A stationary frequency effect in Manchester English

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The impact of lexical token frequency on phonetic implementation has been argued to support Exemplar Theory in the following way (Bybee 2002; Pierrehumbert 2002):

(a) Synchronically, high-frequency words exhibit more coarticulation and reduction than low-frequency words (e.g. Dinkin 2008, Gahl 2008, among many others).
(b) This is because, in diachronic processes of lenition, frequent words change at a faster rate than infrequent ones.
(c) This is because high-frequency items suffer greater exposure to phonetic biases in production and perception than low-frequency items, which is then directly registered in phonetically detailed lexical representations.

However, hypothesis (b) has not been corroborated by actual diachronic observations, and does not logically follow from (a): as acknowledged by Hay *et al.* (2015), frequent items can be ahead of infrequent ones, yet change at the same rate. In this scenario, the impact of frequency gives rise to a **constant rate effect** à la Kroch (1989): the logistic curves of change for high- and low-frequency items exhibit different intercepts but equal slopes. The existence of CREs in phonology has been established by Fruehwald *et al.* (2013), and further evidence comes from Zellou & Tamminga (2014). As regards (c), the empirical predictions of Exemplar Theory remain unclear. Sóskuthy (2014) shows that, without *ad hoc* stipulations, the inertia of a large exemplar cloud cancels out the greater exposure to phonetic bias.

In this paper, we challenge (b) with evidence from a CRE in Manchester /t/-glottalling, which is strongly conditioned by token frequency. Crucially, there is no significant difference in the diachronic growth rates in high- and low-frequency words. We demonstrate this statistically using LOESS-smoothers, mixed effects logistic regression, and Kauhanen & Walkden's (2015) mathematical model of the CRE. Our data come from a socially-stratified sample (62 speakers born between 1926 and 1985; 9,187 tokens of /t/ auditorily coded). Figure 1 shows no significant difference between the curves of change across frequency bins. Figure 2 shows the results of applying Kauhanen & Walkden's CRE model, which uses time-invariant contextual biases to derive context-specific curves from a single logistic growth function for all frequency bins. Fitting this more constrained model, with the CRE built in, leads to no increase in error over a model with completely independent logistic curves.

Further support comes from generalized mixed-effects logistic regression, which shows that an interaction between frequency and birthyear does not improve on a model without the interaction (by AIC or BIC). We conclude that the evidence stacks in favour of a scenario in which high- and low-frequency words change at the same rate, thus providing support for a CRE in Manchester /t/-glottalling.

The absence of evidence for (b) suggests that alternatives to (c) should be considered. Frequency-driven CREs are consistent with modified versions of classical modular architectures in which neogrammarian innovation is effected through change in phonetic implementation rules referring to phonological categories in surface representations, whilst the impact of frequency is produced by orthogonal mechanisms (e.g. cascading activation, listener modelling).

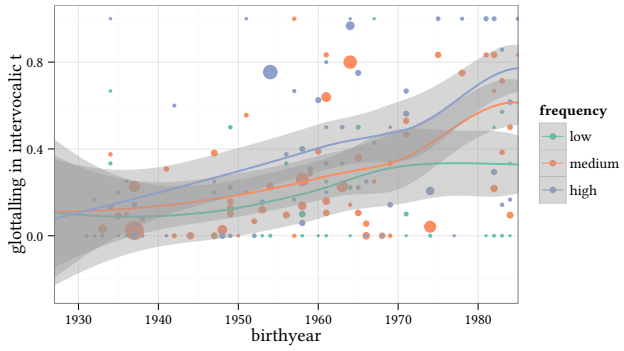

Figure 1

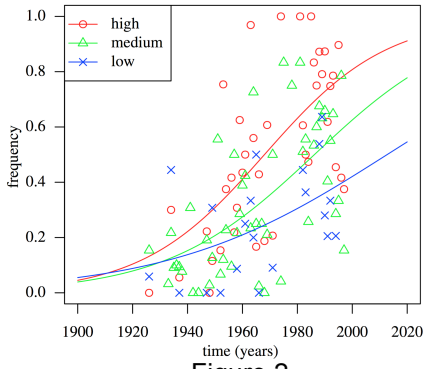

Figure 2