

# Variable Adaptation of /v/ and /tʃ/ in English Loanwords in Saudi Arabic

Areej Alenazi, Sam Hellmuth

Language and Linguistic Science, University of York, UK

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## Abstract

This study seeks to explore the impact of the input modality, language exposure, context, and gender on the production patterns of two non-native sounds, /tʃ/ and /v/, in Saudi Arabic. A production task was conducted to test 67 Saudi speakers in three conditions: aural-only (auditory inputs), written-only (orthographic inputs), and aural-written (auditory-orthographic inputs). Language exposure had a main effect on the production of the two sounds. Context was a major factor influencing the production accuracy of /v/ but not /tʃ/; /v/ was more likely to be devoiced in word-final position. The written input resulted in a decrease in the production accuracy for /tʃ/ but not /v/, suggesting that the effect of the input type varies for different non-native sounds.

Keywords: borrowing, variable adaptation, input modality, language exposure

## Introduction

When one language borrows a word from another language, a non-native sound may be preserved or substituted (e.g., Kang et al. 2016). This means that substitution doesn't necessarily occur when a sound doesn't exist in the native language. Previous studies of English loanwords in Arabic (e.g., Al-Athwary, 2017) showed variations between speakers in the production of /tʃ/ and /v/: /tʃ/ was either preserved or replaced by /ʃ/; /v/ was sometimes preserved and sometimes replaced by /f/. Prior research has attributed these variations to Arabic phonology, but less attention has been paid to the role of perception or orthography.

Research on L2 acquisition suggests that the input modality (with acoustic and/or orthographic information) in which a lexical item is initially encountered can influence the production of non-native sounds, especially if they are realised differently or do not occur in the native language (e.g., Bassetti, 2017). The production patterns of non-native sounds may thus vary with how borrowers are first exposed to a source word.

In this study, we consider the possible impact of input modality and a range of other factors (context, gender, and level of English exposure) on production accuracy of the two sounds.

## Methodology

The participants were 67 Saudi speakers, split by gender (31 male/ 36 female) and level of English exposure (high/medium/ low). Adapting the design of Vendelin and Peperkamp (2006), in this study, participants' oral productions of target words were elicited in three conditions: aural-only, written-only and aural-written. In aural condition, they heard non-words pronounced by an English native speaker, and in written condition they saw the word on screen. In aural-written condition, they heard the non-words while viewing the written forms on screen. Gorilla (<https://gorilla.sc>) was used to present stimuli and record participants' responses. The stimuli were 24 CVCVC non-words with target segments embedded in three positions: initial, intervocalic and final. The vowels were held constant with /æ/ in the first syllable and /ɪ/ in the second syllable. In each condition, participants were requested to produce six non-words twice. Written stimuli were presented in English orthography, with /v/ spelled with the letter <v> and /tʃ/ with the digraph <ch>; /æ/ was spelled with <a> and /ɪ/ with <i>. Recordings of auditory stimuli were produced by a female native speaker of British English, normalised to the same intensity level (75 dB). Participants' productions were auditorily coded as one of either [v~f] or [ʃ~tʃ], by the first author, with reference to the waveform and spectrogram in Praat.

## Results

Mixed effects logistic regression models were run for each target segment to estimate the probability of the binary outcome based on the different predictors. Figures 1-2 visualise the predicted probability of substitution for each target. Overall, production accuracy (i.e. preservation of the loan segment) was lower for /v/ than /tʃ/. Language exposure had a main effect on the production accuracy of /v/; the high exposure group ( $\beta = -2.1889$ , SE = 0.4171,  $z = -5.247$ ,  $p = 1.54e-07$  \*\*\*) and the medium exposure group ( $\beta = -1.0199$ , SE = 0.4059,  $z = -2.513$ ,  $p = 0.01198$  \*) are each significantly different from the low exposure group. There was also a main effect of context: /v/ was more likely to be produced in both word-initial context ( $\beta = 1.5524$ , SE = 0.4960,  $z = 3.130$ ,  $p = 0.00175$  \*\*) and word-intervocalic context ( $\beta = 0.8802$ , SE = 0.4316,  $z = 2.040$ ,  $p = 0.04139$  \*). Female participants showed higher production accuracy than male participants for /v/ ( $\beta = -1.9756$  (SE = 0.4181,  $z = -4.725$ ,  $p = 2.30e-06$  \*\*\*) as well as an interaction of gender with condition ( $\beta = 1.2801$ , SE = 0.4087,  $z = 3.132$ ,  $p = 0.00174$  \*\*), whereby male participants were less likely to produce /v/ whenever aural input is available. The performance of the female participants did not differ between conditions. Input modality had a main effect on production accuracy of /tʃ/. The results showed that /tʃ/ was less likely to be produced in the aural-written condition ( $\beta = 1.1494$ , SE = 0.3543,  $z = 3.245$ ,  $p = 0.00118$  \*\*) and in the written condition

( $\beta = 3.1923$ ,  $SE = 0.3534$ ,  $z = 9.033$ ,  $p = < 2e-16$  \*\*\*) than in the aural condition. The effect of language exposure was also significant; the high exposure group differed significantly from the low exposure group ( $\beta = -2.4332$ ,  $SE = 0.6027$ ,  $z = -4.037$ ,  $p = 5.4e-05$  \*\*). The production accuracy of /tʃ/ was not affected by context or gender.

