

The Shibboleths of the Kusaal Speakers of English as a Second Language in Ghana

Hilda Abla Kodzoe-Bonto*, Elizabeth Orfson-Offei, and Jemima Asabea Anderson

Department of English, University of Ghana, Ghana

E-mail: hylda.bonto@gmail.com, <https://orcid.org/0009-0001-2229-4236>

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Abstract

This is a socio-phonetic study of the production of the English post-alveolar affricates /tʃ, dʒ/ by 30 student-teachers and workers from Gbewaa College of Education in the Upper East Region, Ghana. The focus of the study was to confirm the substitution of the post-alveolar affricates /tʃ, dʒ/ for velar plosives /k, g/ by Kusaal speakers of English as a Second Language and to uncover factors that influence the substitutions. The Variationist theory employed allowed for quantitative data analysis to affirm and define the pattern of substitutions. The findings revealed that 22.50% of 1800 tokens of /tʃ/ were substituted for /k/ and 38.39% of 1800 tokens of /dʒ/ were substituted for /g/. This study sheds light on the phonological intricacies and distinctive patterns that emerge when Kusaal speakers navigate English as a second language. Leveraging extensive documentation and previous academic insights, the research delves into the nuanced intersections of linguistic influence and adaptation. Through an analytical lens, it seeks to unpack how native Kusaal phonological features intertwine with English, resulting in unique accents and pronunciations that enrich the broader discourse on Ghanaian English variants. The regression model analysis was significant at the 5% level with a p-value of 0.001, and the prediction was reliable at 75.5% or 69.1%. The substitutions of [tʃ~ k] and [dʒ~ g] affirm the phenomenon among the Kusaal speakers of English. An audit analysis of the consonant sound systems of both languages revealed the absence of the post-alveolar affricates in Kusaal as a factor. A study of the phonological environments also revealed that the presence of certain vowel sounds triggered substitutions in word-initial and final positions. This study, among others, reiterates the importance for teachers of second languages to know the features of their learners' L1, as this will greatly assist them in coming up with the best interventions to help their learners.

Keywords: Accent, Acoustic Segmentation, Ghanaian English, Nativization, Phonological Position

1. Introduction

The English in Ghana has transformed from the contact language in the 16th century (Adjaye, 2005 ; Ngula, 2014) and the colonial language to a variety today that is distinct from British English. Ghanaian English has continued to be enriched with flavours from the many indigenous Ghanaian languages. The process of transformation, which Schneider (2007, 2014) is discussed in his Dynamic Model of post-colonial Englishes, has been unfolding for many years now. Today, researchers like Huber (2014) and Appiah (2020) locate the English spoken in Ghana between the nativization and endonormative stabilization stages of Schneider's model. The nativization process is "reflected in the linguistic characteristics as stress patterns, vocabulary from the local languages, grammatical features which indicate the



influence of local languages, and semantic concepts drawn from other languages spoken in the communities” (Crystal, 2003, p. 80). Adjaye (2005), cited (Okyere, 2013) , precisely describes how Ghanaian English (GhE) has evolved and says that.

It is inevitable that the GhE accent will be influenced by the indigenous languages in the country, particularly since English is one of many languages and is in constant contact with the other languages. Most speakers of GhE are at one and the same time speakers of one or more indigenous languages. There is therefore a two-way transference: from English to the other languages and vice versa, with the result that the pronunciation of certain segments in GhE could be attributed to various local languages,” (pp. 277)

Agreeing with Adjaye’s observation are Koranteng, (2006) (Gyasi, 2017) and many other scholars who have said that the English Ghanaians speak is a variety on its own, influenced by Ghanaian indigenous languages. While Ghanaian English continues to be studied and documented, it is important to note that there is no homogenous accent of English in Ghana. Quartey (2013) argues that the English spoken in the southern part of Ghana, which has, over the years, dominated the discourse of Ghanaian English pronunciation, is markedly different in some respects from that spoken in the northern part of Ghana. She asserts that there is a need to study the English spoken in the northern part of Ghana to fully describe spoken English in Ghana and that focusing more on southern Ghana English does not tell the full story.

It is in light of this that this paper is interested in finding out how the sound patterns of one of the many indigenous languages in the north of Ghana, Kusaal, influence how Kusaal natives speak English as a second language. An observation made by some educated Kusaas indicated the substitution of the post-alveolar affricates for the velar plosives, a phenomenon that does not exist among southern speakers of English. The researchers found this observation very interesting and worth further investigation to enrich the discussion of the distinctive features of English among various indigenous people in Ghana.

1.1. Objectives

- To establish the extent of the substitution of the post-alveolar affricates /tʃ, dʒ/ for the velar plosives /k, g/ by educated Kusaal speakers of English.
- To identify the factors that have led to this substitution.
- To find out the phonological environments that elicit the use of the velar plosives in place of the palato-alveolar affricates.

1.2. Research Questions

- Does the substitution of the post-alveolar affricates for velar plosives exist among the Kusaal speakers of English?
- What influences the substitution?
- What phonological environments are eliciting the substitution?

2. Literature Review

Labov (1972) carried out the famous variation research in Martha's Vineyard to understand the implications of linguistic social variables such as ethnicity, occupation, and age on language variation and change on the diphthongs (ay) [ai] and (aw) [aʊ] (p. 14). 69 informants, made up of 42 English descent, 16 Portuguese, and 9 Indians, were used for the study. The selected informants were the three main ethnic groups on the island.

3,500 instances of (ay) and 1,500 instances of (aw) of data were collected and analysed. The findings indicated the centralization of (ay) and a rise in the centralization of (aw) all in the linguistic environment of the following consonants /h, l, r, w, m, n/ in the initial segmental environment favours centralization in words like *right, wife, night, nice, house, out*. It was noted that Portuguese descent use of centralization was higher than that of the English descent and the Indian descent (Labov, 1972, p.34). Labov accepts that the technique employed in the interview was not rigidly followed and "a number of changes in the interview structure were made as the study progressed" (Labov, 1972, p. 41). Taking note of all the shortfalls in the techniques used in Martha Vineyard, Labov developed a more refined technique, which he later employed in the famous New York (1966) research. Fought (2006) in her quest to find out the variety of English spoken in New York, found that ethnic origin was influential to language variation. Three New Yorkers with different ethnic backgrounds, an African American, a Puerto Rican American, and a European American interviewed on the same topic. All three sounded like New Yorkers with phonological characteristics such as raised [ɔ̃] as in *more* or *floor*, yet all three sounded different with a variant associated with their ethnicity. The African American used [f] for [θ] in *teeth* and 'monophthongization' of [aj] as [a] in *climbing*. These phonological features are variants linked to African American Vernacular English (AAVE). The Puerto Rican American used the vowels [i] and [u] with no glide, a little bit higher compared to other dialects. In some way, the European American also exhibited some slight variation. These sociolinguistic studies augment the argument that the ethnic background of speakers of English as a second language can lead to variation or accentedness.

Quartey's (2013) comparison of Akan speakers of English from the south of Ghana and Upper West speakers of English from the north revealed that the Akans used the post-alveolar approximant significantly more than the northern participants, who also used other variants. Again, while most of the Akan participants did not have any issues with the realization of the

post-alveolar fricatives, many of the participants from the north substituted the post-alveolar fricatives for the voiceless alveolar fricatives. She concluded that English spoken in the south of Ghana has features that are different from English spoken in the north and advocated for more studies that focused on English spoken in the north.

