

Intervocalic voicing of Danish stops

Modern Standard Danish has a two-way laryngeal contrast that relies on aspiration rather than voicing. Voicing does not, in fact, play a role anywhere in the phonology of Danish. However, it has long been assumed that the lenis stops /b d g/ – phonetically [p t k] – are typically voiced in onset position following vowels or other voiced consonants (e.g. Fischer-Jørgensen 1954, 1980), and it is cross-linguistically common for languages with no voiced stop phonemes to have them allophonically in medial position (e.g. Keating et al. 1983). Recent acoustic studies of the pronunciation of Danish stops have refrained from measuring or reporting closure voicing (Pharao 2011; Mortensen and Tøndering 2013; Schachtenhaufen 2013). In this study, we take a closer look at intervocalic stop voicing in Danish, and how it is affected by a number of factors – including phonetic, phonological, morphological, and syntactic factors.

We extracted all intervocalic stops from the monologues of the DanPASS corpus (Danish Phonetically Annotated Spontaneous Speech; Grønnum 2009). These monologues consist of approximately three hours of unscripted speech from 18 speakers. A total of 3,744 intervocalic stops were extracted. These were categorically classified as either continuously voiced or not; tokens with periodicity in the waveform throughout the closure and release were classified as continuously voiced. In the vast majority of cases, this was straightforward. We coded for a large number of possible predictors of voicing. Given the nature of the transcriptions, we could automatically extract a large number of phonetic environmental predictors, including *stød*, vowel features, stress, and local speech rate. There are published lists of lexical frequency in the DanPASS corpus, which we take as an (imperfect) proxy for ‘local lexical frequency’. We manually coded for a number of higher-order linguistic effects, such as word class and morpheme type. Finally, we included the age and gender of speakers.

Our preliminary results show that just over one third of lenis stops are continuously voiced intervocalically, and around 5% of fortis stops. Many of our predictors clearly influence voicing: *stød* on the preceding vowel inhibits voicing; voicing is more likely if the preceding syllable is stressed; voicing is more likely to occur within a word than at a word boundary, and most likely before an inflectional suffix; voicing never appears to occur with low frequency lexical items. Since we have many categorical predictors, and many of them are likely to be correlated, we plan on using multiple correspondence analysis (MCA) to explore and summarize the relations between different predictors. MCA reduces a number of categorical predictors to a smaller number of dimensions in a Euclidian space; the output of the analysis is coordinates along these dimensions for each data point. These coordinates can in turn serve as predictor variables in a mixed-effects regression model along with other continuous variables such as age and lexical frequency, and random effects such as speaker and lexical item.

References

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