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# Phonological Transfer in the Acquisition of English Consonant Clusters by Arabic Speakers

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**Abstract**

This article investigates the pronunciation challenges that Algerian Arabic-speaking learners of English encounter when producing consonant clusters, which are common in English but structurally limited in Arabic. The study aims to identify the types of phonological modifications learners employ and to determine the extent to which these patterns reflect transfer from their first language, as well as from French, their second language. To achieve this objective, the research examines the oral production of ten EFL students enrolled at Tahri Mohamed University of Bechar. Twenty English words containing initial and final consonant clusters of varying complexity were selected, and participants' pronunciations were recorded for detailed analysis. The methodology combines auditory transcription with acoustic analysis performed using PRAAT software. This dual approach allows for a precise examination of segmental features, including epenthetic vowel insertion, consonant substitution, and cluster simplification. The findings reveal consistent phonotactic transfer from the learners' native language, with frequent use of inserted vowels to break up difficult clusters. In addition to Arabic phonological transfer, subtle influence from French phonology was also observed in several productions, particularly in the articulation of /t/ and /r/ within consonant clusters. Differences related to proficiency level emerged, indicating that more advanced learners tend to approximate target-like pronunciation more closely, although L1 constraints remain noticeable across the sample. The study concludes that consonant cluster production constitutes a persistent challenge for Algerian EFL learners due to cross-linguistic interference and multilingual phonological interaction. These results demonstrate the need for targeted pronunciation instruction within EFL curricula, particularly activities that focus on cluster recognition, articulatory training, and awareness of L1 transfer. By highlighting the systematic nature of learners' difficulties, the article contributes to a deeper understanding of second language phonology and offers pedagogical implications for improving learners' intelligibility in spoken English.

**Keywords;** Consonant clusters; Epenthesis; L1 interference; Phonological transfer; PRAAT analysis.

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## Introduction

Learning to speak a second language involves more than acquiring vocabulary and grammar; it also requires mastering the phonological system of the target language. One of the significant challenges faced by second language (L2) learners is producing phonotactic patterns that do not exist in their native language (L1) (Eckman, 2004). Among these challenges is the production of consonant clusters, sequences of two or more consonants that occur without intervening vowels. English permits a wide variety of such clusters, both at the beginning and end of syllables, whereas many Arabic dialects, including Algerian Arabic, have more restrictive syllable structures (Broselow, 1992; Watson, 2002).

English phonotactics permit highly complex consonant clusters, allowing up to three consonants in syllable-initial position (e.g., street /striːt/) and up to four consonants in syllable-final position (e.g., texts /teksts/) (Roach, 2009). In contrast, Arabic syllable structure is considerably more constrained. Most Arabic varieties favour simple CV or CVC patterns and generally avoid complex initial or final consonant clusters through phonological repair strategies such as epenthesis or deletion (Watson, 2002). Algerian Arabic, including the Bechari dialect examined in this study, permits limited consonant clustering compared to English, particularly in word-final position.

Arabic phonology typically avoids complex clusters through processes like epenthesis (vowel insertion) or consonant deletion (Hellmuth, 2013). These repair strategies reflect an underlying preference for CV syllable structures, especially in word-initial positions. As a result, Arabic-speaking learners of English often modify English consonant clusters to align with Arabic phonotactic rules. This phenomenon, known as phonological transfer, the influence of L1 phonological rules on L2 production, is a well-documented source of pronunciation difficulty in second language acquisition (Odlin, 1989; Flege, 1995).

Such transfer can significantly affect intelligibility and fluency, particularly when cluster simplification alters word recognition. Despite widespread acknowledgment of these challenges, more empirical studies are needed in the context of Algerian EFL learners, where local dialects and limited exposure to native English further shape pronunciation outcomes (Bouabdallah, 2015).

This study aims to explore how Arabic speakers acquire and produce English consonant clusters, focusing on the strategies they employ, the role of L1 transfer, and the influence of English proficiency. Thus, this research will answer the following question:

1. What types of phonological transfer affect Arabic-speaking EFL learners' production of English consonant clusters?
2. How do learners treat initial versus final consonant clusters?
3. How does English proficiency level influence the accuracy of cluster production?

## 1. Literature Review

### *1.1. Phonological transfer in second language acquisition*

In the field of second language acquisition (SLA), phonological transfer refers to the influence that a learner's first language (L1) phonological system exerts on the pronunciation patterns of the second language (L2). Odlin (1989), a foundational scholar in cross-linguistic influence, defines transfer as the application of prior linguistic knowledge to new learning contexts, noting that such influence may be either facilitative or obstructive. In pronunciation, this transfer often appears as segmental errors (e.g., substituting sounds) or suprasegmental mismatches (e.g., stress, intonation), as well as at the phonotactic level, that is, the rules governing how sounds can be combined in a language.

In the case of Arabic-speaking learners of English, transfer is often negative due to substantial differences between the two phonological systems, especially regarding consonant clusters. Arabic tends to avoid clusters, particularly at the beginning or end of words, while English makes extensive use of them (Watson, 2002). As a result, learners may adopt repair strategies such as vowel insertion (epenthesis), consonant deletion, or metathesis to make English words conform to Arabic syllable structures. These strategies are not random but reflect systematic L1 transfer.

### *1.2. The Contrastive Analysis Hypothesis (CAH)*

One of the earliest theoretical frameworks to account for phonological transfer is the Contrastive Analysis Hypothesis (Lado, 1957). According to CAH, the principal difficulties in learning a second language stem from differences between the learner's native language and the target language. The more dissimilar the structures are, the more likely negative transfer, or interference, is to occur. In the context of this study, CAH predicts that Arabic-speaking learners will struggle with English consonant clusters because these structures are either restricted or completely absent in their L1.

