Phonological vowel height differences arise from phonetic vowel duration differences

Labov's (1994) first two well-attested principles of vowel chain shifts are Principle I: High vowels are raised, and Principle II: Short vowels are lowered. The number of cases where vowel quality splits have occurred along the durational fault lines in vowel systems is legion, but are particulary well attested in Germanic languages, where the historical and current durational differences are accompanied by vowel quality differences along Labov's principles. Cases in English range from *sane*[ei] – *sanity* [ae] (earlier [ae(:)]) via *mood* [u:] – *good* [U] (earlier [U(:)]) to *bad* [eə] – *bat* [ae] (earlier [ae(:)] on the East Coast. The first question is whether these principles are phonological, and thus arise from the organization of the phonological grammar independently of articulatory and perceptual considerations, or phonetic, caused by functional factors at play in the speech process which may or may not lead to phonologization of the phonetic changes.

It will be argued the answer is 'phonetic', largely on the basis of cases where non-phonological duration differences have the same effects as cases discussed by Labov. First, English raises vowels before voiced coda obstruents. This occurs in both phonologically long and short vowels, crucially in the contexts in which their allophones are long, i.e. not when those same vowels appear before voiceless coda obstruents (Hillenbrand et al. 2001, Moreton 2004). Second, there is the case of vowel raising in Dutch dialects with lexical tone, where again vowels in phonetic lengthening contexts, this time induced by the occurrence of a lexical tone, are raised, regardless of phonological length, or conversely, lowered if they occur in the context of syllables without the lexical tone and their allophones are short. In other words, it is the phonetically longer vowels, regardless of the (phonemic or allophonic) conditioning of the longer duration, that are raised. Both cases will be extensively exemplified.

Second, there is the question *why* longer vowels are raised (or shorter vowels lowered). Labov's two principles represent a single fact: across languages, phonetic vowel duration differences are enhanced by phonetic vowel height differences, longer vowels being pronounced with higher tongue positions. Why then does vowel raising enhance the perception of duration? It will first be shown with the help of perceptual data that there is a universal tendency for higher vowels to sound longer than lower vowels. The effect is in part language-dependent, and - significantly - less easily established with listeners whose phonology lacks vowel quantity, like French. The explanation is to be found in what has been discussed as 'compensatory listening', the phenomenon that the listener's judgements of the presence of phonetic variables is goes against some natural articulatory tendency. In our case, this is the fact that lower vowels tend to be longer, due to the longer travelling time for tongue(-plus-jaw) to and from consonantal positions.

Second, it will be shown that the articulatory and perceptual behaviour represents a case of 'phonetic knowledge', the controlled, collusive behaviour of speakers and listeners in constructing efficient phonetic and phonological systems, rather than being 'automatic' (Kingston & Diehl 1994). For one group of listeners, we will show that the perceptual effect is independent of consonantal context. That is, the listener abstracts away from the actual consonantal position from which the tongue moves and to which it returns. This means that the enhancement of the duration is applied per vowel category, rather than being an inherent effect of the speech process that speakers and listeners cannot help.

References

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