Oladimeji (2016) worked on Nigerian English from the perspective of phonology using 150 speakers of English of three ethnic backgrounds (Hausa, Igbo, and Yoruba) guided by sociolinguistic variables of age, sex, occupation, education, L1 exposure, and motivation. The studies confirmed that native Hausa speakers of English exhibited distinctive linguistic features, while the other two ethnic groups retained elements of their mother tongues. The research did not touch on the phonological environment that favoured the ethnic groups' production of the phonemes studied. However, with the focus on post-alveolar affricates, the study confirmed that all three ethnic groups accurately produced the voiceless post-alveolar. The investigation concluded by saying that exposure of participants to their ethnolect before acquiring English as a second language is the reason for phonological variation among the participants.

Similarly, Mbufong (2013) coined the term 'Cameroonization', which he describes as 'the adaptation the English language has undergone, undergoing in the cultural and social situation of Cameroon' (Mbufong, 2013, p. 476). Cameroonian English from the point of phonology, Lamso speakers of English in the northwest region of Cameroon are noted for monophthongisation of diphthongs. The Lamso speakers of English will pronounce words with the following diphthong /əʊ/ as is *low*, as /u/ e.g., *show* [ʃu], *goat* [gut], and *go* [gu], and approximate long vowels as short vowels /i: / as in *meat*, *me*, *mean*; /e/ as [mɛt], [mɛ], and [mɛn] (p. 478). Nonetheless, Peter, Wolf & Simo Bobda (2003) recognised the fact that L1 plays a vibrant role in distinguishing Gambian English due to the strong articulatory feature of 'fronting' of most consonants. Gambians' articulation of the RP affricates /tʃ/ and dʒ/ associated with the Wolof, Mandinka, and other associated languages to Aku was rendered as "/tj/ or /tɕ/, and less commonly as /dj/ (e.g. [tɕɛntɕ] change, [tɕɛtɕis] churches, [kɔntɛdjfn] contagion). /tʃ/ is sometimes pronounced as /dj/, caused by lenition, e.g., much [mɔdj]. Further, /dʒ/ may be pronounced as /j/; e.g., ma[j]ority, reli[j]ion, while syllable-final /tʃ / may be realized as /t / (or weakened as /d/), e.g., [skret, witkraf] scratch, witchcraft" (Peter et al., 2003, p. 50). Darko (2019) studies on 'Homophonous Realization of Contrastive English Lexical Items' endorse earlier studies on Ghanaian English (GhE) by Adjaye (2005); Huber (2008); Koranteng (2006); and Quartey (2009 & 2014), that GhE is heavily influenced by first language (L1) in phonology. He argues that two or more sounds may be merged and given a preferred realisation based on the speaker's L1, e.g. /æ/, /ʌ/, /ə/ → /a/, Darko (2019, p. 70). The phenomenon of vowel reduction in GhE compared to Received Pronunciation (RP) emanates from the fact that most Ghanaian languages do not have some RP sounds.

3. Theoretical Framework

The theoretical frame that guides this study is the Variation theory. The Variation theory employs the variable rule on pronunciation, which posits that the unconscious use of unique sounds in a language that does not belong to a community of people cannot be viewed as an error, but rather as a systemic pattern of variation. The Variationist is interested in how the same idea or sound is expressed differently by different speakers. The Variation paradigm in this case explores how some Ghanaian speakers of English as a second language, the Kusaas, vary in the pronunciation of the post-alveolar affricates. The theory, therefore, investigates the substitution of the post-alveolar affricates with the velar plosives by the Kusaal speakers of English in Ghana. The Variationist paradigm, according to Labov (1966), offers a quantitative analysis of variable linguistic forms to reveal probabilistic forms that have certain resistance from mindful suppression. Labov (1969) further says that the unconscious choices made by speakers in discourse are not random but are systematic and the frequency in the selection of the systemic choices can be predicted. Therefore, the predictable linguistic choices can be statistically and methodologically described as a linguistic variable or ‘variable rule’, according to Sankoff (1988c:984) and cited in Tagliamonte (2006, p. 134). Sankoff elucidates three conditions for a ‘variable rule’ analysis: the linguistic variable should be defined within a discourse that is able to identify the variable whenever it was used in a linguistic performance; the defined choice observed must occur randomly; and finally, the observed linguistic variable should occur repeatedly and must not be studied because it occurred once in a discourse. This current study’s researchers observed that 1) the Kusaal speakers of English use the velar plosives in place of post-alveolar affricates in discourse; 2) the observed shibboleth substitutions occurred randomly in discourses and 3) the substitutions were not a single occurrence but were repeated among several native Kusaal speakers of English as a second language. As all these observations were in line with Sankoff’s conditions for the use of the variable rule, the Variation theory was chosen as the theory to apply in the more thorough investigation of the occurrence of the substitution of the post-alveolar sounds with the velar plosives among native Kusaal speakers of English as a second language: the factors that lead to these substitutions and the phonological environments that elicit such substitutions.

4. Methodology

4.1. Method of Data Analysis

As the Variationist theory is deep-rooted in “quantitative analysis to validate interpretation of data,” Dubois and Sankoff (2001), the Rbrul software (Johnson 2009; R Team 2007) was used to numerically analyse the data. We relied on the use of frequency distribution tables, percentages, and measures of mean and standard deviation for the analysis. The percentages established the number of post-alveolar affricates [tʃ and dʒ] substituted for [k and g]

correspondingly per 100 instances. The mean is the average number of substitutions out of the total number substituted. The standard deviation measures the dispersion of the distribution of the substituted sounds relative to the mean. The predictive model of regression and the correlation analyses were used to measure significance levels at 5% ($p < 0.05$).

4.2. Participants

The quasi-random sampling method was employed to select participants for the study. The sampling method targeted specific participants: native Kusaas who speak English as a second language. Further, the participants should have attended their basic and secondary education in the northern sector of Ghana, where they originate from. The demographic criterion for place of education was used to reduce the occurrence of linguistic influence of other indigenous Ghanaian languages, particularly southern Ghanaian indigenous languages, which are typically Kwa languages, while those in the north are largely Gru languages. As Ghanaians are taught to write and speak English from the basic school level, it is accepted that Ghanaians who have reached the college level of education can be described as educated Ghanaian speakers of English. For this reason, 25 students in years 1 and 2 of Gbewaa College of Education, Pusiga, were selected for this study. Year 3 students were excluded because they were writing their examinations at the time of data collection. Five other participants were selected from the tutors and other workers of the college. For a good representation, there were 15 males and 15 females, totalling 30 participants in all.

4.3. Material for Elicitation

It had been observed earlier that some Kusaal speakers of English were able to produce the post-alveolar affricate phones in *chalk* and *George*, but not in *chair*, *fetch*, *college*, and *bridge*, which they produced as [kair], [fek], [kɔleg], and [bri:g], respectively. For this reason, this study opted to focus on the environment in which the post-alveolar affricate phones appeared in words. Previous studies like that of Adjaye (2005), Koranteng (2006), and Huber (2008) all agree that typically, Ghanaian speakers of English as a second language approximate the twelve monophthongs of the RP to seven. The RP vowels /i:/ and /ɪ/ are approximated to [i] in Ghanaian English (GhE) / ə, ɜ: and e/ are rendered as [e], /æ, ʌ, and ɑ: / realised as [ɑ], /ɔ: and ɒ / as [ɔ] and /u: and ʊ/ as [u] in GhE. Undoubtedly, the Ghanaian realisation of the aforesaid vowels upholds the argument by researchers Kachru (1992), Crystal (2003) and Schneider (2007) that L1 sound patterns influence L2 sound production. The approximated vowels in GhE /i/ and /e/ as two front vowels and /ɔ / and /ɑ/ as two back vowels were used to build two-word lists for this study. Wordlist A focused on the /tʃ/ phone in the environment of the selected vowels in the initial, medial, and final positions, while Wordlist B focused on the /dʒ/ phone in the same three phonological environments as the voiceless post-alveolar affricate. Some tokens were picked at random from Wordlists A and B and used in a passage. Suntornsawet (2017) explained

that sounds are inclined to acquire different phonetic realisations in connected speech. The essence of the passage was therefore to test how the same sounds would be produced in connected speech by the same participants. 1800 tokens on Wordlist A (60 words *30 participants) and 420 tokens in the passage, totalling 2220 tokens for /tʃ/, were generated and analysed. For /dʒ/, there were also 1800 tokens for Wordlist B but 450 tokens for the passage, summing up to 2280 tokens for /dʒ/. In entirety, 4470 tokens were analysed for both post-alveolar affricate phonemes. Table 1 gives sample tokens with phonological environments and positions tested.