Although CAH has been critiqued for its predictive limitations, especially its failure to account for learner variability and developmental errors, it remains a useful diagnostic tool for identifying areas of potential phonological conflict between two languages (Eckman, 1977).

### *1.3. Markedness and learnability*

Building on the limitations of CAH, Markedness Theory, as discussed by Eckman (1977), refines the understanding of phonological difficulty by proposing that certain structures are inherently more complex, or marked, than others. Marked structures tend to be less common across languages and are acquired later by both first and second language learners. English consonant clusters, particularly those occurring at the end of syllables or those containing three consonants (e.g., /str/), are considered highly marked. Since Arabic generally favours unmarked syllable structures like CV (Consonant-Vowel), learners are more likely to simplify marked forms in English, such as reducing the cluster or inserting a vowel to break it up. Markedness Theory helps explain why even advanced learners may continue to struggle with consonant clusters. Their difficulty is not merely a matter of language distance, but of structural complexity.

### *1.4. Universal grammar and epenthesis*

Another useful lens for examining phonological transfer is the notion that all learners rely on universal constraints when acquiring a second language. Broselow (1992), drawing on both generative phonology and SLA research, suggests that second language learners apply repair strategies such as epenthesis not only because of their L1 rules but also due to universal learning strategies when faced with unfamiliar phonological patterns. According to her, learners "fix" illegal or marked structures to make them conform to permissible ones, either in their native language or in terms of more universally accessible structures.

Broselow (1992) observed that many Arabic-speaking learners of English employ epenthesis as a repair strategy when producing illegal consonant clusters. For speakers of several Arabic varieties, including Levantine and North African dialects, this often involves inserting a short vowel such as /ɪ/ or /ə/ before or within a consonant cluster, resulting in productions such as /ɪskuːl/ for school. Broselow's work highlights how learners attempt to reconcile L2 input with both their L1 phonology and general phonological constraints shared across languages.

### *1.5. Empirical studies on Arabic-English phonology*

Several empirical studies have confirmed the persistence of L1 phonotactic influence among Arabic-speaking EFL learners. For example, Almbark, Bouchhioua, and Hellmuth (2014) analysed the production of English initial clusters by Syrian Arabic speakers and found consistent patterns of epenthesis and simplification. Similarly, Hellmuth (2013) showed that learners tend to overuse vowel insertion in initial clusters, especially at lower proficiency levels. These findings are supported by Bouabdallah (2015), who studied Algerian university students and documented frequent mispronunciations linked to Arabic syllable constraints, including the deletion of final consonants and insertion of vowels in complex onsets. Such studies underline the predictability and persistence of transfer phenomena and reinforce the need for phonological awareness in both teaching and learning English as a foreign language in Arabic-speaking contexts.

## 2. Methodology

### *2.1 Research design*

This study follows a descriptive, mixed-methods research design, combining qualitative phonological analysis and quantitative acoustic measures to explore the phenomenon of phonological transfer in the acquisition of English consonant clusters by native Arabic speakers. It specifically focuses on speakers of

Algerian Arabic, more precisely the Bechari dialect spoken in southwestern Algeria. The approach allows for a nuanced investigation of how learners produce consonant clusters that are not part of their native phonological inventory, particularly focusing on patterns such as epenthesis, deletion, and cluster reduction. The study integrates auditory analysis with acoustic software to ensure analytical depth.

### *2.2 Participants*

The participants were ten (10) undergraduate EFL students from the Department of English at Tahri Mohamed University of Bechar (TMUB), Algeria. They were native speakers of Algerian Arabic, particularly the Bechari dialect. Participants were selected purposively using snowball sampling, beginning with students who had taken phonetics classes with the researcher. All participants had completed at least five years of English instruction and were classified as intermediate to upper-intermediate based on their academic performance and institutional language proficiency assessments. No participant reported speech, hearing, or learning disorders. Participation was voluntary and based on informed oral consent, with full assurance of anonymity and ethical compliance.

### *2.3 Recording environment and tools*

Recordings took place in a quiet university classroom in the absence of regular teaching activities, which helped minimise background noise and ensured clearer acoustic data. Each participant was recorded individually on a standard desktop PC connected to a professional unidirectional condenser microphone, with audio captured in Audacity and saved in WAV format. Participants were given time to practice the target phrases before the actual recording and were allowed to repeat items if errors or hesitations occurred.

### *2.4 Materials and word list*

The material consisted of 20 English words selected to target problematic consonant clusters. These included both initial and final clusters, with equal representation of two-consonant and three-consonant clusters. Selection criteria included (1) documented pronunciation difficulty for Arabic speakers, (2) frequency and phonotactic diversity, and (3) suitability for acoustic and perceptual analysis. The selected words were chosen because they represent phonotactically marked consonant clusters that are frequently reported as problematic for Arabic-speaking learners of English in previous SLA and phonological transfer studies. Additionally, the words vary in cluster complexity and position, allowing comparison between initial and final clusters.

Monosyllabic words were intentionally selected to minimise prosodic and stress-related interference and to ensure that pronunciation difficulties could be attributed primarily to consonant cluster production rather than syllabic complexity or intonational variation. Although English permits four-consonant codas, such forms were excluded to maintain analytical focus and avoid excessive articulatory difficulty that might obscure more recurrent transfer patterns observable in two- and three-consonant clusters. The words were embedded in the carrier phrase “Say ___ again” to normalize stress patterns and reduce unnatural articulation.

