The possible-word constraint in Cantonese speech segmentation

Michael C. W. YIP

School of Arts & Social Sciences, The Open University of Hong Kong

myip@ouhk.edu.hk

Introduction

Speech segmentation is a central issue of spoken language comprehension research (Cutler, 2001). And, recently, one important solution comes from the discovery of a mechanism operated in our lexical system, the Possible-Word Constraint (PWC). In their word-spotting experiments, Norris, McQueen, Cutler and Butterfield (1997) observed that listeners usually found it more difficult to spot the real word *apple* in the nonsense word string *fapple* than in *vuffapple*. Both *f* and *vuff* are not words in English, but only the latter one could be a possible word in the sense that the word *vuff* generally satisfied all the phonological conditions for becoming a word. The consonant of *f* would never been a possible word under any circumstances. Hence, Norris et al. (1997) proposed that our lexical system would be sensitive to this kind of discrepancy and inhibit the activation of those words that stranded an "impossible word candidate" residue in the speech signal during speech processing. This procedure was called the Possible Word Constraint (PWC). However, realization of this mechanism has been done in English (Norris, McQueen, Cutler, Butterfield & Kearns, 2001); Japanese (McQueen, Otake, & Cutler, 2001) and Sesotho (Cutler, Demuth & McQueen, 2002) so far. Hence, the present study aims to further examine the efficiency of the PWC in Cantonese, a language that differs significantly from most Indo-European languages (English, Dutch, French) in its use of lexical tones, phonotactic structure and its special morphemic nature of words.

Experiment

In the syllable-spotting experiment, listeners were presented with nonsense syllables strings [khow[1]kQm[1]]; [a:kQm[1]]; and [tkQm[1]] in which the target syllable [kQm[1]] was attached with one of the three different context types: (1) a pseudo-syllable [khow[1]]; or (2) a vowel [a:]; or (3) a consonant [t], and then they were instructed to spot any real Cantonese syllable embedded in the sound strings by pressing a response key and then named aloud the spotted target syllable. The three different context types will appear before or after the target syllable to reduce any strategic effects (Yip, 2000; in press).

Results and Discussion

Two main findings in the present study were concluded.
First, results suggested that different types of context significantly influence the spotting performance of participants. These effects were mainly contributed by the differences between consonant vs. vowel; consonant vs. pseudo-syllable conditions. The present set of results confirmed that listeners would find it more difficult to spot a target Cantonese syllable out from a nonsense sound string when it was attached with a single consonant than attached with either a vowel or a pseudo-syllable. These patterns of results are consistent with other research findings from different languages (Cutler, et al., 2002; McQueen, et al., 2001; Norris, et al., 1997; 2001).

Second, the results also showed that participants usually found it more difficult to spot out the target syllable when the context appeared at the beginning, in particular for the cases of consonant and vowel context. This effect was simply a lexical effect of spoken word recognition in Cantonese (Li & Yip, 1998). Finally, the present results are generally consistent with previous studies of the PWC and hence adding new and supportive evidence to the applicability of the PWC in Cantonese.

References

Cutler, A. (2001). Listening to a second language through the ears of a first. *Interpreting, 5,* 1-18.

Cutler, A. & Chen, H-C. (1997). Lexical tone in Cantonese spoken-word processing. *Perception and Psychophysics, 59*, 165-179.

Cutler, A., Demuth, K. & McQueen, J.M. (2002). Universality versus language-specificity in listening to running speech. *Psychological Science, 13*, 258-262.

Li, P. & Yip, M. C. W. (1998). Context effects and the processing of spoken homophones. *Reading and Writing, 10*, 223-243.

McQueen, J.M., Otake, T. & Cutler, A. (2001). Rhythmic cues and possible-word constraints in Japanese speech segmentation. *Journal of Memory and Language, 45,* 103-132.

Norris, D., McQueen, J. M., Cutler, A. & Butterfield, S. (1997). The possible-word constraint in the segmentation of continuous speech. *Cognitive Psychology, 34*, 191-243.

Norris, D., McQueen, J.M., Cutler, A., Butterfield, S. & Kearns, R. (2001). Language-universal constraints on speech segmentation. *Language and Cognitive Processes, 16,* 637-660.

Yip, M. C. W. (2000). Probabilistic phonotactics and the segmentation of Cantonese continuous speech. Doctoral Dissertation. Chinese University of Hong Kong.

Yip, M. C. W. (in press). Possible-word constraints in Cantonese speech segmentation. *Journal of Psycholinguistic Research.*