Table 1. Sample Words with /tʃ/ and /dʒ/ and their environment

Phones	Phonological Environment	Phonological Positions		
		Initial	Medial	Final
Post-alveolar Affricates	Approximated Ghanaian Vowels			
/tʃ/	/e/	Chess	Purchase	Fetch
/dʒ/		Gem	Energy	Merge
/tʃ/	/a/	Chant	untouchable	Hatch
/dʒ/		Jeep	Gadget	Garage
/tʃ/	/i/	China	preacher	Stitch
/dʒ/		Jam	Prejudge	Bridge
/tʃ/	/ɔ/	Choke	botches	Notch
/dʒ/		John	Project	Forge

4.4. Method of Data Collection

Recorded interviews with participants via the Zoom application became the mode through which data was collected. This was because just when the study began, the COVID-19 pandemic peaked in Ghana, necessitating the closure of all educational institutions. The challenges faced using this mode included the inability of most of the participants to use the Zoom application. Participants had to be given a prior voice call to be taken through how to connect to the Zoom application link and audio. Some of the recording sessions had to be called off and rescheduled due to bad internet connectivity and background noise, which distorted the sound quality. Approximately 10 minutes were allocated to each participant per session. All participants involved in the study were willing participants and gave their consent. Before the recordings, participants were informed that the study was generally about how Kusaal speakers of English pronounced the vowel phones. This was done to avert participants' attention from the actual sounds being investigated to minimise hypercorrection. Once the interviews were done, all participants were debriefed and made aware of the actual sounds under investigation.

They were then allowed to indicate if they still wanted to be part of the study or not. They all gave consent to be included in the study.

4.5. Method of Data Analysis

The data collected were coded as KUS_M_ (Kusaal Male Speaker) and KUS_F_ (Kusaal Female Speaker) and numbered for easy identification and analysis. A binary analysis was applied to the data by indicating all the sounds that were produced as /tʃ/ and /dʒ/ as absent and the substituted sounds /k/ and /g/ as present, while taking note of any other realisation of the post-alveolar affricates. All the data were analysed via auditory judgement through repeated listening. The Praat acoustic tool was very helpful in aiding the auditory judgment through repeated listening, especially the connected speech of participants, by segmenting the audio sounds into sound segments. All repaired pronunciations that used the post-alveolar affricates instead were not considered for the analyses because this study is not interested in hypercorrection. Figures 1 and 2 give the acoustic segmentation of two participants' pronounced words into sound segments using Praat. Figure 1 displays the voiceless post-alveolar affricate in word-final position, while Figure 2 displays the voiced post-alveolar affricate in word-medial position.

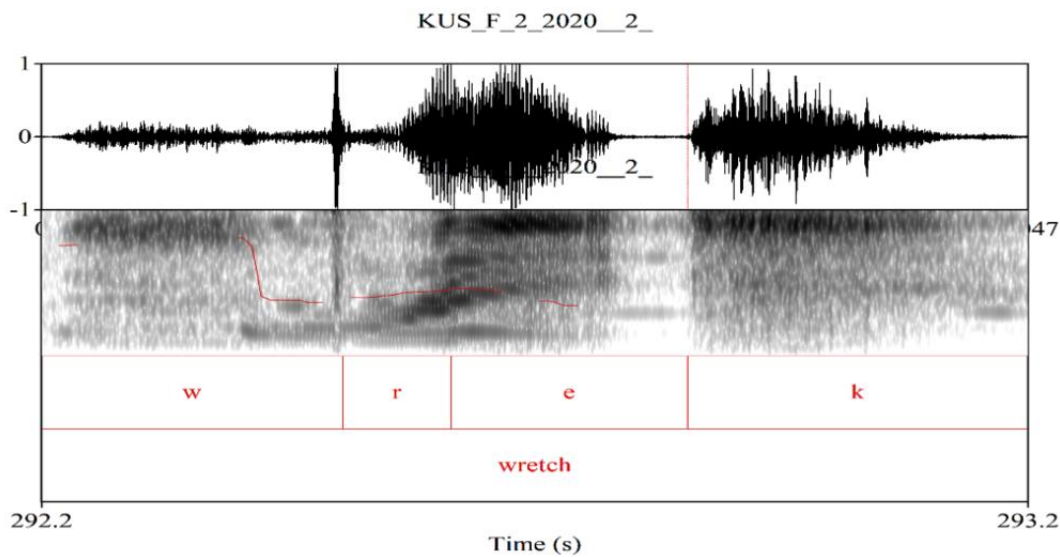


Figure 1. Acoustic segmentation of the word 'wretch' uttered by Female speaker 2

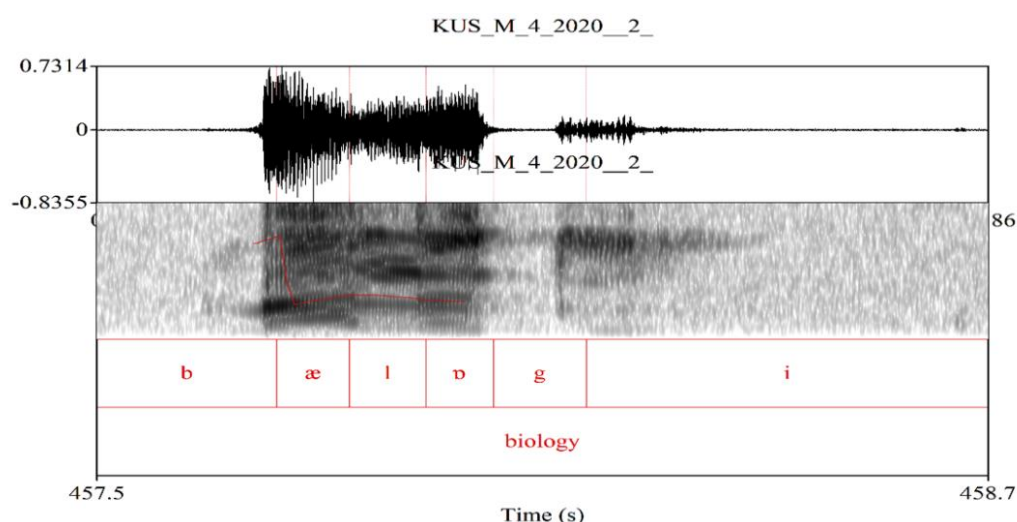


Figure 2. Acoustic segmentation of the word 'biology' uttered by Male speaker 4

5. Result and Findings

Research Question 1: Does the substitution of the post-alveolar affricates for velar plosives exist among the Kusaal speakers of English?