**Table 1: Target Word List**

| Word | IPA | Cluster Position | Cluster Type | Syllable Structure |
|---|---|---|---|---|
| Play | /pleɪ/ | Initial | 2-consonant | CCV |
| Blue | /bluː/ | Initial | 2-consonant | CCV |
| Tree | /triː/ | Initial | 2-consonant | CCV |
| Through | /θruː/ | Initial | 2-consonant | CCV |
| Street | /striːt/ | Initial | 3-consonant | CCCVC |
| Splash | /splæʃ/ | Initial | 3-consonant | CCCVC |
| Scream | /skriːm/ | Initial | 3-consonant | CCCVC |
| Split | /splɪt/ | Initial | 3-consonant | CCCVC |
| Desk | /desk/ | Final | 2-consonant | CVCC |
| Milk | /mɪlk/ | Final | 2-consonant | CVCC |
| Help | /help/ | Final | 2-consonant | CVCC |
| Lamp | /læmp/ | Final | 2-consonant | CVCC |
| Bank | /bæŋk/ | Final | 2-consonant | CVCC |
| Gift | /gɪft/ | Final | 2-consonant | CVCC |
| Gold | /gəʊld/ | Final | 2-consonant | CVCC |
| Cold | /kəʊld/ | Final | 2-consonant | CVCC |
| Asked | /ɑːskt/ | Final | 3-consonant | VCCC |
| Helped | /helpt/ | Final | 3-consonant | CVCCC |
| Text | /tekst/ | Final | 3-consonant | CVCCC |
| Acts | /ækts/ | Final | 3-consonant | CVCCC |

**Source:** Researcher-Constructed Word List

### *2.5 Transcription and verification*

After recording, the speech samples were transcribed using broad phonemic transcription by the researcher. To enhance the validity of the transcription and interpretation of cluster realisations, the researcher consulted a native English speaker from Brighton, UK, a qualified English teacher currently based in Amman, Jordan, and a long-time acquaintance of the researcher. Her role was to confirm perceptual accuracy, offer comparative judgments, and ensure that the pronunciation deviations were analysed from a native speaker's perspective.

### *2.6 Acoustic analysis*

In addition to auditory transcription, the recordings were analysed using PRAAT, a widely used software program developed by Boersma and Weenink (2023) for speech analysis and phonetic research. PRAAT allows researchers to examine waveform structures, spectrograms, segment duration, and acoustic properties of speech with high precision. The software was selected for this study because it enables detailed visualisation of consonant clusters and facilitates accurate detection of vowel insertion, consonant deletion, and segmental substitution patterns.

The acoustic features measured included the duration of consonant clusters and inserted vowels, and waveform visualisation to detect insertions, deletions, or substitutions. Each target item was labelled according to the error type, and the data were coded and statistically analysed to identify recurring phonological patterns among the participants. Quantitative analysis was conducted manually using frequency counts and percentage calculations, while Microsoft Excel was used to organise and categorise the coded phonological patterns.

## 3. Data Analysis and Discussion of Results

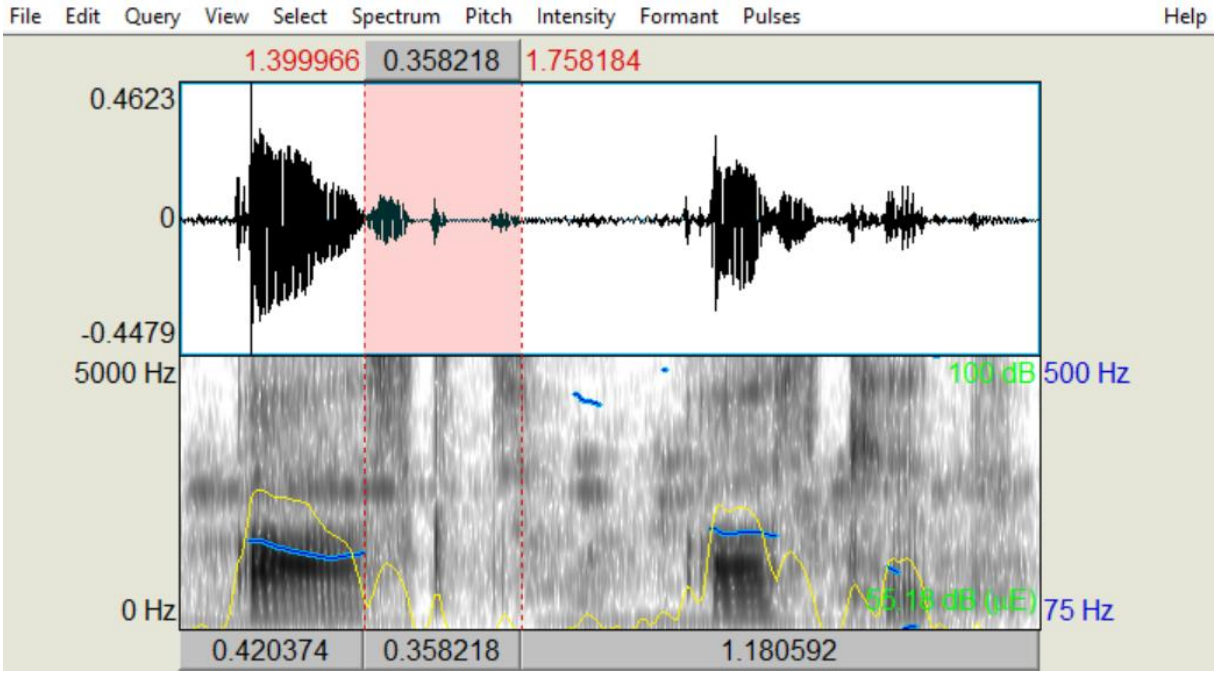
The research focused on how 10 participants produced 20 selected English words containing either initial or final consonant clusters, yielding a total of 200-word tokens. These words were carefully chosen to

represent a range of challenging cluster types, and participants' responses were analysed for patterns of accuracy, epenthesis, and substitution. Recordings were transcribed by the researcher and evaluated in comparison with native-like models provided by a British English speaker.

