Long-term phonetic convergence vs. speaker-specificity: creaky voice in L2 English

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Phonetic convergence (also *imitation*, *accommodation*, *alignment*, *entrainment*) between interlocutors within conversations and in experimental tasks is by now a well-documented phenomenon, both between L1 speakers of the same language [1, 2, 3], and in the L2 speech of speakers with various L1 backgrounds [4]. While some researchers have made explicit claims that such short-term accommodation may provide the seeds for sound change in the longer term, this is not uncontroversial [5, 6]. Longitudinal studies have shown accent change and phonetic convergence over the medium to long term, but to a modest extent and modulated by various factors [7, 8]. Our study uses a longitudinal speech corpus of a relatively tight-knit community to shed light on potential change and phonetic convergence over a number of years. An additional factor here is that the variety converged upon is L2 English.

The D-LUCEA corpus [9] consists of recordings of students at University College Utrecht, an international campus college in the Netherlands where English is the lingua franca. Participants were recorded up to five times over their three-year stay in L2 English as well as their L1. The sub-corpus (n=29) used for the current study consists of the first and last recordings of all female speakers from the first cohort with Dutch as their L1. Speakers in the corpus have previously been shown to converge over time on phonetic features, both segmental (the realisation of /s/ in their L1 and L2 [10]) and prosodic (L2 speech rhythm [11]), though not on their use of filled pauses [12], where they maintained speaker-specific patterns. The current study looks at potential convergence by these speakers on their use of creak/creaky voice (CV). CV is a well-known social marker in L1 (especially American) English, where it is associated with upwardly mobile, urban, young female speech. It is also a feature that speakers have been shown to converge on in conversation [13, for Australian English], and that L2 speakers are able to learn through exposure alone [14]. CV has been much less studied in other languages; in Dutch, it has been described as rare and idiosyncratic [15, 16], though there have been recent mentions on social and in popular media, drawing explicit parallels with the sociolinguistic profile of CV in English [17]. We examine whether the students in our corpus acquire CV in their English, use it in their L1 as well, and whether they converge over time.

Our method involved the automatic detection of f0 [18] across students' (read and spontaneous) speech, as many (though not all) types of CV involve low f0 [19]. Previous use of this method has shown that speakers tend to have bimodal f0 distributions, one for CV and one for modal voice [20, 21]. Using the antimode (AM), the local minimum between the two modes, as a cut-off point allows for each f0 measurement to be classified as either creaky (<AM) or modal voiced (>AM), which in turn enables the calculation of creak prevalence per speaker.

The results show high inter-speaker variation coupled with limited intra-speaker variability, both across languages and recordings (Fig.1). Linear mixed-effects models showed effects of recording (creak prevalence increases over time) in the spontaneous speech condition (p=.034) and within the L2 English data (p=.033); they also showed a significant interaction (p=.017) between language and speech style (more CV in English, but only in the read speech). Fig.2 illustrates the effects of recording, language and style on creak prevalence in the data. The limited effect of language is surprising (CV is not a known socio-indexical or stylistic feature in Dutch) and while CV increases over time across all speakers, the relative stability in inter-speaker variation and the similar levels in both languages suggest creak is an idiosyncratic feature, rather than gradually acquired or converged upon. Though speakers are assumed to be more plastic in adjusting their L2 accent features than their L1 [22], our study complements those that find limited convergence at the community level in the medium to long term.
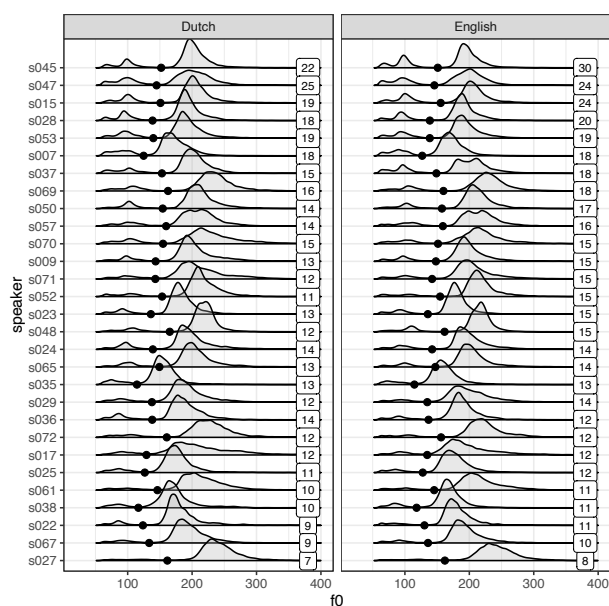
Fig. 1. f0 (Hz) distributions, antimodes (●) and creak prevalence (%) by language for all speakers. Speakers sorted by overall creak prevalence.
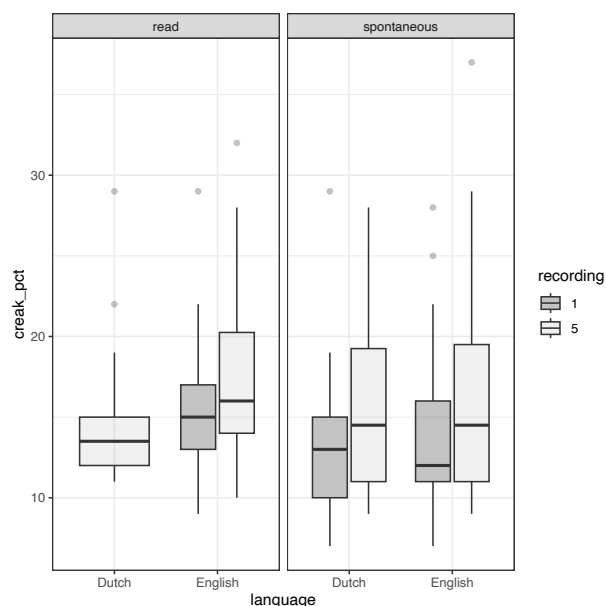
Fig. 2. Creak prevalence (creak_pct) by language (Dutch, English), speech style (read, spontaneous), and recording (first <1>, last <5>).

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