The degree of substitutions was investigated first to help clear the doubt whether this phenomenon was widespread enough, or whether what had been observed were just isolated incidences. 405 tokens representing 22.50% were produced as /k/ out of 1800 word-isolation tokens used for /tʃ/. 691 (38.39%) tokens were realised as /g/ out of 1800 word-isolation tokens for /dʒ/. The graphical model of the substituted sounds /tʃ/ and /dʒ/ to /k/ and /g/ in word isolation are presented in Figure 3. Table 2 displays the frequency distribution of the substituted sounds, while Table 3 gives the mean and standard deviation of sounds in word isolation. Figure 4 gives a graphical representation of the post-alveolar affricates in connected speech followed by a statistical summary in Tables 3 and 4.

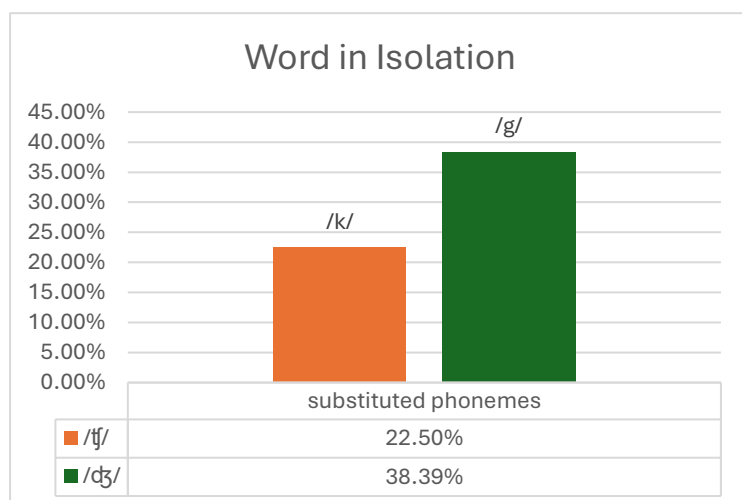


Figure 3. The production of [tʃ ~ k] and [dʒ ~ g] in word isolation in percentage

Table 2. Establishing the proportion of sound substitution /k, g/

Sounds	Number produced as /tʃ and dʒ/	Percentage	Number substituted as /k and g/	Percentage	Total Tokens
/tʃ/	1395	77.50%	405	22.50%	1800
/dʒ/	1109	61.61%	691	38.39%	1800
Total tokens	2504	69.56%	1096	30.44%	3600

Table 3. Summary of substituted sounds in word isolation

Sound	No. Res.	Min	Max	Mean	St. Dev.
/tʃ/	30	0	34	13.5	13.35
/dʒ/	30	3	46	23.05	10.36
Total /tʃ and dʒ/	30	3	80	36.53	22.5

No Res: Number of Respondents

Min: Minimum

Std. Dev. Standard Deviation

Max: Maximum

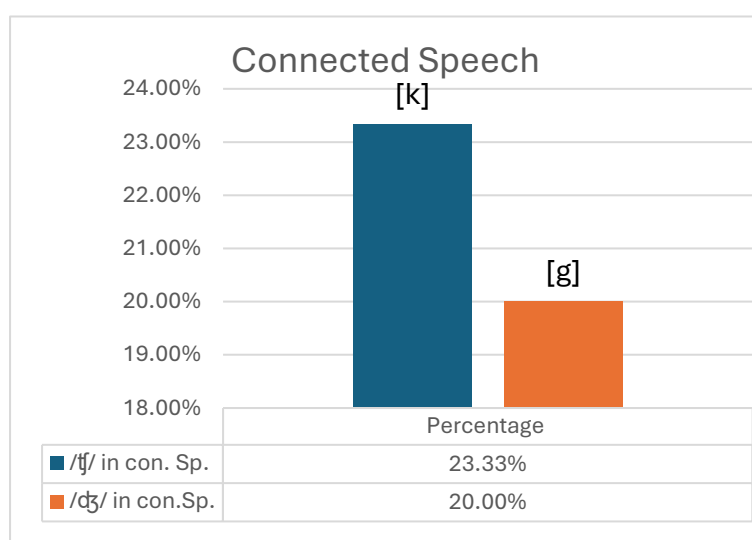


Figure 4. Production of [tʃ~k] and [dʒ~g] in connected speech

Table 4. Percentages of sound substitution of /tʃ and dʒ/ in connected speech

Sounds	No. of /tʃ/ and /dʒ/	No. of sub of /tʃ/ and /dʒ/	Percentage of /tʃ/ and /dʒ/	Total Tokens
/tʃ/.	420	98	23.33%	420
/dʒ/	450	90	20.00%	450
Total tokens	870	188	21.61%	870

Table 5. Summary of Sound substitution in connected speech

Sounds	No. of Res	Minimum	Maximum	Mean	Std. Dev.
/tʃ/	30	0	10	3.267	2.69
/dʒ/	30	0	7	3	1.91
Total token	30	0	15	6.267	4.07

The total substitution of the post-alveolar affricates to velar plosives was 30.44%, and the standard deviation was 22.5. This indicates that the substitution of these sounds in Wordlists A and B was substantial. Correspondingly, the 21.61% substitutions with a standard deviation of 4.07 in connected speech were sufficient to indicate a trend, rather than isolated cases of substitution, among the Kusaal speakers of English as a second language. Though the percentage values may be telling the story of evidence of substitution, the critical question to ask is ‘how serious should we take the rather small percentage [values]’ (Hudson, 1996, p. 154) as enough evidence for such conclusions? To prove the significance of the substitutions being made in both isolated words in lists A and B, with that of the words in connected speech, further statistics were run to predict the chances of substitutions relying on the regressive analysis model as indicated in Tables 6, 7, and 8. Table 6 shows that the substitution of /tʃ/ with /k/ in Wordlist A and connected speech at a p-value of 0.001 was significant at the 5% level. The model recorded an R-squared value of 79.9% or an Adjusted R-squared value of 74.6%. Thus, the substitution of /tʃ/ with /k/ in Wordlist A can truthfully be used to predict that the same substitution will occur in connected speech.

Results presented in Table 7, on the other hand, indicate that the substitution of /dʒ/ in Wordlist B affected that of the ones read in the passage at a significance level of 5% (p-value of 0.01). The prediction was, however, not reliable in the case of /dʒ/ to predict that the substitution made in the isolated words will also occur in the connected speech. The values for prediction were low at 49.9% for R-squared or 36.9% for Adjusted R-squared. When both sounds were combined to run the model, as shown in Table 8, the model for the substitution was significant at the 5% level with a p-value of 0.001. The model for prediction was reliable at 75.5% or 69.1%. The post-alveolar affricates can therefore be said to be phones that are substituted with velar plosives by Kusaal speakers of English.

