

Phonological Rule Change: The Constant Rate Effect

The detailed quantitative study of language change, as found in studies such as Labov (1994) and Kroch (1989), has raised two central questions for linguistic theory. The first is an issue in the theory of language change itself, namely: do changes in different components of the grammar progress in the same way? The second question addresses the relationship between the study of change and the development of synchronic linguistic theory: can quantitative, diachronic data help to choose between alternative analyses of synchronic facts? This paper addresses both of these questions with the case study of the loss of word-final stop fortition (frequently termed “devoicing”) in the history of German, and concludes that the answer to both questions above is “yes”.

Kroch (1989), followed by Pintzuk (1991), Santorini (1992), *inter alia*, showed conclusively that when a new syntactic variant begins to enter the grammar, its use may be more or less favored in different contexts, but it increases in frequency in every context at the same rate over time (the “Constant Rate Effect”). This shows that the different contexts express the same underlying change, a single incoming rule which is unspecified for context. The differing frequencies in each context, then, are orthogonal, additive, and extragrammatical. With the case of final fortition in German, this paper shows that the Constant Rate Effect holds in phonology as well, demonstrating that phonological change and syntactic change progress in precisely the same way, and that the different contexts for final fortition express a change in a single underlying rule in the grammars of German speakers.

The data for the study come from four versions of the same text (the ‘Augsburger Stadtbuch’; compiled by Glaser (1985)), produced at four intervals from the 13th to the 16th century. Note the comparison between the “a” and “b” sets of forms for the lexical items in (1)-(3) below, each of which reoccur in different versions of the text. It is clear from comparing the earlier sets of forms with the later sets of forms for each lexical item that the alternation in final stops, which was robust in the 13th century, had been lost by the 16th century.

Following Kroch (1989) and subsequent work, we estimated the slopes of the decline in frequency for each fortition context in a logistic regression. The slopes are very similar, and the high p-value of a test for their differences means that the differences between them are most likely due to chance (b: -0.023, d: -0.029, g: -0.025; $p = 0.76$). This is a clear demonstration of the Constant Rate Effect in the phonological domain (the model for each context can be seen in the dotted lines in Figure 1). Furthermore, the quantitative patterns characterizing this change show that the rule of fortition which was ultimately lost was neither a rule of devoicing, as is commonly assumed in the literature (cf. Bermúdez-Otero and Hogg, 2003), nor of aspiration, as suggested in Iverson and Salmons (2007). As Figure 1 shows, the rule was lost in the velar group significantly earlier than in the labials and apicals. Since voicing is most marked in velars (Blevins, 2004), we would expect the alternation to be retained in the velars longer than the others if the neutralization were really devoicing. If ⟨p⟩, ⟨t⟩, and ⟨k⟩ were actually aspirates, similar acoustic dynamics would obtain, favoring retention in velars. Instead, the quantitative evidence argues directly against both of these interpretations, and instead suggests that the phonetic nature of the fortis consonants was something else, which we will argue to be consonant length and [constricted glottis].

This study shows that final fortition in German was a single phonological rule unspecified for place, that the loss of that rule was actuated simultaneously in several contexts, and that its loss progressed at the same rate in each context. Importantly, this illustrates a separation between between grammatical and extragrammatical processes in synchronic production that one may expect to be more conflated in usage based approaches to phonology (cf. Exemplar Theory: Pierrehumbert (2002) *inter alia*). The detailed quantitative patterns also show that fortition was not a rule of devoicing, but rather a rule of lengthening. Thus, this study is a further demonstration, outside of the syntactic domain, of how diachronic data can be brought to bear on questions of linguistic theory.

- (1) ‘day’
 a tak (Nom. sg.) tage (Dat. sg.); manuscript date: 1276
 b tag (Nom. sg.) tage (Dat. sg.); manuscript date: 1483
- (2) ‘counsel’
 a rat (Acc. sg.) rade (Dat. sg.); manuscript date: 1276
 b rad (Acc. sg.) rade (Dat. sg.); manuscript date: 1523
- (3) ‘highway robbery’
 a ftrazraup (Nom. sg.) ftrazreube (Gen. pl.); manuscript date: 1276
 b ftraßraúb (Acc. sg.) ftraßraúbe (Gen. pl.); manuscript date: 1523

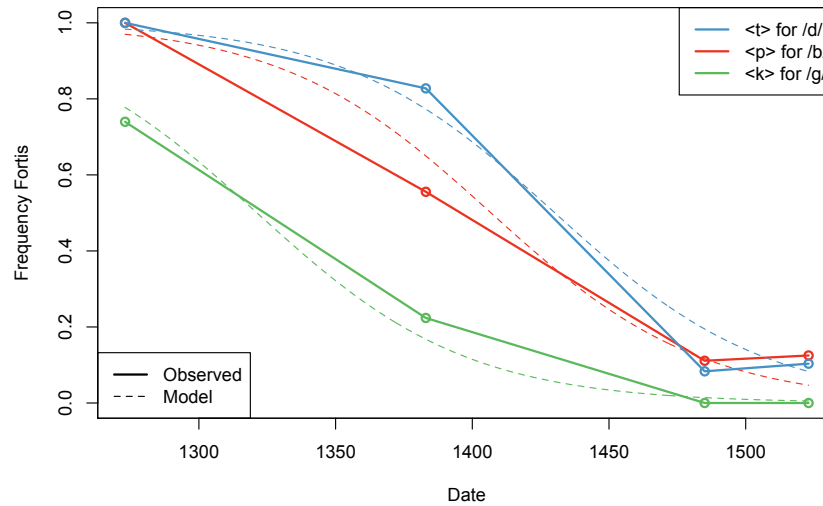


FIGURE 1. Loss of Final Devoicing

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