# Acoustic differences between supposedly identical singular-plural nouns in German

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Words such as *time* and *thyme* and suffixes such as the English plural *-s* and the genitive *-s* have normally been considered homophonous. However, in recent years, several studies have shown that these forms differ in their precise acoustic detail, e.g., in their duration (see, e.g., Drager 2011; Gahl 2008; Plag, Homann, & Kunter 2017). The present contribution aims at expanding research in this area by investigating whether supposedly identical nouns in the singular and plural are really acoustically identical.

Eight native speakers of German (four males) participated in the Praat (Boersma & Weenink 2018) production study presented here. The test material included (a) eight pairs of disyllabic, initially stressed, and monomorphemic German nouns whose nominative singular and plural are expressed with the same word (see 1a and 1b) and (b) eight pairs of disyllabic, initially stressed, and bimorphemic German nouns whose singular and plural genitive are expressed with the same word (see 1c and 1d). The target words of the four conditions were embedded in sentences (see 1), which were read out. Each subject read a total of 32 experimental sentences, i.e., the entire test material (8 items x 2 conditions per item + 8 items x 2 conditions per item), and 64 filler sentences. The four conditions were counterbalanced using a Latin Square Design. Each participant saw a different order of the items. At least 47 other sentences appeared between an item in one condition (e.g., 1a) and the same item in a different condition (e.g., 1b).

All nouns were of a very low frequency. The noun forms of the four conditions were checked for their frequencies, and only relevant cases were manually included in the average frequency. That is, for instance, the form *Spatzen* 'of the sparrow(s)' can also occur in cases other than genitive; however, in the average value of the word *Spatzen* in the genitive, only genitive case forms were included. The average frequency values of the four conditions (see, e.g., 1) did not significantly differ from each other. All frequencies were checked using the COSMAS2 (Connexor) corpus of the Institute of the German language (https://www.ids-mannheim.de/cosmas2/).

Using a boxplot analysis (see Larson-Hall 2010), all statistical outliers were removed from the original dataset. Then, repeated-measures ANOVAs by subject and by item were performed on the two dependent variables DURATION INITIAL WORD PART and DURATION FINAL WORD PART. "Initial word part" refers to the part of a word preceding the *en*, i.e., e.g., the stem of the genitive words (see *Spatz* in 1 c/d). "Final word part" refers to the *en*, which was a suffix in (1c/d) but not in (1a/b). The independent/fixed variables were NUMBER (singular/plural) and CASE (nominative/genitive) (both were within-subject, NUMBER was within-item and CASE was between-item). SUBJECT and ITEM were included as random factors. The analysis revealed a significant effect for DURATION INITIAL WORD PART in $F_2$: Plural nouns were spoken with significantly longer duration than singular nouns ($p < .05$).[1] The results show that plural nouns differ acoustically from their respective singular forms, although the two have been considered to be identical. That is, the "basic" and less marked singular form is uttered in a more compromised form than the plural version. Overall, the results will be interpreted against the background of models of speech production and the role of acoustic detail in the distinction between morphosyntactic properties.

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[1] There was no significant interaction and no main effect of CASE.

(1)  a.  *Der* **Batzen** *kippt vom* *Teller.*
         The chunk.SING.NOM falls from.the plate.
     b.  *Die* **Batzen** *kippen vom* *Teller.*
         The chunk.PLU.NOM fall from.the plate.
     c.  *Der* *Kopf* *des* **Spatzen** *kippt* *hin* *und* *her.*
         The head of.the sparrow.SING.GEN goes back and forth.
     d.  *Der* *Kopf* *der* **Spatzen** *kippt* *hin* *und* *her.*
         The head of.the sparrow.PLU.GEN goes back and forth.

[1] Boersma, P., & Weenink, D. 2018. *Praat: doing phonetics by computer*. Computer program.

[2] Drager, K. 2011. Sociophonetic variation and the lemma. *Journal of Phonetics* 39(4), 694-707.

[3] Gahl, S. 2008. *Time* and *thyme* are not homophones: The effect of lemma frequencies on word durations in spontaneous speech. *Language* 84(3), 474-496.

[4] Larson-Hall, J. 2010. *A guide to doing statistics in second language research using SPSS*. New York, NY: Routledge.

[5] Plag, I., Homann, J., & Kunter, G. 2017. Homophony and morphology: The acoustics of word-final S in English. *Journal of Linguistics* 53, 181-216.