### *3.1. Overview of patterns observed*

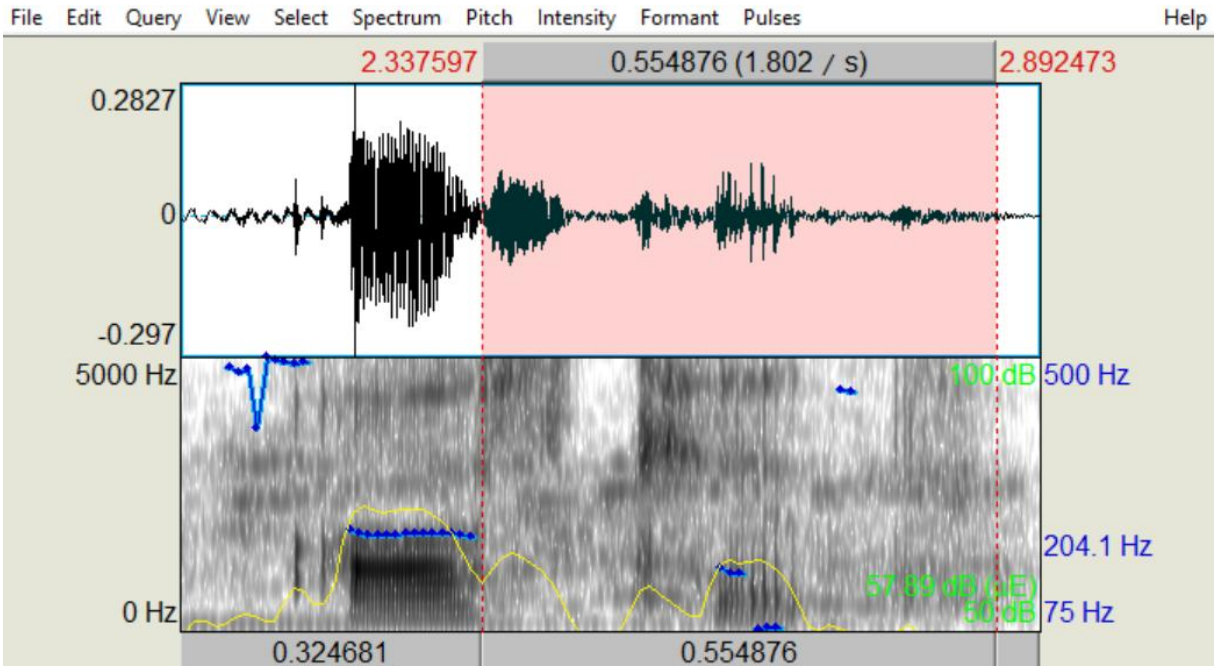
The analysis of the data was organised according to the frequency and phonological significance of the error patterns observed rather than following the sequential order of the target words presented in Table 1. This approach allows for a clearer discussion of the dominant transfer processes affecting learners' production of English consonant clusters. The most frequent phenomenon identified in the data was epenthesis, occurring in 66 out of 200 cases (40.7%). Participants often inserted a short epenthetic vowel, typically realised as /ɪ/ or a schwa-like central vowel, to break up final consonant clusters. For instance, *asked* /æskt/ was commonly produced as /æskid/, *helped* /*helpt*/ as /helpid/. This reflects a transfer from Arabic phonotactics, which do not permit final clusters of this type. These modifications help learners reduce articulatory complexity but also result in non-target-like forms.

