Universals in the distribution of geminate consonants and perception of consonant length

The paper presented here reports on the results from the crosslinguistic study of consonant length in connection to the universals in the crosslinguistic distribution of long consonants. It has been shown in previous literature that long consonants or geminates prefer to appear in certain phonetic environments across languages while avoiding others: they are abundant in the intervocalic position, and after stressed vowels, while scarce in the proximity to other consonants, on the edges of the words, and away from stress (Thurgood 1993, Kraehenmann 2001). The proposed explanations include poorer acoustic cues to consonant duration on the edges of the words compared to the intervocalic position which offers clear beginning and end points for the consonant; general preference for the enhanced duration of the stressed syllables, and an association between higher pitch which often accompanies stress and an increase in duration (Kraehenmann 2004, Padgett 2003, Thurgood 1993, Pike 1974). Here I present evidence that certain phonetic environments indeed provide better conditions for the perception of consonant length. In the experiment with speakers of Russian, American English, and Italian the perceptual boundary between short and long consonants was examined in pre-stress, post-stress, and no-stress positions, as well as in intervocalic vs. preconsonantal and in word-initial vs. word-final positions (using non-synthesized non-words). Duration of the singletons and geminates in these positions was also measured for the three languages. Results revealed position-dependent differences in the perception of consonant length that could not be attributed to differences in production. Some phonetic environments conditioned a higher proportion of "long" responses, or an earlier shift to the "long" percept. Interestingly, these environments included the ones generally associated with a higher instance of long consonants crosslinguistically: intervocalic and post-stress. In the case of Russian this can be explained by language-specific effects: in Russian long consonants occur more often in intervocalic and stress-adjacent positions, as well as word-initially as opposed to word-finally. However, American participants, who showed the same pattern of responses, could not have been conditioned by the language-specific factors since long consonants are not characteristic to American English, apart from the occasional sequences as in "white tie" and "unknown". This suggests that observed perceptual phenomenon is language-independent and as such can be a contributing factor in shaping the crosslinguistic distribution of long consonants.

Italian, like Russian, has been reported to contain more long consonants in post-stress positions (Esposito and Di Benedetto 1999). However, unlike Russian, where long consonants arguably have a semi-phonemic status, Italian geminates are phonemic. Preliminary results for Italian participants suggest that phonemic status of long consonants in Italian may take precedence over the phonetic effects. Position-related differences in the perception of consonant length were less pronounced, apart from a strong bias towards singleton perception in the preconsonantal position and on the edges of the words, which can be explained by the absence of the geminates in these positions in Italian. Pending more data from the Italian participants, it is possible that phonetic factors which influence the perception of the duration in different positions and are perhaps responsible for the asymmetric crosslinguistic distribution of geminate consonants are detectable only for the speakers of the languages where the contrast has not been fully phonologized. Although there are reasons to believe that these phonetic factors influenced the distribution of long consonants in Italian at some stage of their development (Esposito and Di Benedetto 1999).

To conclude, this study shows that certain crosslinguistic universals in the distribution of long consonants can be attributed to position-dependent differences in the perception of consonant length. These differences are shown to be language-independent although in languages with phonemic consonant length the effect of the position-related phonetic factors can be obscured on the synchronic level.