Phonological transfer and orthographic influence in the pronunciation of Saudi undergraduate EFL learners

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Abstract. This study examines the influence of L1 phonological transfer and L2 orthography on the pronunciation of Saudi undergraduate EFL learners. Focusing on English vowels and consonant clusters, the study analysed the pronunciation of 20 EFL learners aged 18-22 through recorded reading tasks transcribed in IPA. The results revealed frequent substitution of English vowel phonemes absent in Arabic with closer L1 equivalents or spelling-driven alternatives. The results also showed that English initial and final consonant clusters posed challenges for Saudi EFL learners. They employed epenthesis and deletion strategies to simplify syllable structures containing difficult clusters. The study highlights the interplay between L1 interference and L2 orthography, showing the persistence of these pronunciation errors despite the efforts invested in formal education. The study also emphasises the importance of explicit instruction on problematic phonemes, gradual cluster training, raising awareness of spelling-pronunciation mismatches and early intervention to improve intelligibility among Saudi and other Arab EFL learners as well.

Keywords: phonological transfer, vowels, consonant clusters, pronunciation, spelling, Saudi EFL learners.

Алкураші Хассан. Фонологічний трансфер та орфографічний вплив у вимові саудівських студентів бакалаврату, які вивчають англійську мову як іноземну.

Анотація. Це дослідження вивчає вплив фонологічного трансферу першої мови (L1) та орфографії другої мови (L2) на вимову саудівських студентів бакалаврату, які вивчають англійську мову як іноземну. Зосереджуючись на англійських голосних фонемах та скупченнях приголосних, у дослідженні проаналізовано вимову 20 студентів EFL віком 18–22 роки, записи читання яких були транскрибовані за Міжнародним фонетичним алфавітом (IPA). Результати показали часті випадки заміни англійських голосних фонем, відсутніх в арабській мові, на найближчі за звучанням еквіваленти рідної мови або варіанти, зумовлені написанням (орфографією). Результати також засвідчили, що початкові та кінцеві скупчення приголосних в англійській мові становлять значні труднощі для саудівських студентів EFL. Вони застосовували стратегії

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епентези (вставлення голосного) та делеції (пропуск звуку) для спрощення структури складів, що містять складні кластери. Дослідження підкреслює взаємодію між інтерференцією L1 та орфографією L2, демонструючи стійкість цих вимовних помилок попри зусилля, вкладені у формальну освіту. Дослідження також наголошує на важливості цілеспрямованого викладання проблемних фонем, поетапного тренування вимови скупчень, підвищення обізнаності щодо невідповідності між написанням і звучанням, а також раннього втручання для покращення зрозумілості мовлення серед саудівських та інших арабських студентів EFL.

Ключові слова: фонологічний трансфер, голосні фонеми, скупчення приголосних, вимова, орфографія, саудівські студенти, які вивчають англійську мову як іноземну.

Introduction

Pronunciation is a cornerstone of oral communication and a critical component of English language proficiency. Learners of English as a foreign language (EFL) often struggle with pronunciation tasks (Al-Saidat et al., 2023). This is attributed to the differences between the phonological systems of English and their first language (L1), on the one hand, and the complexities of English orthography on the other, as learners frequently rely on grapheme-to-phoneme mappings that are not necessarily consistent. Among Saudi EFL learners, pronunciation remains one of the most persistent and challenging areas of language acquisition. Despite years of formal instruction, many students continue to struggle with intelligible speech production, hindering their ability to communicate effectively. Two of the most problematic features are the articulation of English vowel sounds and the production of consonant clusters–phonological elements that are often absent or limited in the learners' first language, Arabic (Al-Shalabi, 2021).