**Figure 1: Native speaker's Duration of the Cluster 'asked' in final position**




**Source:** PRAAT

**Figure 2: Participant's (Non-Native) Production of the cluster 'asked'**

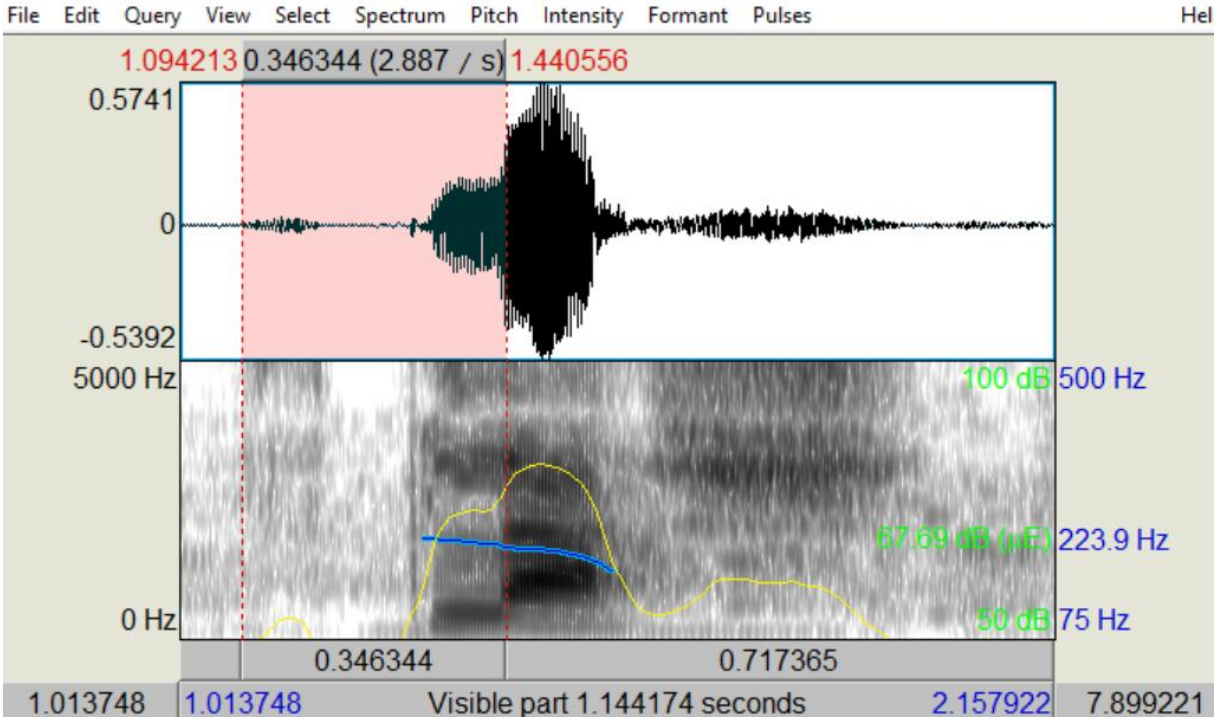



**Source:** PRAAT

The acoustic analysis of the word *asked*, as shown in the PRAAT spectrograms (Figures 1 and 2), highlights a clear difference between native and non-native pronunciation of final consonant clusters. The native speaker produced the final cluster /skt/ with a duration of approximately 0.35 seconds, reflecting a fluent and compact articulation. In contrast, the non-native participant extended this duration to 0.55 seconds. Upon closer auditory and visual inspection, it became evident that the participant pronounced *askid*, inserting a vowel between the final consonants. This form of epenthesis, specifically the insertion of a schwa or similar vowel, serves as a repair strategy to accommodate the phonotactic constraints of the speaker's L1, which typically disallows such complex final clusters.

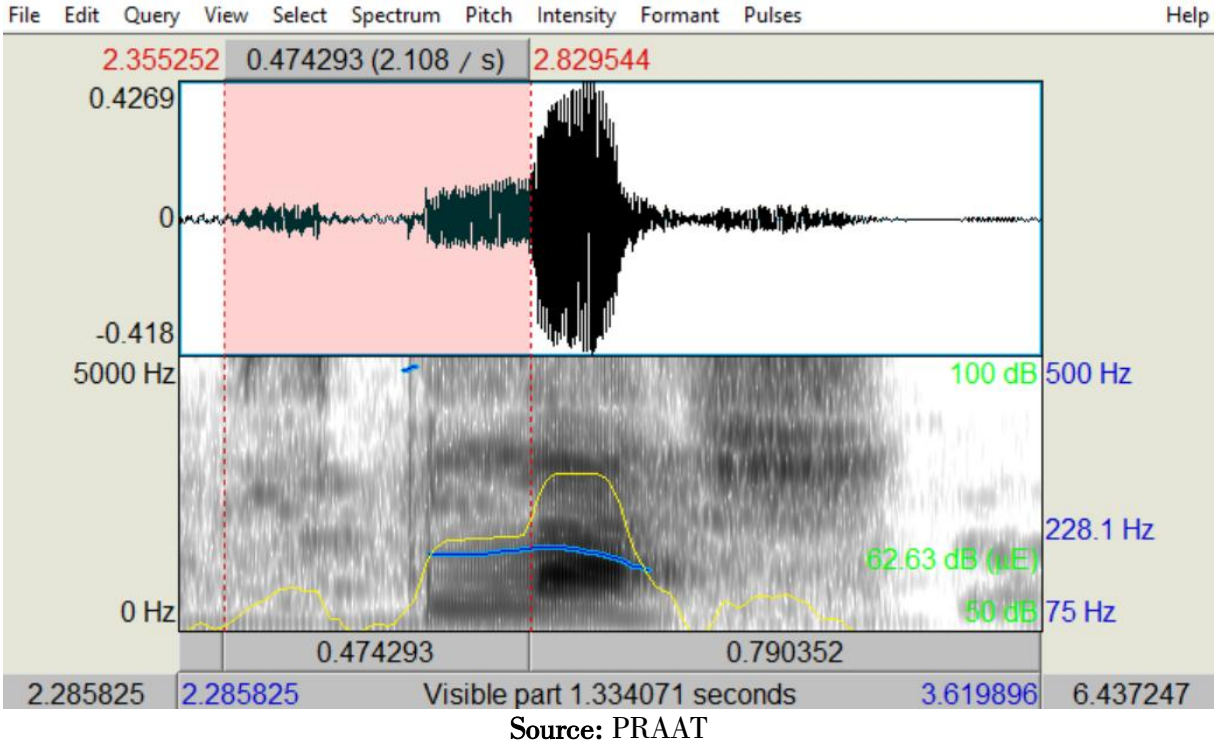
The extended cluster duration reflects both the presence of the additional vowel and the articulatory effort made to separate the final consonants, which would otherwise be challenging to produce in sequence. This finding aligns with prior research on Arabic-speaking learners, who often insert vowels in final clusters to make them more pronounceable (Broselow & Finer, 1991; Hansen, 2001). The participant's realization of *askid* illustrates the ongoing influence of L1 phonology on L2 production and underscores the role of interlanguage phonology in shaping learner output. Such deviations highlight the need for explicit pronunciation instruction focusing on final cluster articulation and the elimination of intrusive vowels to help learners move toward more target-like fluency.

