Perception of complex coda clusters and the role of the SSP

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Abstract

Modern Persian permits coda clusters, many of which violate the Sonority Se-quencing Principle. In a syllable counting task, Persian speakers consistently per-ceived clusters in CVCC target items as monosyllabic, whereas English speakers generally perceived clusters existing in English as monosyllabic but those not exist-ing in English as bi-syllabic. Moreover, the latter were perceived as monosyllabic more frequently if they adhered to the SSP than if they did not. In a follow-up ex-periment, French speakers performed a similar task, related to the clusters of that language. It is anticipated that the French speakers will exhibit similar perceptual behavior demonstrating the influence of the native language when the cluster exists in French, and the influence of the SSP if it does not.

Introduction

Cross-linguistically, it is generally observed that sequences of consonants in syllable onsets and codas are restricted by the Sonority Sequencing Principle (SSP), such that the sonority of the segments decreases from the nucleus out towards the margins of the syllable. The general sonority hierarchy is as follows:

(1) Sonority Hierarchy: Vowel > Glide > Liquid > Nasal > Obstruent

Despite the general tendency for languages to observe the SSP, a number of languages contain clusters that violate it, such as modern Persian, which permits numerous clusters in word final position, many of which violate the SSP (Alamolhoda 2000, Mahootian 1997).

(2) a. fekr *'thought'*
    b. hosn *'beauty'*

Recent research has demonstrated that speakers of languages with relatively simple syllable structures have difficulty in accurately perceiving the number of syllables in words with complex syllable structures. For example, speakers of Japanese, a language with simple syllable structures, were unable to accurately identify the number of syllables in test items such as *ebzo* vs. *ebuzo*, perceiving three syllables in both cases (Dupoux et al. 1999). Such findings have been interpreted as an indication that listeners impose

their native language syllable structure on the strings they hear. Similar findings have also been reported by Kabak and Idsardi (2003) for Koreans listening to English stimuli. It should be noted, however, that the CV structure which is perceived, is the universally least marked syllable type. Thus these findings might also be interpreted as showing that when faced with a complex structure, Japanese (and Korean) listeners rely on universal principles, and favor the unmarked CV syllable structure.

In the present research, we first examined the perception of English speakers listening to CVCC Persian words in which several of the coda clusters also exist in English while others do not. Furthermore, some of the clusters observed the SSP and some did not. This allowed us to evaluate the relative contributions of the existence of a particular syllable type in one's native language and the role of universal principles, in particular the SSP, in perception behaviour. A second experiment with French listeners is in progress to assess the generalizability of the original English findings.

Perceptual study - English

In order to evaluate the relative roles of native language influence and the SSP, a perceptual experiment was conducted. Specifically, we tested the following hypotheses:

Hypothesis 1: In a CVCC structure, English speakers will perceive 1 syllable if the cluster is found in English; 2 syllables if not.

Hypothesis 2: In a CVCC structure, English speakers will perceive 1 syllable if the cluster observes the SSP; 2 syllables if not.

The subjects in the experiment were 22 native English speakers and 4 Persian speakers. The participants listened to pre-recorded Persian words and indicated whether they heard 1 or 2 syllables. The stimuli were 97 target words consisting of a CVCC syllable, as well as 20 CVC and 20 CVCVC words that served as distractors. The stimuli were all real words in Persian, and contained only consonantal segments also found in English, so as not to add any unnecessary complications for the English listeners. The set of targets was randomized twice and both lists were presented to each subject. Thus there were 194 targets per subject, which yielded a total 4,268 responses. Figure 1 shows the responses which were evaluated using an ANOVA.

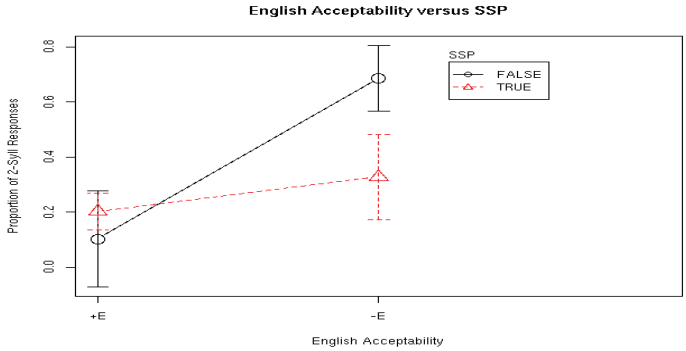

Figure 1. Perception of clusters based on Language and SSP.

These results revealed that clusters existing in English (+E) were perceived as monosyllabic significantly more frequently than clusters not found in English (-E) (e.g. [sk] vs. [šk]). Furthermore, it was found that if the cluster exists in English, the choice of one or two syllables was not affected by whether the cluster adhered to or violated the SSP. Among the clusters not existing in English, however, our results showed a significant effect of the SSP. Clusters that adhere to the SSP (True) were most often perceived as monosyllabic and clusters violating the SSP (False) were most often perceived as bi-syllabic (e.g [šk] vs. [kr]). Thus both Hypotheses 1 and 2 were supported.

Perceptual study – French

To further investigate the relative influence of L1 and the SSP in the perception of coda clusters, a comparison study is underway with French native speakers. French permits a variety of word final clusters (which surface when word final schwa is deleted), some of which are closer to those of Persian than are the English coda clusters. While most clusters in French observe the SSP (e.g.[rk]), a number do not (e.g. [bl]).

In this experiment, the stimuli were nonce words, which consisted of 84 CVCC targets as well as 10 CVC and 10 CVCVC distractors. All items are possible words of Persian, and were recorded by a native speaker of Persian. Of the target items, 44 are words with clusters that are found in French, while 40 have clusters that are not. Furthermore, 44 targets conform to the SSP, while 40 do not. As in the English study, the set of stimuli is randomized twice, and each subject hears both sets. Again, the subjects' task is to indicate whether they perceive one or two syllables.

It is hypothesized that those clusters present in French will be perceived as monosyllabic more frequently than those not present in French. Furthermore, we expect that the perception of the clusters not present in French will

show sensitivity to the SSP. That is, it is predicted that the clusters that conform to the SSP will tend to be perceived as monosyllabic, while those that do not conform to the SSP will be perceived as bi-syllabic.

Conclusions

It has been shown that English speakers' perception of Persian coda clusters appears to be determined by the presence or absence of the cluster in English as well as by the cluster's adherence to or violation of the SSP. One syllable was perceived if the cluster was acceptable in English, while two syllables were perceived when it was not. Furthermore, one syllable was perceived if the cluster conformed to the SSP, while two syllables were perceived if it did not, in particular when the cluster was not found in English. Similar findings are anticipated for French listeners. Thus, we propose that while there is no doubt that one's native language, or L1, affects a listener's perception of another language, in some cases the perceptual behaviour might, in fact, also be due to more universal properties of phonology, ones that give rise to the patterns of the L1 in question in the first place.

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