Table 6. Effect of isolated word substitutions on /tʃ/ sound substitution in connected words

	Estimate		Std.Error	Tvalue	Pr(> t)
(Intercept)	0.079		0.554	0.142	0.883
reg\$total_tʃ_initial	0.384		0.163	2.363	0.027*
reg\$tol.tʃ_medial	0.596		0.125	4.754	0.001*
reg\$tol.tʃ_final	0.064		0.066	0.973	0.341
reg\$tol.dʒ_initial	-0.068		0.166	-0.413	0.683

reg\$tol.dz_medial	0.218		0.119	1.826	0.081.
reg\$tol.dz_final	-0.096		0.086	-1.106	0.280
R-Squared		0.799			
Adjusted R-Square		0.746			
Degree of freedom		6 and 23			
F-statistics		15.190			
p-value		0.001			

Significant codes: 0 '****' 0.001 '***' 0.01 '**' 0.05 '.' 0.1 '.' 1

Table 7. Effects of isolated word substitutions on total /dz/ sound substitution in connected words

	Estimate		Std.Error	Tvalue	Pr(> t)
(Intercept)	0.622		0.621	1.001	0.327
reg\$total_ʃ_initial	0.157		0.182	0.860	0.398
reg\$tol.ʃ_medial	0.000		0.141	-0.001	0.999
reg\$tol.ʃ_final	0.064		0.073	0.872	0.392
reg\$tol.dz_initial	-0.166		0.186	-0.893	0.381
reg\$tol.dz_medial	0.385		0.134	2.883	0.008**
reg\$tol.dz_final	-0.168		0.097	-1.739	0.095.
R-Squared		0.499			
Adjusted R-Square		0.369			
Degree of freedom		6 and 23			
F-statistics		3.822			
p-value		0.01			

Significant codes: 0 '****' 0.001 '***' 0.01 '**' 0.05 '.' 0.1 '.' 1

Table 8. Effects of isolated word substitutions of post-alveolar affricate phonemes substitutions in connected words

	Estimate		Std.Error	t-value	Pr(> t)
(Intercept)	0.701		0.924	0.758	0.456
reg\$total_ʃ_initial	0.541		0.271	1.996	0.058.
reg\$tol.ʃ_medial	0.596		0.209	2.851	0.01**
reg\$tol.ʃ_final	0.128		0.109	1.170	0.254
reg\$tol.dz_initial	-0.234		0.276	-0.848	0.405
reg\$tol.dz_medial	0.603		0.199	3.034	0.01**
reg\$tol.dz_final	-0.264		0.144	-1.833	0.08.
R-Squared		0.755			
Adjusted R-Square		0.691			
Degree of freedom		6 and 23			

F-statistics		11.82			
p-value		0.001			

Significant codes: 0 '****' 0.001 '***' 0.01 '**' 0.05 '.' 0.1 ' ' 1

Research Question 2: What influences the substitution?

An audit of the consonant sound system of both RP and Kusaal was done to find out if there were any systemic variations in there that could be a possible factor for such unique substitutions among the Kusaal speakers of English. The audit revealed that both RP and Kusaal consonant systems had 24 consonant phonemes (refer to Tables 9 and 10).

However, these phonemes were not the same. For instance, Kusaal neither has affricates, the dental phonemes /θ, ð/ nor the post-alveolar phonemes /ʃ, ʒ, tʃ, dʒ/ that English has.

Table 9. Kusaal Consonant Chart

	bilabial	labio-dental	alveolar	palatal	velar	labial-velar	glottal
plosive	p b		t d		k g	kp gb	ʔ
nasal	m		n	ɲ	ŋ	ŋw	
fricative		f v	s z	ʃ			h
approximant				j		w	
lateral			l				
trill			r				

Adapted: Musah (2010, p. 31)

Table 10. English Consonant Chart

	bilabial	labio-dental	dental	alveolar	post-alveolar	palatal	velar	glottal
plosive	p b			t d			k g	
nasal	m			n			ŋ	
fricative		f v	θ ð	s z	ʃ ʒ			h
affricate					tʃ dʒ			
approximant	w					j		
lateral				l				
trill				r				

Adapted: Roach (1991, p.52)

It can be said that the absence of affricates in Kusaal influences the substitution of these sounds with the plosives among Kusaal speakers of English as a second language. When there are systemic consonant variations in the L1 and L2, systemic consonant conflation (Brown, 1991) occurs. Brown (1991) expounds that the conflation that were customarily found with learners of ESL or EFL saw /tʃ/ conflated as /ʃ/, and /dʒ/ conflated as /z/ or /j/. However, findings from this current study deviate from Brown's general observation. From the audit of the sound systems, the phonemes /tʃ, dʒ/ were not in the Kusaal consonant system, and therefore, this could explain why /tʃ/ did not conflate with either /ʃ/ or /dʒ/ but rather /k/. Though the phonemes /z and j/ are present in the Kusaal system, neither of them was used to replace /dʒ/ as occurred in Brown's study, but /g/ was used instead. One of seven models of phonological processes that lead to L2 pronunciation features because of the transfer from L1, as proposed by Mayor (2008), is that the use of the nearest L1 phoneme that is equivalent to the L2 would be selected. This could explain why the velar plosives were used in place of the post-alveolar affricates. The tendency to make the sound systems of the L1 and L2 conform is another aspect of Mayor's (2008) model. It could be said that with the 69.56% instances where the post-alveolar affricates correctly occurred, the participants who produced them have successfully acquired these sounds in English or managed to conform to the English sound system. On the other hand, with the other 30.44% of instances of substitutions, the participants were trying to make the sound system in English conform to that of Kusaal.

Research Question 3: What phonological environments are eliciting the substitution?

An analysis of the positions, that is, whether the sound that is substituted is at the initial, medial, and final positions, was made (see Figure 5). The voiceless post-alveolar affricate at the final position was substituted 51.33% of the time. Table 11 exhibits the average substitution at the final position with a mean value of 10.27 and a standard deviation of 8.3. This means that it is more plausible for Kusaal speakers of English to substitute the /tʃ/ phoneme at word-final with /k/ than in word-initial and medial positions. Thus, they are more likely to produce *fetch* as [fek], for instance.

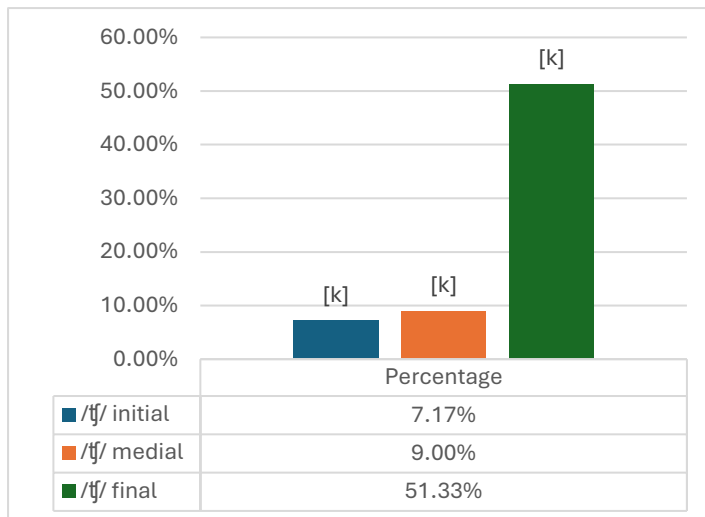


Figure 5. Phonological position of /tʃ/ realised as [k]

Figure 6 shows the data representation for the voiced post-alveolar affricate /dʒ/ at the final position, which leads to the substitution and is closely followed by the medial position. The mean of 10.63 and a standard deviation of 7.69 means that /dʒ/ in word-final position triggers the phoneme to be realised as /g/. However, looking at the mean difference of /dʒ/ at word medial and final, which is 0.93, suggests that at word medial, the sound triggers /dʒ/ to be realised as /g/ than in the case of /tʃ/

