were used in the mouse-tracking experiments, matched and mismatched, and we carried out two experiments, investigating stems and word-final /s/, respectively. Matched forms consisted of stems and endings from one category (a plural stem glued to a plural ending, or a mono-morphemic substring glued to a final /s/ of a mono-morphemic word). Mismatched forms combined a substring from one category (e.g. a plural stem) with the ending from the other category (the final /s/ of a mono-morphemic word form). The expectation was that, if subphonemic detail influences processing, the mouse tracks of the mismatched items should be different from those of the matched items.

In the experiment with stems we used homophonous words (e.g. *days* and *daze*) and participants had to click on either *days* or *daze*, indicating what the participants thought they had heard. In other words, the participants had to disambiguate a given stimulus. In the experiment with word-final /s/, we did not use homophones, and, following the setup by Kemps et al. (2005a, 2005b), participants had to take a number decision, i.e. say whether they heard a word referring to one thing, or more than one thing.

We used smooth additive quantile regression models (Fasiolo et al., 2020) to model the x and y coordinates of the mouse tracks. The analysis shows that indeed the type of matching significantly affected the comprehension of word-final /s/, leading to a detour of the mouse-track for mismatched stimuli. Similar detours were found for mismatched stems. There was also an interaction with the response type, i.e. whether the participants clicked on the mono-morphemic or the plural word. Clicking on the plural homophone goes together with more direct mouse tracks, while clicking on the mono-morphemic homophone goes together with less direct mouse tracks, but the less direct route for the mono-morphemic response becomes more direct if the mismatch involves a plural stem.

Our results demonstrate that listeners indeed are influenced by the subtle acoustic differences in the stimuli, be it final S or the part of the word preceding it. Listeners can perceive morpho-phonetic information and make use of such information in comprehension. This result has important theoretical implications. In most extant models of language production and language comprehension morpho-phonetic effects are unexpected and unexplained (e.g. Roelofs & Ferreira 2019, Turk & Shattuck-Hufnagel 2020, Cutler 2021). This paper adds to the literature that calls for more adequate models.

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