**Figure 3: Native Speaker's Production of 'splash'**




**Source:** PRAAT

**Figure 4: Participant's (Non-Native) Production of 'splash'**




**Source:** PRAAT

The PRAAT spectrogram above presents the acoustic realization of the word *splash* as produced by a native speaker (figure 3) and a non-native participant (figure 4). The red-highlighted section in each panel indicates the duration of the initial consonant cluster /spl/, which is particularly challenging due to its three-member structure and rising sonority profile.

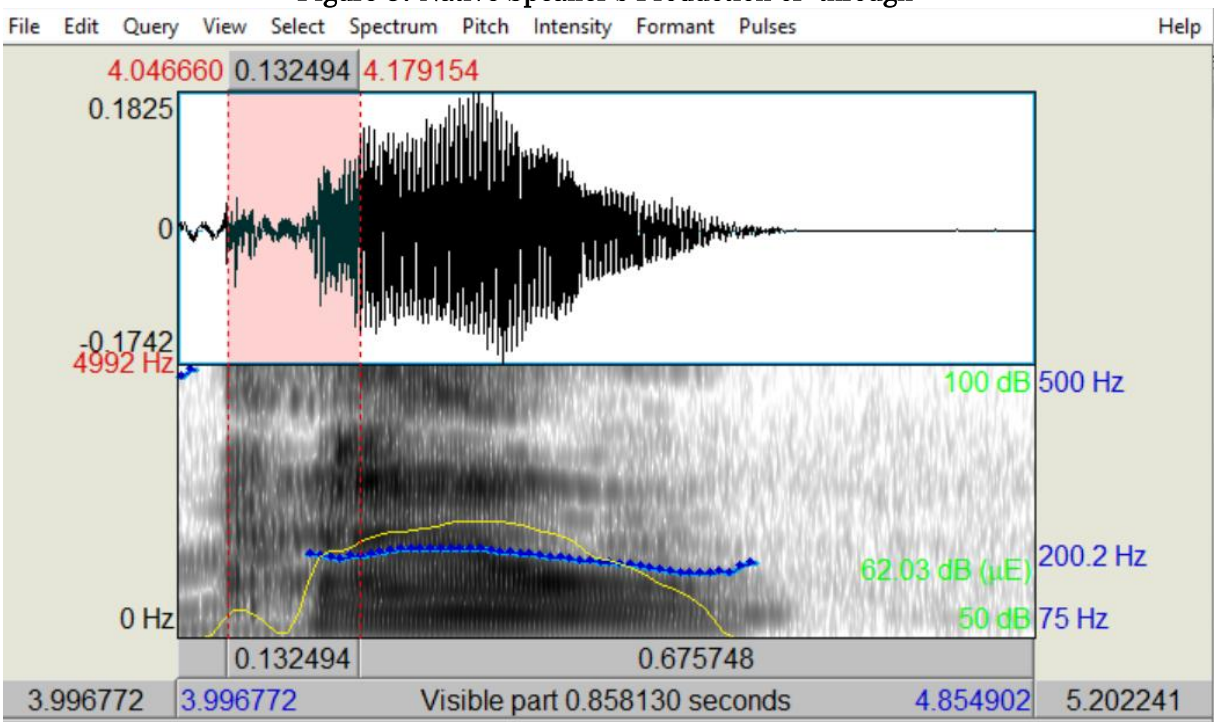
In the native speaker's production, the cluster duration is approximately 0.35 seconds, indicating a smooth, continuous articulation of the /s/, /p/, and /l/ sounds. The waveform and spectrogram reveal clear transitions between the fricative /s/, the plosive /p/, and the liquid /l/, without any sign of vowel intrusion or segmental distortion. This fluent cluster realisation reflects both native-like articulatory ease and familiarity with complex onset structures.

In contrast, the participant's production shows an extended cluster duration of 0.47 seconds, approximately 0.12 seconds longer than the native benchmark. This longer duration may reflect a number of interlanguage phonological processes. Most notably, the waveform suggests a slight pause or articulatory hesitation, possibly indicating vowel intrusion (epenthesis) or exaggerated articulation of one of the cluster elements, commonly observed among EFL learners whose first language (e.g., Arabic or French) lacks similar onset clusters. The spectrogram further supports this by showing a less cohesive transition between consonants, particularly between /p/ and /l/, which may signal additional effort or imprecise articulation.

This temporal discrepancy, though not drastic, reflects the increased cognitive and articulatory demands placed on learners when producing highly marked clusters. It aligns with markedness theory and previous findings in second language phonology (e.g., Eckman, 1977; Broselow & Finer, 1991), which suggest that longer or disfluent cluster durations often result from learners applying repair strategies to accommodate unfamiliar phonotactic patterns. Such deviations underscore the influence of L1 constraints and the need for focused pronunciation training to target difficult cluster onsets like /spl/.