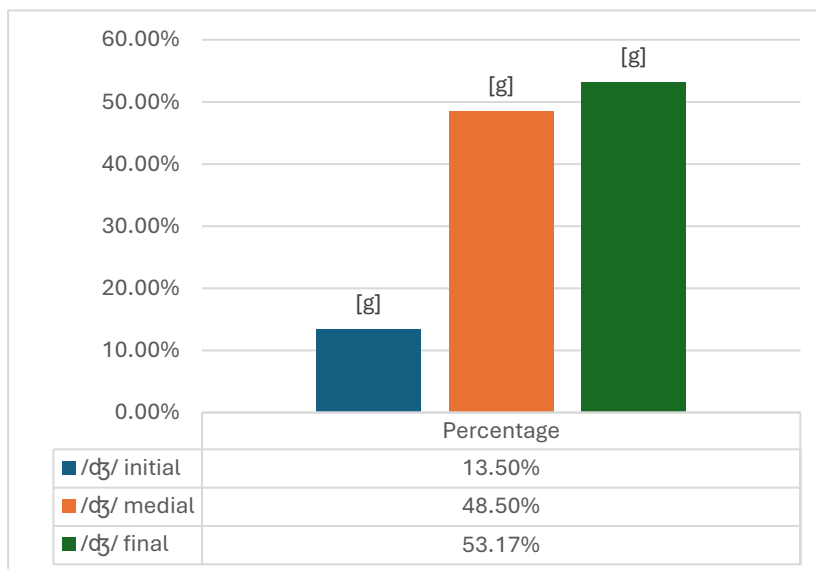


Figure 6. Phonological position of /dʒ/ realised as [g]

Table 11. Average substitution of sounds regarding phonological position by respondents

Age / Phonological Positions	No. Res	Min	Max	Mean	Std. Deviation
Age	30	19	47	26.23	7.84
/tʃ/ initial	30	0	10	1.43	2.19
/tʃ/ medial	30	0	11	1.8	2.37
/tʃ/ final	30	0	20	10.27	8.03
/dʒ/ initial	30	0	10	2.7	2.9
/dʒ/ medial	30	2	17	9.7	5.16
/dʒ/ final	30	0	20	10.63	7.69

To accurately determine the significance of the substitutions made by the Kusaal speakers of English, rather than relying solely on the results of the percentages, a correlation analysis was employed. The correlation analysis was used to establish how related and significant the substitutions being made in the three phonological positions of /tʃ/ and /dʒ/ were. Table 12 exhibits positive correlation values in all three phonological environments. This result reflects that the substitution made by participants in all the phonological positions of /tʃ ~ k/ will also occur with that of /dʒ ~ g/. All substitutions made in the three phonological positions were all significant at the 0.05 level.

Table 12. Correlations of substituted /tʃ/ and /dʒ/ regarding their phonological position

Phonological Position	/tʃ/ initial	/tʃ/ medial	/tʃ/ final	/dʒ/ initial	/dʒ/ medial	/dʒ/ final
/tʃ/initial	1					
/tʃ/medial	.409*	1				
/tʃ/ final	.524**	0.253	1			
/dʒ/ initial	.433**	0.121	0.252	1		
/dʒ/ medial	.454**	.322*	.618**	.689**	1	
/dʒ/ final	.487**	0.242	.868**	0.194	.690**	1

*Correlation was significant at the 0.05 level. **Correlation was significant at the 0.01 level

The second phase of the phonological environment of Research Question 3 looked at how the GhE approximated vowels /e, a, i, ɔ / may have influenced the substitution of the sounds under study. Figures 7, 8, and 9 show how the phoneme /tʃ/ in the three phonological environments was influenced by the vowels. /i/ triggers the /tʃ/ in initial and final phonological positions to be produced as [k], while /a/ does so when it precedes /tʃ/ in word medial positions. A careful study of the result analysis shows that even though /e/ did not lead in any of the phonological contexts, it was, however, always the second in percentage for both sounds. This presupposes that /e/ has a strong probability to trigger /tʃ/ to be realised as /k/ in all phonological positions.

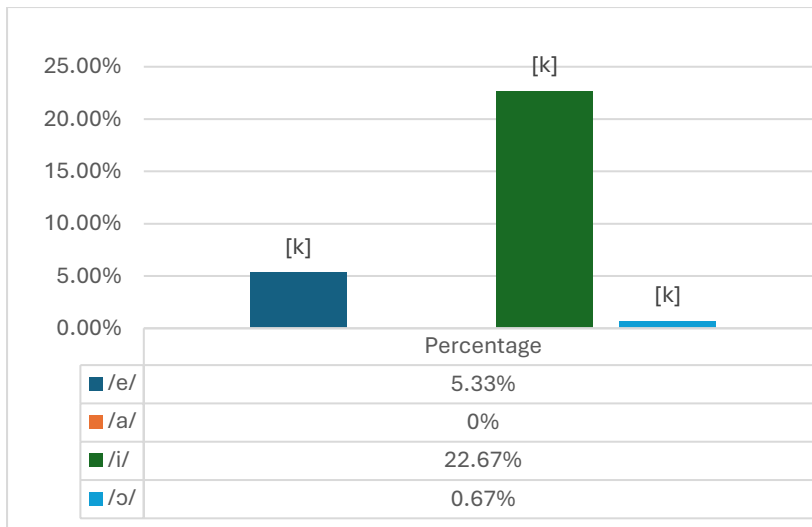


Figure 7. Phonological context of substituted /tʃ/ word initial influenced by vowels

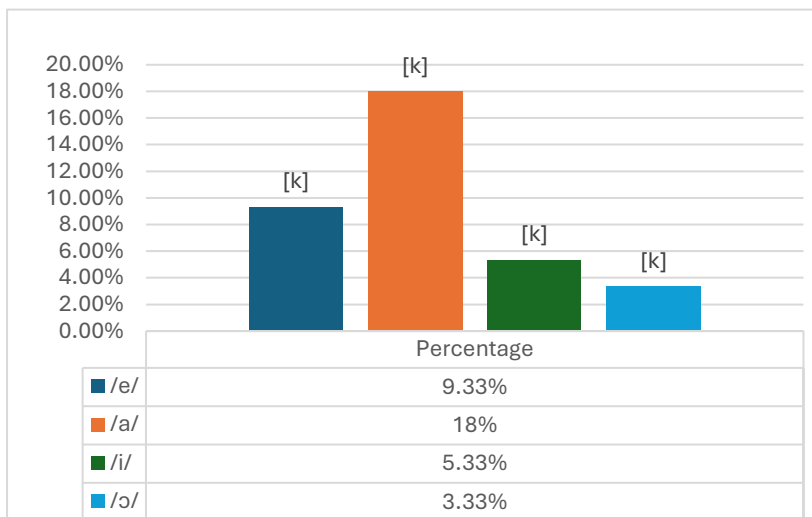


Figure 8. Phonological context of substituted /tʃ/ word medial influenced by vowels

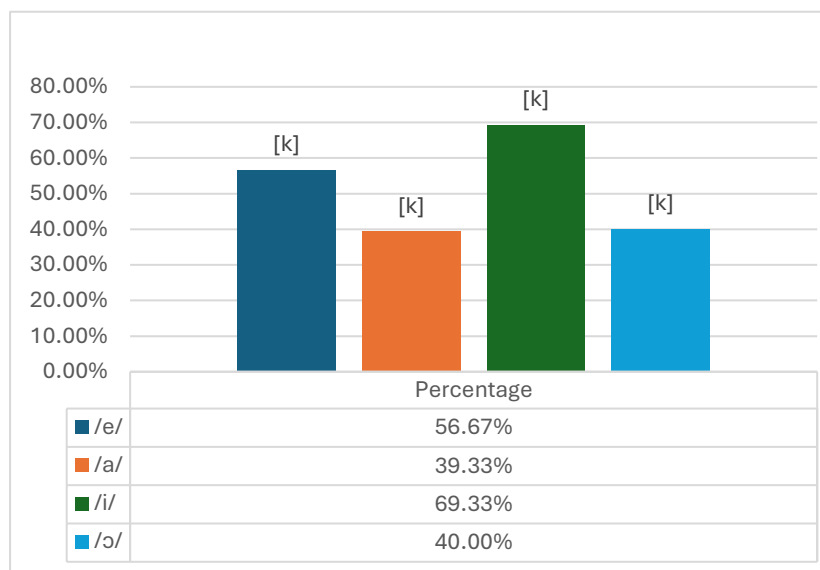


Figure 9. Phonological context of substituted /tʃ/ word final influenced by vowels