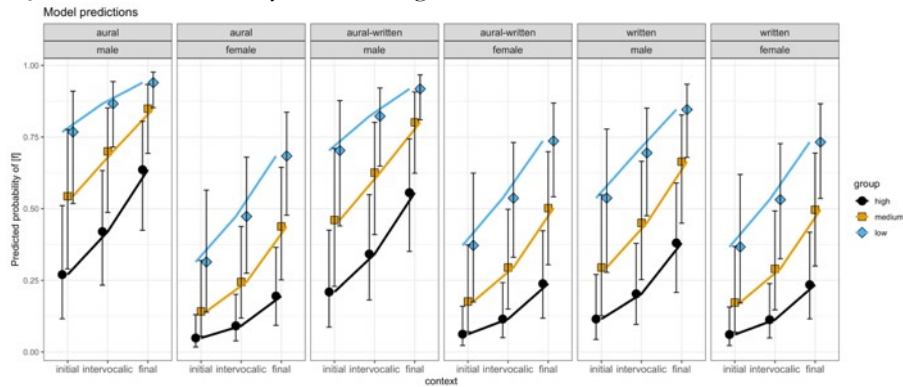


Figure 1. Predicted probability of [f] production in target non-words by context, group (level of language exposure), condition and gender.

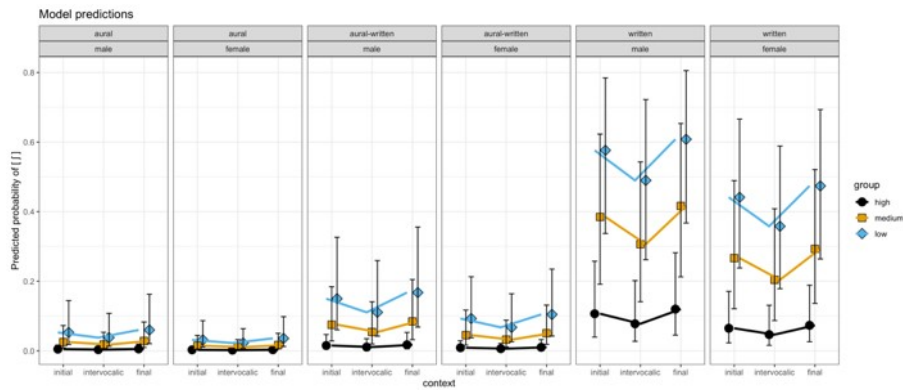


Figure 2. Predicted probability of [ʃ] production in target non-words by context, group (level of language exposure), condition and gender.

## Discussion

The influence of level of English exposure is most evident in how input condition contributes differently to the production of /v/ and /tʃ/. Overall, as already noted, the presence of written-only input supported the production accuracy of /v/, but this effect was greater with more exposure to English. Participants in the high exposure group were more likely to utilize the orthographic information whereas written-only input had reduced impact on production for the participants in the low exposure group. In contrast, the

absence of aural input resulted in lower production accuracy for /tʃ/, though participants in the high exposure group had the highest production accuracy in written condition, perhaps as they are more familiar with English orthography.

These results contrast with some previous studies which found that orthographic input along with auditory input can improve production accuracy of non-native sounds (e.g., Davidson, 2010), but are in line with other studies which showed that orthographic input accompanying auditory input is not helpful (e.g., Vendelin and Peperkamp, 2006). It is worth noting that target /tʃ/ was spelled as <ch> in the stimuli, which in English can represent not only /tʃ/ but also /ʃ/ and even /k/ (e.g., chair, chef, and character). This spelling inconsistency contrasts with the transparency of Arabic orthography where one letter represents one sound. Context influenced production of /v/ but not /tʃ/: participants were more likely to replace /v/ with [f] in word-final position. It is worth noting that the final /v/ was partially devoiced in the auditory stimuli, which is a feature of English word-final fricatives, so /v/ was even more similar to the participants' closest native sound /f/ in word-final position. The source of devoicing in the participants' own productions cannot be attributed to their native language since has a word-final voicing contrast (e.g., [dəz] 'push' and [dəs] 'hide'). Thus markedness, rather than native language transfer, may have influenced participants' production of /v/ (Eckman, 1991).

In conclusion, the findings demonstrate a primary role of language exposure in influencing variable adaptation of loan segments; participants with high English exposure were more likely to produce target-like /v/ and /tʃ/. Nevertheless, all participants, regardless of level of English exposure, struggled with production of /v/ in word-final context. Finally, written input supported production accuracy for /v/ but not for /tʃ/, suggesting that the effect of the input type (auditory, written, or both) varies for different non-native sounds.

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