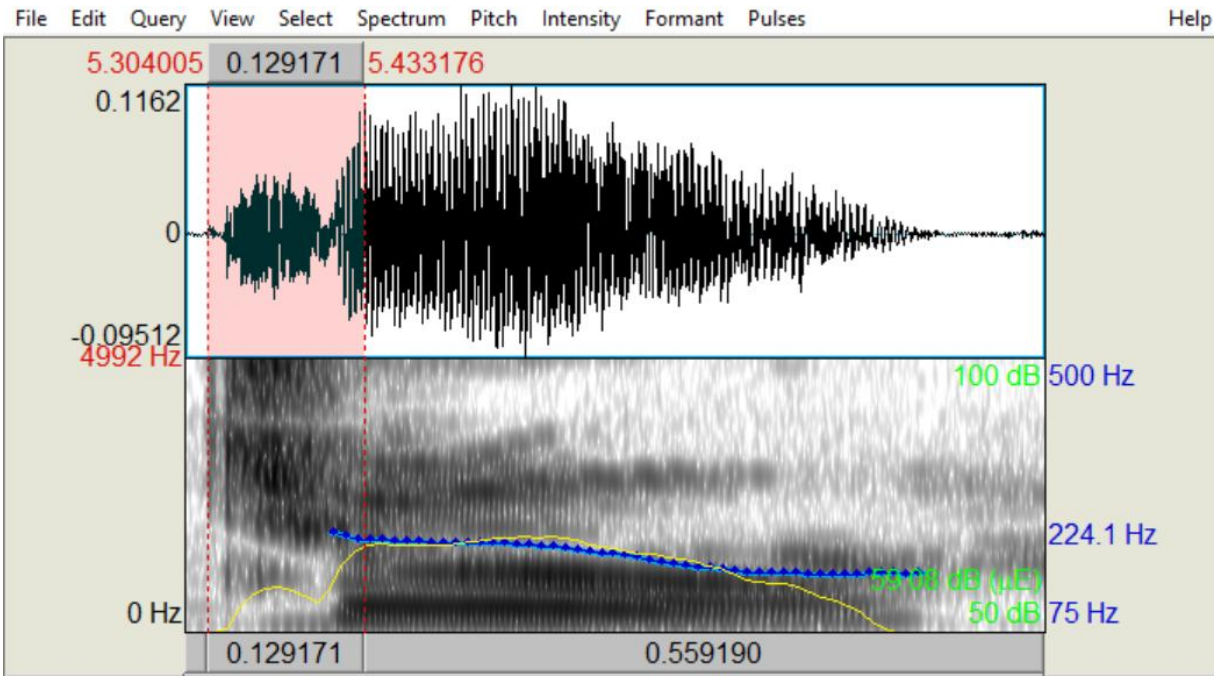
Another common issue was substitution of interdental fricatives, observed in 54 cases (33.3%) particularly in clusters containing /θ/, such as in *three* or *through*. These sounds were typically replaced by /t/ and /d/, producing forms like /tri:/ instead of / θri:/ and /tru:/ instead of /θru:/, respectively. Although interdental fricatives were not the main focus of this study, their substitution affected the integrity of some initial clusters. This tendency is consistent with prior findings and fossilisation patterns documented among Algerian learners, specifically Bechari speakers, especially at early stages of learning.

**Figure 5: Native Speaker's Production of 'through'**




**Source:** PRAAT

**Figure 6: The Participant's (Non-Native) Production of the word 'through'**




**Source:** PRAAT

Figure 5 displays the waveform and spectrogram of the word *through* as produced by a native speaker of English. The shaded portion, lasting approximately 0.132 seconds, corresponds to the initial voiceless interdental fricative /θ/. Acoustically, this segment is characterized by low-amplitude frication noise, evident in both the waveform and the spectrogram. The waveform shows a continuous, aperiodic signal with no silent closure, and the spectrogram reveals diffuse energy concentrated in the higher frequencies, typical of fricatives. The absence of a clear burst or silence confirms that the native speaker articulated /θ/.

In contrast, Figure 6 presents the same word as pronounced by a participant from the Bechari dialect background. The highlighted segment, nearly identical in duration at 0.129 seconds, demonstrates a distinctly different articulatory pattern. The waveform includes a brief silent closure followed by a sharp burst, indicating the production of a voiceless plosive [t] rather than the target /θ/. The spectrogram reinforces this interpretation, showing a transient burst and subsequent formant transitions but lacking the fricative noise associated with /θ/. This substitution of /θ/ with [t] can be attributed to negative transfer from the participant's first language, specifically the Bechari dialect of Arabic, in which the interdental fricative /θ/ is absent. As a result, the speaker replaces the unfamiliar sound with the closest familiar counterpart, here, the voiceless alveolar plosive [t].

This phonetic interference highlights a common pronunciation issue among Arabic-speaking learners of English and supports findings in L2 phonological acquisition that emphasize the impact of L1 phoneme inventories on the perception and production of L2 sounds.

Influence from French phonology was subtly present in 20 occurrences (12.3%). This was evident in the articulation of /t/ and /r/ in clusters such as *train* or *true*, where some learners employed a dentalized /t/ or produced /r/ with a uvular quality, influenced by their exposure to French. These productions do not indicate random errors but systematic interference from the learners' second linguistic system.

Finally, 22 words (13.6%) were pronounced accurately, showing that certain clusters, especially initial two-consonant combinations such as *play*, *blue*, and *clean*, are more accessible to learners. These correct productions likely reflect increased exposure through instruction or frequent use in classroom contexts.

**Table 2: Distribution of Observed Phonological Patterns**

| Error Type | Instances | Percentages |
|---|---|---|
| Epenthesis | 66 | 40.7% |
| Substitution | 54 | 33.3% |
| French-influenced Pronunciations | 20 | 12.3% |
| Accurate Cluster Production | 22 | 13.6% |
| **Total** | **162** | **100%** |

**Source:** Research data collected by the author

The table summarises the total number of observed phonological patterns rather than the total number of word tokens, as some productions displayed overlapping features. As shown in Table 2, epenthesis was the most frequent phonological pattern observed among participants, followed by consonant substitution. This confirms the dominant influence of Arabic phonotactic constraints on learners' production of English consonant clusters.

