Identification of English primary stress by Japanese listeners and bias toward word-final stress: due to F0 patterns or an influence from Japanese loanword accent?

Sugahara [7] compared the identification patterns of English primary stress in trochaic and iambic words whose segmental patters are idential (e.g., *TRANSplant* as a noun vs. *transPLANT* as a verb, *IMport* vs. *imPORT*, *REmake* vs. *reMAKE*, etc) between English native and Japanese listeners. In an environment where the two stress patterns were not distinguished by pitch (i.e., both carried a flat F0 pattern) while other acoustic contrasts were kept intact, native and Japanese listeners showed opposite responses: native listeners preferred more initial primary stress while Japanese listeners preferred more final stress. English listeners' preference for word-initial stress may be due to the fact that the majority of words in the English vocabulary have initial stress ([1] [2] [3] [4] [5]). It has not yet been clear, however, why Japanese listeners preferred word-final stress, and the main goal of this study is to investigate its reasons.

Sugahara [7] speculates that Japanese listeners' preference for final stress could be attributed to the flat pitch pattern of the audio stimuli. Pierrehumnert [6] among others reports that in order for two pitch peaks in speech to be perceived as equally prominent, the second one should be lower in pitch due to declination. As Japanese listeners are so sensitive to F0 information that they are likely to interpret the flat F0 contour as carrying an informative cue for prominence difference between the two syllables. That is, the fact that the F0 of the final syllable is the same as that of the preceding initial syllable could make the final syllable perceived as higher and more prominent than the initial syllable. There is, however, another possible account. Japanese listeners are influenced by "Japanese loanword accent locations" when they judge the primary stress locations of the English stimuli. Once the iambic nouns used in the study are converted into Japanese loanwords, they have an antepenultimate accent on the nucleus of their original final syllables, e.g. *TRANSpl**a**nt* → [t<o>. ra. n. s<u>. p<u>. r**a***. n. t<o>], where '*' shows an accent location and vowels in < > are epenthetic.

To examine which of the two accounts above is on the right track, a perception study is carried out, in which truncated words are used as auditory stimuli in identification tasks, without giving listeners the pitch information of an entire stimulus (e.g. *TRANS* and *trans* from *transplant*) to make the declination factor ineffective. Stimuli used in this experiment are not only trochaic noun vs. iambic verb pairs but also semantically unrelated pairs that share the same segments only in their initial syllables (e.g., *Union* vs. *uNIQUE*, *RObot* vs. *roBUST* etc). If Japanese speakers' preference for final stress is entirely due to the declination factor, they would not show final stress preference any longer given the truncated stimuli. If they are influenced by loanword accent locations instead, they would show different preference patterns between the truncated stimuli of the noun-verb pairs and those of the semantically unrelated pairs. It is because a loanword accent falls on the nucleus of the final syllable of the noun-verb pairs while the semantically unrelated pairs are variable in their loanword accent locations. For example, it is assigned to the initial syllable of *Union* as in [yu*.ni.o.n] while it is assigned to the final syllable of *uNIQUE* as in [yu.ni*.i.k<u>]. Therefore, more final stress responses will be obtained for the noun-verb pairs than for the semantically unrelated pairs. Results will be reported in the presentation.

References: [1] Cooper, N., Cutler, A., Wales, R. 2002. Constraints of lexical stress on lexical access in English: Evidence from Native and non-native listeners. *Language and Speech,* 45, 207-228. [2] Cutler, A., Butterfield, S. 1992. Rhythmic cues to speech segmentation: Evidence from juncture misperception. *J. of Memory and Language* 31, 218-236. [3] Cutler, A., Carter, D. M. 1987. The predominance of strong initial syllables in the English vocabulary. *Computer Speech & Language* 2, 133-142. [4] Cutler, A., Norris, D. 1988. The role of strong syllables for lexical access. *J. of Experimental Psychology: Human Perception and Performance* 14, 113-121. [5] Leyden, K. van., Heuven, V. J. van. 1996. Lexical stress and spoken word recognition: Dutch versus English. *Linguistics in the Netherlands.* Amsterdam: John Benjamins, 159-170. [6] Pierrehumbert, J. 1979. The perception of fundamental frequency declination. *J. Acoust. Soc. Am.* 66, 363-369. [7] Sugahara, M. 2011. Identification of English primary stress and bias toward strong word-initial syllables: native vs. Japanese listeners. *Proceedings of ICPhS 2011.*