Research has consistently shown that vowel pronunciation poses substantial difficulty for second-language learners due to the complexity and variability of the English vowel system. Given that Arabic is the learners' first language, it plays a significant role in shaping their interlanguage (Al-Saidat et al., 2024). English contains over a dozen distinct vowel phonemes, many of which have no direct equivalents in Arabic. Mispronunciation of these vowels - such as confusing /æ/ with /ʌ/, or /ɪ/ with /iː/ - can significantly hinder listener comprehension and result in frequent communication breakdowns (Jahara & Abdelrady, 2021; Schwartz et al., 2016; Ho, 2009). Consonant clusters, or sequences of two or more consonants without intervening vowels, are similarly challenging. While English allows clusters at both word-initial and word-final positions (e.g., *spring*, *asks*, *texts*), Arabic phonotactics are more restrictive. Consequently, Saudi learners may omit consonants or insert vowels between them, a process that reduces both the accuracy and naturalness of their speech (Al-Rubaat & Alshammari, 2020).

Although English has been part of the Saudi curriculum since the mid-20th century and is taught from the primary level through higher education (Alharbi, 2019), learners often arrive at university with limited oral proficiency. Contributing factors include first language interference, insufficient exposure to native English input, and the marginalisation of pronunciation instruction within classroom practices (Roach, 2009; Gilakjani, 2012).

To address these gaps, the current study investigates the pronunciation difficulties faced by Saudi undergraduate students, focusing specifically on vowel sounds and consonant clusters. By examining both error types and causes, this research seeks to contribute practical insights that can inform more effective pedagogical approaches and improve pronunciation instruction in EFL contexts.

Literature Review

Pronunciation is widely recognised as a foundational aspect of communicative competence in a second language. It comprises segmental features - individual vowel and consonant sounds – as well as suprasegmental elements like intonation, stress, and rhythm. According to Seidlhofer (2001), pronunciation involves the production and perception of meaningful sounds, playing a central role in conveying speaker intent and ensuring mutual understanding. In global contexts, where English functions as a lingua franca, intelligible pronunciation is often prioritised over native-like accuracy (Zielinski & Yates, 2014; Jenkins, 2002). Despite its importance, pronunciation remains one of the most neglected areas in EFL instruction. Many teachers lack training in phonetics and phonology, and curricula often emphasise grammar and vocabulary at the expense of spoken language accuracy (Derwing & Munro, 2005; Gilbert, 1995). Learners themselves frequently perceive pronunciation as difficult and intimidating, which further discourages practice (Darcy, 2018).

Vowels

However, research continues to underscore the essential role of pronunciation in oral fluency and communication success (Celce-Murcia et al., 2010). For Arabic-speaking learners, English pronunciation presents distinct challenges due to significant phonological mismatches. Arabic has a relatively small vowel inventory - three short vowels and their long counterparts – compared to the diverse set of monophthongs and diphthongs in English (Ladefoged & Johnson, 2015). This disparity leads to frequent substitution of unfamiliar English vowels

with familiar Arabic ones, causing confusion and reducing intelligibility (Flege, 1995; Ho, 2009). Studies have documented frequent mispronunciations involving vowels such as /æ/, /ɪ/, and /ʌ/, which are particularly difficult due to their absence in Arabic and the learners' limited auditory discrimination (Fadhillah et al., 2020). Moreover, Alshehri (2020) found that tense-lax vowel contrasts, such as /ɪ/ and /iː/, were frequently confused due to limited phonological awareness. Jahara and Abdelrady (2021) investigated pronunciation difficulties faced by Arab female undergraduate EFL learners at Qassim University, Saudi Arabia. The study involved thirty-two third-year students. The results revealed that participants were confused between /ɪ/ and /e/, and /ʌ/, /ɒ/ and /ə/. It was also indicated that the sounds /əʊ, aʊ, eə, aɪ, ɔɪ/ were missing from the inventory of a few participants. Naji and Almakrob (2023) examined the pronunciation of English vowels by sixty-seven Yemeni EFL learners. Using a questionnaire and a vowel production test, the results revealed that the vowels /e/, /ɒ/, /eə/, /ɔ:/, /ʊ/, and /u:/ were the most difficult vowels to pronounce. They classified these errors as interlingual since they are caused by the differences between the phonological systems of the two languages, Arabic and English.