In the case of the phoneme /dʒ/, when the vowels /i/ and /e/ precede /dʒ/, they trigger /dʒ/ to be realised as [g] at word initial, as indicated in Figure 10. When /dʒ/ is preceded by /e/ in the medial position, it tends to be produced as [g] more (see Figure 11). Finally, as shown in Figure 12, in the final position, /dʒ/ in the environment of /a/ will elicit /dʒ/ to be substituted for [g]. From the data presented for both phonemes /tʃ/ and /dʒ/, it can be concluded that the back vowel /ɔ/ does not have much significant effect in triggering substitution of the sounds for velar plosives. The approximated vowels /i, e, a/ were the vowels with the highest probability for substitution.

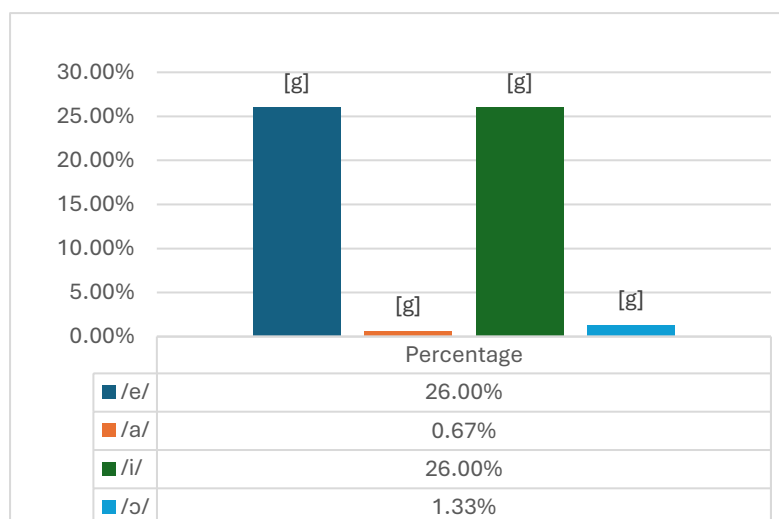


Figure 10. Phonological environments of substituted /dʒ/ word initial influenced by vowels

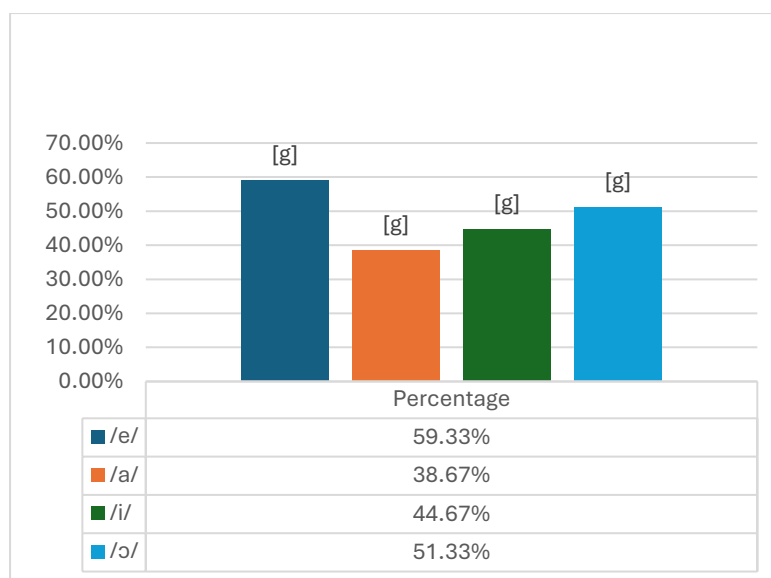


Figure 11. Phonological environments of substituted /dʒ/ word medial influenced by vowels

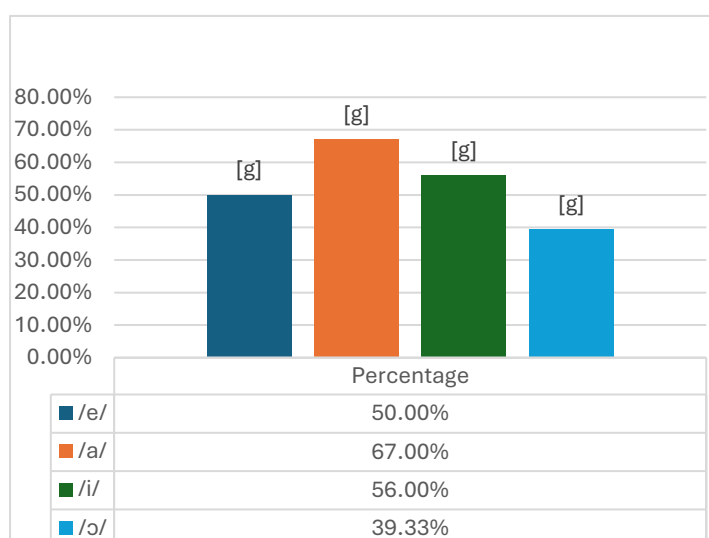


Figure 12. Phonological environments of substituted /dʒ/ word final influenced by vowels

To confidently affirm the percentage analysis made, a correlation analysis was run. Table 13 presents the correlation relationship of the variables. /a/ preceding /tʃ/ in the initial position recorded a zero substitution, therefore it was a constant variable. The negative correlation means that when the /tʃ, dʒ/ in any of the positions increased in substitution, the identified environment reduced in substitutions. On the other hand, when there is a positive correlation, it means that an increase in the substitutions of /tʃ, dʒ/ in the identified environment leads to an increase in substitution in the identified context. It was realised that most of the negative correlations of /tʃ, dʒ/ occurred in the environment of /u/; thus, /u/ does not have much influence on triggering substitution.

Table 13. Correlations of substituted sounds of /ʃ/ and ɖʒ/ regarding the phonological environments