### *3.2. Discussion*

The results of this study show the significant impact of phonological transfer from Arabic and, to a lesser degree, French on the pronunciation of English consonant clusters by Algerian EFL learners. The findings reinforce the complexity of acquiring marked phonotactic structures in a foreign language, particularly when such structures are prohibited or rare in the L1, as is the case with final clusters in Arabic.

#### *3.2.1. L1 influence and epenthesis*

The use of epenthesis, especially schwa insertion in final clusters, aligns with a wide body of literature that identifies this strategy as a repair mechanism used by Arabic-speaking learners. Broselow and Finer (1991) observed that Arabic speakers often insert a vowel between final consonants to conform to native syllable constraints. Similarly, Hansen (2001) reported that Saudi learners of English tended to insert vowels in *CC* final clusters, confirming that the avoidance of illegal codas is a common developmental/ strategy.

The frequency of such insertions in this study (40.7%) supports these findings and highlights the persistent role of L1 syllable structure in shaping interlanguage phonology. According to the Interlanguage Phonology framework (Selinker, 1972; Major, 2001), learners construct hybrid systems influenced by both L1 and L2 rules. In this case, participants seem to lean heavily on Arabic phonotactics, especially when confronted with final *-ed* forms or CCC endings.

It should be acknowledged, however, that some productions involving past tense forms such as asked and helped may also reflect instructional fossilisation associated with the pronunciation of the English bound morpheme -ed. In many EFL contexts, learners are overexposed to the /ɪd/ pronunciation pattern and may generalise it to contexts where /t/ or /d/ are required. Therefore, while epenthesis remains strongly linked to phonotactic transfer, pedagogical influence may also have contributed to some vowel insertions observed in the data.

#### *3.2.2. Substitution and fossilisation*

Another dominant issue was the substitution of /θ/ and /ð/ within clusters, as in *three* → *tree* and *them* → *dem*. This type of error has been thoroughly documented in the literature on Arabic-speaking EFL learners (Flege, 1995; Al-Ani, 1970). This study echoes these patterns, with 33.3% of tokens displaying substitution errors involving interdental fricatives. This reflects the absence of /θ/ and /ð/ in both the speakers' mother tongue (Bechari Dialectal Arabic) and French phonemic inventories, which predisposes learners to adopt the closest native alternatives, usually /t/ and /d/.

As highlighted in Khelf and Mostari (2019), these substitutions often become fossilised, especially when not explicitly corrected in instruction. The persistent use of /t/ and /d/ reflects what Selinker (1972) termed fossilised interlanguage rules, which learners internalise and carry into advanced stages of proficiency. The fact that these substitutions occurred even within cluster environments indicates their deeply rooted nature.

### *3.2.3. French phonology and cross-linguistic influence*

Beyond Arabic, the participants' exposure to French may account for subtle articulatory deviations, such as uvular /ʁ/ in *grow* or fronted /t/ in *train*. Although these were less frequent (12.3% of tokens), they reflect the multilingual phonological environment Algerian students operate within. According to Flege's Speech Learning Model (SLM, 1995), bilinguals may transfer articulatory habits not just from their L1, but also from any previously learned L2 that shares overlapping features with the target language.

This cross-linguistic influence has been noted in studies by Wrembel (2010) and Simon (2005), both of whom found that trilingual learners often exhibit phonetic interference across multiple language systems. In Algeria, where French is used extensively in education and public life, its influence on English production should not be underestimated, particularly in segmental features like /t/ and /r/ articulation.

### *3.2.5. Accurate production and learner potential*

Despite the articulatory and phonotactic challenges associated with complex English consonant clusters, 13.6% of all productions were accurate. Most correct tokens involved initial two-consonant clusters, such as in *play*, *clean*, or *blue*, clusters that are both easier to articulate and more frequently reinforced through classroom input. This reflects the hierarchical difficulty of clusters, as predicted by Markedness Theory (Eckman, 1977), which suggests that initial two-member clusters are less marked and therefore more easily acquired than final three-member clusters.

This positive trend shows the value of repetition, input frequency, and phonological salience in shaping learner output. With targeted feedback and corrective phonetic training, learners can gradually overcome fossilised patterns and develop greater control over difficult cluster structures.

## Conclusion and Recommendations

This study has demonstrated that the production of English consonant clusters by Algerian EFL learners is significantly shaped by the phonotactic constraints of their first language, Arabic, and to a lesser extent, French. The frequent use of epenthesis and substitution strategies shows the persistent influence of native phonological rules on interlanguage development, particularly in the articulation of marked or non-native structures. These findings are consistent with established theoretical models such as Interlanguage Phonology and the Speech Learning Model, which explain how learners construct hybrid phonological systems influenced by prior linguistic experience.

The relatively low percentage of accurate cluster productions highlights the ongoing challenges learners face in achieving native-like pronunciation. However, the presence of correct realizations, especially among learners at more advanced levels, confirms the potential for improvement through pedagogical intervention. The observed error patterns suggest that without explicit and systematic instruction, certain phonological features may become fossilised, thereby hindering further progress in L2 acquisition.

In light of these findings, several recommendations can be made:

1. Pronunciation should not be treated as peripheral but rather as a central component of English language instruction, with particular focus on problematic phonotactic structures such as consonant clusters.
2. Teachers should help learners become aware of the differences between L1 and L2 phonological rules and highlight areas of likely transfer or interference.
3. Regular, focused correction and feedback on mispronounced clusters can reduce fossilisation and promote self-monitoring.
4. Incorporating speech analysis software such as PRAAT or Audacity in classroom practice can help both instructors and learners identify subtle articulation errors and monitor improvement over time.

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