

Hypo- or Hyperarticulation? A closer look at infant-directed speech in German

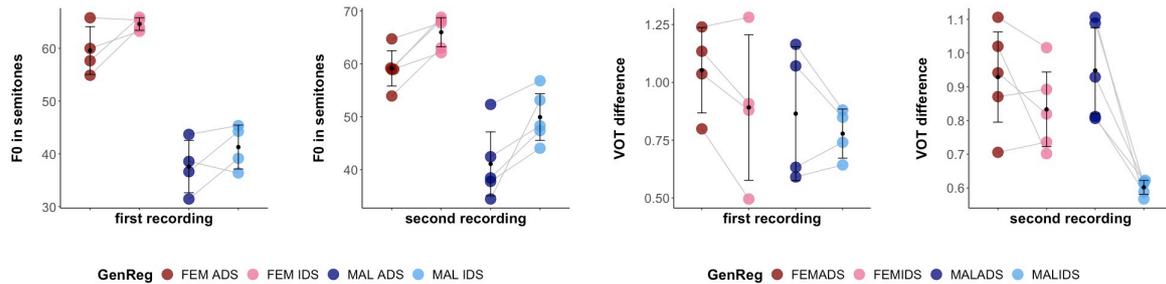
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Introduction: Infant-directed speech (henceforth: IDS) has been discussed to be clearly distinct from adult-directed speech. However, researchers do not necessarily agree on *how* the two registers differ. Broadly, two lines of arguments can be found. On the one hand, IDS is argued to enhance contrasts. Cross-linguistically, we find evidence for hyperarticulation, particularly for vowel quality (Kuhl et al., 1997; Liu et al., 2003; Weirich & Simpson, 2017). The idea is that more distinct and hyperarticulated exemplars of a category are beneficial for learning contrasts. In a similar vein it has been shown that consonant contrasts are enhanced. For instance, voice onset time contrasts have been analyzed in many languages (Baran et al., 1977; Sundberg & Lacerda, 1999; Sundberg, 2001; Englund, 2005; Burnham et al., 2013). On the other hand, there is also evidence for hypoarticulation in IDS, both for the articulation of vowels and consonants (Sundberg & Lacerda, 1999; Englund & Behne, 2005; Synnestvedt, 2010; Narayan & Yoon, 2011; Benders, 2013; Benders et al., 2019). To date it is unclear, whether hypo- and hyperarticulation are influenced by language-specific characteristics, the age of the child or other factors.

Methods: The present study on German IDS investigates aspects of both vowels and consonants. Using a picture description task, we recorded infant- and adult-directed speech in five mothers and fathers twice. During the first recording the child was 8 months old while she was 13 months old, the time when they were expected to speak their first words, at the time of the second recording. We investigated a fully balanced item set of initial fortis and lenis stops [p, t, k, b, d, g] followed by three vowel qualities [a, i, u].

Results: With our data, which we analyzed by means of linear mixed effects models, we replicate well-known findings for increased F0 in IDS (e.g. Fernald & Simon, 1984), see fig. 1. Fortis and lenis stops in German are distinguished by voice onset time and we find this contrast hypoarticulated in IDS, see fig. 2. It appears that for some variables, fathers display the difference in IDS only at a later point in time. Analyses of the temporal organization of the CV-sequence revealed that vowels become relatively longer and consonants become shorter while the overall duration of the sequence remains stable. Additionally, we analyzed vowel quality and found a similar vowel space sizes for registers (pace Kuhl et al., 1997; Weirich & Simpson, 2017), but a higher variability in IDS (McMurray et al., 2013).

Discussion: We show hyperarticulation with regard to F0, the vowel duration, and variability whereas the consonant quality and duration are hypoarticulated. The present German IDS data does not only take mother- but also fatherese into account and investigates possible developmental changes by looking at several points in time. It shows that previous literature on hyper- and hypoarticulation may partially be explained by an age- and sex-specific attention shift towards the unit of interest. Thus, while some former studies have been assumed to contradict each other (Baran et al., 1977; Sundberg & Lacerda, 1999; Sundberg, 2001; Englund, 2005; Burnham et al., 2013), it may have been the case that a general hyper- or hypoarticulation is a somewhat simplified view on IDS. Instead changes in IDS are best explained by attention shift to segments (Benders et al., 2019), which may be of special interest to the learning child at that specific time. Therefore, we might find hyperarticulation in one aspect of speech, while we find hypoarticulation in another. We suppose that language acquisition needs to be seen as a dynamic process and parents may adjust to the age-specific needs of their child accordingly. In line with Benders et al. (2019) and Benders (2013) we assume that a directing attention and conveying emotions is the reason why the vowel portion is hyperarticulated.



Figures 1-2: (1) Mean F0 differences between registers by sex and recording, dots indicate mean values for each participant. (2) Mean VOT differences between fortis and lenis stops controlled for speaking rate in registers, by sex and recording.

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