

The incomplete phonologization of the non-sibilant dental fricatives in American English

In production, the voiced and voiceless dental fricative phonemes occupy an overlapping region of sound across multiple dimensions of voicing, place, and manner. They are heavily influenced by the phonetic environment in which they occur, including voicing, prosodic position, and stress. Linguistically, the voiced and voiceless dental fricatives are considered to be two separate phonemes, hereafter referred to as eth /ð/ and theta /θ/. The contrast between eth and theta in American English carries virtually no functional load, having only eleven minimal pairs, seven of which have alternate pronunciations which can render them non-contrastive, such as *mouth*~*mouth* (the verb with eth or theta) or *ether*~*either* ([iðə] or [aɪðə]). Of the remaining four, two are noun-verb pairs which do not contrast in any position, and are derivationally related (*teeth*~*teethe*, *wreath*~*wreathe*), one is composed of an archaic form which appears only in compounds (*sooth*~*soothe*), and the only pair with potential contrast (*thigh*~*thy*), contains an archaic pronoun that is only used in formulaic utterances.

Historically, eth was an allophone of theta, found intervocalically. It later became phonemic as many final syllables were reduced and eventually lost, especially in the verb inflections, leaving eth available as a word-final phoneme. The loss of this conditioning environment is really only partial in that we still have the -ing endings. Also, in modern usage, most of these verb-final -th endings, such as in *mouth* or *sheathe*, can be pronounced as voiceless. The main contributor to phonologization occurred when the word-initial <th> of a handful of high-frequency function words was re-analyzed as being primarily voiced due to its reduced nature. Eth has far greater token frequency than theta due to the high frequency of the function words containing it; however, theta has a much greater type frequency than eth, being found in a far greater number of words. The high type frequency seems to shape speakers' perception of theta being the primary dental fricative.

A series of 3 experiments was conducted to determine if eth and theta are phonemic, if they are equally phonemic, and to try to tease apart some of the details surrounding their phonemic, yet non-contrastive nature. A phoneme monitoring experiment revealed slower response times for eth than for theta. Catch trials, introducing eth where theta was the target, and vice versa, produced a very high number of false alarms. These results and the debriefing comments from participants reveal that it is a more difficult task to identify eth than theta, and that the two are highly confusable. It suggests that eth may at least sometimes be processed as an allophone of theta rather than a phoneme in its own right. It also provides support for the hypothesis that while processing these sounds, lexical candidates containing both eth and theta are activated, as a result of the phonetic overlap between the two sounds in natural speech. Faster response times for syllables containing theta may be a result of the higher type frequency of words containing theta.

Identification and discrimination experiments were constructed using a continuum of blended naturally produced words, *thigh* and *thy*, in order to determine if listeners could distinguish between stages of voicing, using actual lexical items rather than phonemes. These experiments revealed a strong bias for theta, even when transition information from eth was left between the fricative and the vowel, and even though *thy* and *thigh* have roughly the same frequency. One interpretation of these results is that the phoneme labeling process, for eth and theta, at least, is a higher-level decision, and does not come into effect until after lexical activation occurs, if at all, and is more dependent on type frequency. While considering the possible implications of the level of the phonemic category on sound change, we must also wonder whether the split of the dental fricatives, or the phonologization of eth occurred and was completed, and is now collapsing in on itself, whether it is still in the process of occurring, or whether the two sounds have continued to exist in a similar state as allophones since the earliest stages.