Vowel-Epenthesis Patterns in Loanword Adaptation of Initial sC Clusters in Najdi Arabic

In this study, I investigate vowel epenthesis that arises in loanword adaptation in Najdi Arabic (NA), an Arabic dialect spoken in the middle region of Saudi Arabia. In addition, I present experimental data from NA, to advocate for the perception-based analysis of loanword adaptation, an approach early adopted by Fleishacker (2002). Based on acoustic and perceptual evidence, Fleishacker has found that in many languages sibilant + stop clusters are resolved by prothesis (i.e. epenthesis before the cluster), while obstruent + sonorant clusters are resolved by anaptyxis (i.e. epenthesis into the cluster). Accordingly, she developed a constraint-based analysis of vowel epenthesis with respect to word-initial consonant clusters in which she proposed a universally-ranked partial scale of context-sensitive DEP-V constraints as follows: DEP-V/S_T » DEP-V/S_N » DEP-V/S_L » DEP-V/T_R.

Analyzing a data consisted of 89 non-native words used in NA, I found that in every initial biconsonantal cluster a vowel is inserted before the cluster, for example, [ɨstub] 'stop', [ismo:l] ‘small’ and [ikre:m] ‘cream’. However, the data of triconsonantal clusters reveals a different pattern. The cluster in /str/ triggers prosthesis, e.g. [ɨstres] ‘stress’, while anaptyxis occurs for the /skr/ and /spr/ clusters with the vowel epenthesizing after the first consonant, e.g. [sɨkri:n] ‘screen’; [sɨbring] ‘spring’.

Accordingly, I propose that in NA, initial biconsonantal clusters trigger prothesis whereas initial triconsonantal clusters trigger anaptyxis except for those starting with /st/. I hypothesized that /st/ is perceptually different from the other /s/+stop sequences. Thus, I argue that Fleischhacker's analysis needs to be refined to include further distinction between /st/ and other /s/+stop clusters. I claim that such distinction depends on the perceptibility of place cues of the stops. Coronals have perceptually weaker cues due to their rapid gesture articulation compared to noncoronals, and given that /s/ has longer duration, the formant transition into the following vowel or approximant will be affected also by the fricative /s/ which has a robust internal cues (Kuehn & Moll 1976; Winitz et al. 1972; Byrd 1994; Öhman 1967). Thus, the vowel after /t/ is affected by the friction noise of /s/ more than the vowel after /p/ and /k/; hence /st/ is more unit-like than /sp/ or /sk/.

Olender (2013) has claimed that /st/ is an exceptional case of /s/+stop. His main hypothesis was that; there is a “perceptual bond” between the /s/ and the /t/ which is broken more easily and this satisfies the cross-linguistic tendency for leaving them together by prothesis. The combined nature of /st/ is supported by the fact that such cluster has been found to be variably acquired by children unlike other /s/+stop clusters which they usually reduce to the plosive (Smith, 1973; Catts and Kamhi, 1984; Jongstra, 2003a). It has been also found that /st/ is acoustically unique in that when a sufficiently long period of silence inserted between /s/ and a vowel, /sV/ results in an /stV/ perception (Steffens et al. 1992). This is also supported by Blumstein (1978) who observed that patients suffering different types of aphasia often inserted /t/ after initial /s/.

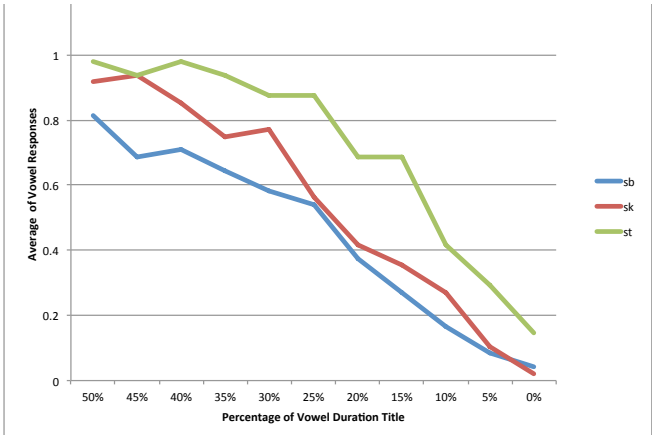
Accordingly, in this paper, I conduct a perceptual experiment to test the hypothesis that /st/ has a greater perceptual bond than /sk/ and /sb/. /sb/ was used instead of /sp/ because in NA /p/ is not a phoneme (in NA, the VOT for /t/, /k/ and /b/ are all positive but /t/ and /k/ have significantly longer VOT than /b/). The linguistic material in my experiment consists of 9 synthesized words of the type siCV; [sibu, situ, siku, siba, sika, sita, sibi, siti, siki]. Each word was manipulated by changing the duration of the first vowel /i/ according to eleven steps. First, the whole vowel was cut and 50% was chosen from the beginning of the vowel. At step 1, this 50% of that vowel occurs between the two consonants. At each successive step, the vowel is cut 5% shorter and thus at step-ten the vowel portion is the shortest. At step eleven, no vowel portion is present. The continuum for the vowel duration is shown in Table 1 below.

Table 1. *Vowel duration of the first vowel at each step.*

Vowel level	1	2	3	4	5	6	7	8	9	10	11
Duration of the vowel	50%	45%	40%	35%	30%	25%	20%	15%	10%	5%	0%

Preliminary results from a pilot study I conducted on 4 subjects showed a main effect for cluster type, $F(2, 6) = 14.17$, $P < .01$. A pairwise comparisons analysis revealed that /st/ is significantly different than the other two clusters. As shown in the graph below, detecting a vowel between /st/ cluster is higher at almost all vowel duration levels than between /sb/ or /sk/.

Figure 1. *Identification responses to each cluster along the vowel duration continuum*



In addition, the lines in the graph show that perceiving the vowel between the cluster becomes more confusing at earlier stages in /sk/ and /sb/ than in /st/. This supports the hypothesis that /st/ indicates a greater robust perceptual bond than the other /sb/ and /sk/ clusters, hence breaking /st/ with a vowel leads to a more dramatic departure from the input than in the case of /sb/ and /sk/. Based on these results, a full experiment will be conducted on more NA speakers. In addition, since the Fleischhacker's hypothesis is language-independent, I plan to conduct the same experiment on native speakers of other languages.

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