Phonological environments	/ʃ/ initial				/ʃ/ medial			
	/e/	/a/	/i/	/ɔ/	/e/	/a/	/i/	/ɔ/
/ʃ/ initial /e/	1							
/ʃ/ initial /a/	.a	.a						
/ʃ/ initial /i/	0.484**	.a	1					
/ʃ/ initial /ɔ/	-0.053	.a	0.486**	1				
/ʃ/ medial /e/	0.16	.a	0.263	0.298	1			
/ʃ/ medial /a/	0.440*	.a	0.376*	0.196	0.447*	1		
/ʃ/ medial /i/	0.395*	.a	0.15	-0.112	0.179	0.491**	1	
/ʃ/medial /ɔ/	0.164	.a	0.129	-0.053	0.638**	0.356	0.475**	1
/ʃ/ final /e/	0.186	.a	0.511**	0.184	0.117	0.313	0.08	0.074
/ʃ/ final /a/	0.235	.a	0.621**	0.242	0.052	0.314	0.17	0.151
/ʃ/ final /i/	0.135	.a	.364*	0.148	-0.046	0.321	0.284	0.079
/ʃ/final /ɔ/	0.258	.a	.591**	0.235	0.074	0.283	0.223	0.194
/ɖʒ/ initial /e/	0.322	.a	0.206	-0.043	-0.14	0.392*	0.326	-0.066
/ɖʒ/ initial /a/	-0.053	.a	0.486**	1.000**	0.298	0.196	-0.112	-0.053
/ɖʒ/ initial /i/	0.305	.a	.510**	0.076	-0.268	0.296	0.246	-0.117
	/ʃ/ initial				/ʃ/ medial			
	/e/	/a/	/i/	/ɔ/	/e/	/a/	/i/	/ɔ/
/ɖʒ/ initial /ɔ/	-0.077	.a	-0.115	-0.05	-0.13	0.282	0.141	0.153
/ɖʒ/ medial/e/	0.074	.a	0.295	0.003	-0.227	0.291	0.228	-0.051
/ɖʒ/medial /a/	0.315	.a	0.451*	0.009	0.104	0.578**	0.317	0.058
/ɖʒ/ medial /i/	0.201	.a	0.467**	0.226	0.209	0.543**	0.422*	0.309
/ɖʒ/ medial /ɔ/	0.099	.a	0.454*	0.278	-0.041	0.465**	0.207	-0.205
/ɖʒ/ final /e/	0.157	.a	0.473**	0.122	0.061	0.23	0.099	0.062
/ɖʒ/ final /a/	0.158	.a	0.425*	0.165	0.149	0.489**	0.126	0.13
/ɖʒ/ final /i/	0.119	.a	0.422*	0.179	0.058	0.229	0.086	0.025
/ɖʒ/ final /ɔ/	0.214	.a	0.660**	0.253	0.039	0.385*	0.111	0.056
	/ʃ/ final				/ɖʒ/ initial			
	/e/	/a/	/i/	/ɔ/	/e/	/a/	/i/	/ɔ/
/ʃ/final /e/	1							
/ʃ/final /a/	0.782**	1						
/ʃ/final /i/	0.705**	0.604**	1					
/ʃ/final /ɔ/	0.713**	0.967**	0.592**	1				
/ɖʒ/ initial /e/	0.053	-0.107	0.238	-0.109	1			
/ɖʒ/ Initial /a/	0.184	0.242	0.148	0.235	-0.043	1		

/dʒ/ initial /i/	0.368*	0.344	0.441*	0.304	0.605**	0.076	1	
	/tʃ/ final				/dʒ/ initial			
	/e/	/a/	/i/	/ɔ/	/e/	/a/	/i/	/ɔ/
/dʒ/ initial /ɔ/	-0.041	-0.226	0.213	-0.226	0.557**	-0.05	0.421*	1
/dʒ/ medial /e/	0.549**	0.565**	0.746**	0.516**	0.401*	0.003	0.499**	0.198
	/tʃ/ final				/dʒ/ initial			
	/e/	/a/	/i/	/ɔ/	/e/	/a/	/i/	/ɔ/
/dʒ/medial /a/	0.343	0.239	0.394*	0.214	0.658**	0.009	0.511**	0.318
/dʒ/medial /i/	0.441*	.0504**	0.497**	0.533**	0.335	0.226	0.453*	0.141
/dʒ/medial /ɔ/	0.279	0.304	0.362*	0.268	0.489**	0.278	0.572**	0.153
/dʒ/ final /e/	0.693**	0.758**	0.536**	0.707**	0.051	0.122	0.242	-0.292
/dʒ/ final /a/	0.554**	0.689**	0.545**	0.630**	0.024	0.165	0.23	0.019
/dʒ/ final /i/	0.658**	0.743**	0.528**	0.659**	-0.115	0.179	0.177	-0.327
/dʒ/ final /ɔ/	0.722**	0.892**	0.547**	0.866**	0.119	0.253	0.456*	-0.116
	/dʒ/ medial				/dʒ/ final			
	/e/	/a/	/i/	/ɔ/	/e/	/a/	/i/	/ɔ/
/dʒ/ medial /e/	1							
/dʒ/medial /a/	0.366*	1						
/dʒ/ medial /i/	0.589**	0.427*	1					
/dʒ/medial /ɔ/	0.490**	0.594**	0.409*	1				
/dʒ/ final /e/	0.747**	0.188	0.596**	0.344	1			
	/dʒ/ medial				/dʒ/ final			
	/e/	/a/	/i/	/ɔ/	/e/	/a/	/i/	/ɔ/
/dʒ/ final /a/	0.406*	0.356	0.380*	0.433*	0.440*	1		
/dʒ/ final /i/	0.667**	0.084	0.516**	0.308	0.885**	0.526**	1	
/dʒ/ final /ɔ/	.700**	.363*	0.599**	0.511**	0.845**	0.623**	0.705**	1

/a/ Could not be computed because at least one of the variables was constant. *. Correlation is significant at 0.05 level. **Correlation is significant at 0.01 level.

6. Conclusion

The study looked at the degree of substitution of the post-alveolar affricates for velar plosives among the Kusaal speakers of English as a second language. The major findings of this research point to the fact that the substitution of the post-alveolar affricates with velar plosives is indeed a phenomenon among the Kusaal speakers of English as a second language in Ghana. The second aspect was to find out what was influencing the substitutions among the Kusaal speakers of English. Kusaal, which is the L1 of the participants in this study, does not have the post-alveolar affricates, and this influences speakers of the language who speak English as a

second language to tend to substitute these affricates for velar plosives. The study additionally sought to find out the phonological environment that elicited the substitution. It was noticed that it is not the case that these affricates are always substituted for velar plosives, but rather the kind of vowel present and the position of the post-alveolar affricate in a word also determine whether the affricates will be substituted or not. When these affricates occur in the final position, the tendency for them to be substituted is highest. The noted substitution was influenced by the vowels /i/ and /e/ at word initial and final, and /a/ at word medial for the phoneme /tʃ/. The phoneme /dʒ/ tends to be substituted the most for [g] when /dʒ/ is in the environment of /i/ and /e/ at the initial position; in the environment of [e] at the word medial position; and in the environment of /a/ at the word final position.

7. Implications and Recommendations

One thing this study has revealed is that teachers of English as a second language should not view all mispronunciation by learners as mere errors but rather consider a systematic variation of learners' L1 as a major factor that influences the way learners speak the L2. The errors reflected in the L2 (English) pronunciations could be negative transfers from the learners' L1 patterns of pronunciation. The mispronunciation in English (L2) can be attributed to the over-generalisation of the rules in learners' L1, which leads to accentedness. This research should inform educators on using the appropriate pedagogical interventions in teaching pronunciation by exposing learners to the sound system of both L1 and L2. It must be mentioned that where there are similarities in the sound system of both L1 and L2, there are positive transfers which make the acquisition of the L2 easy. Teachers are therefore encouraged to focus on these similarities to make the learning of the L2 fun for learners. On the other hand, teachers can provide on-the-spot feedback or correction to help learners who find it difficult to overcome their fossilised pronunciations. It is, however, hoped that this technique would not be overly used to discourage learners from communicating freely and naturally. During the recordings, it was observed that some of the students were hypercorrecting their pronunciations. This means that when teachers introduce the self-correction technique to learners, it will help the learners to internalise the process of correct pronunciation concerning the problematic sounds in English. This work adds to the existing research on the intra-nativized varieties of English in Ghana. It is hoped that future research can focus on the RP diphthongs that might solicit such a unique phenomenon. Acoustic research into finding out the quality of velar plosives used in place of the post-alveolar affricates would be an interesting project as well.

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