Consonant Clusters

According to Crystal (2008), a cluster is "A term used in the analysis of connected speech to refer to any sequence of adjacent consonants, especially those occurring initially or finally in a syllable" (p. 81). Therefore, the sequence of consonants in 'stay' and 'text' can be represented as CC- and -CCC, respectively. Syllable is defined by Crystal (2008) as "A unit of pronunciation typically larger than a single sound and smaller than a word" (p. 467). However, a syllable typically consists of a vowel sound with or without one or more consonants before or after it. What comes before the vowel is referred to as the onset of the syllable, whereas what comes after the vowel is known as the coda of the syllable.

English consonant clusters are another common source of error. Since Arabic restricts the use of multiple consonants in sequence, learners often simplify complex clusters through epenthesis (adding a vowel, e.g., school → /sɪkuːl/), deletion (e.g., texts → /tɛs/), or substitution (e.g., clothes → /kloz/) (Al-Rubaat & Alshammari, 2020; Hameed & Aslam, 2015). Eckman's (1977) Markedness Differential Hypothesis helps explain these difficulties: structures that are absent or more marked in the learner's first language are inherently more difficult to acquire.

While English permits up to three consonants in the onset and up to four in the coda (Roach, 2009), Modern Standard Arabic (MSA) allows a maximum of two-consonant clusters in the coda. In other words, Arabic does not permit initial consonant clusters; the onset must have the structure CV- (Al-Saidat, 2010). However, in Arabic local varieties, one may find initial clusters, such as the /ħmɑːr/ for MSA /ħɪmɑːr/ 'donkey'.

The EFL learners' difficulties in producing consonant clusters have attracted the attention of researchers. For example, Al-Saidat (2010) investigated the types of declusterisation process found in the interlanguage of twenty-four Jordanian undergraduate students of EFL. The study showed that participants unintentionally insert an anaptyctic vowel in both the onset and the coda of the difficult English syllables. He attributed the cause of such phonological errors to L1 interference. Hameed and Aslam (2015) similarly reported epenthesis and consonant deletion as common strategies among learners attempting to pronounce complex clusters. Innovative approaches have shown promise in addressing these challenges. Altakhaineh, Al-Junaid, and Younes (2024) investigated the difficulties that 60 undergraduate Jordanian learners of EFL encounter in spelling and pronouncing initial and final consonant clusters. The results showed that participants had difficulties in both initial and final clusters and that the initial clusters were more problematic than the final ones. The study concluded that L1 interference is evident in the participants' attempts to insert a short vowel in the difficult clusters, producing sequences conforming to the L1 phonotactic patterns. Al-Rubaat and Alshammari (2020) explored the difficulties faced by Saudi undergraduate EFL learners from the perspectives of both learners (20) and instructors (10). The findings showed that EFL learners encounter difficulties in the pronunciation of initial three-consonant clusters and final three-consonant clusters, multi-syllabic words, unfamiliar sounds, vowels, and voiced or voiceless consonants.

In addition to phonological interference, orthographic complexity plays a significant role in learner errors. English spelling patterns are highly inconsistent, often misleading learners who rely on written forms for pronunciation cues. Arabic, by contrast, uses a relatively transparent orthography with consistent sound-symbol relationships (Al-Shalabi, 2021; Roach, 2009). Without sufficient auditory input or explicit instruction, learners may internalise incorrect pronunciations, which can become fossilised over time (Krashen, 1982; Nakazawa, 2012).

Recent empirical research has begun to shed light on the persistence of these issues. For example, Vinte and Mataruca (2024) investigated the phonological difficulties encountered by Mozambican teacher trainees who

spoke Echuwabo as their L1. The study attempted to find out the impact of participants' L1 on English pronunciation. The authors employed three instruments: observations, semi-structured interviews, and audio recordings to collect data from 14 EFL teacher trainees. The results of the study indicated that English sounds absent in Echuwabo, such as /θ/, caused difficulty for the trainees as they frequently pronounced them incorrectly. Errors attributed to this were of three types: insertion, deletion, and substitution. In addition to L1 interference, the findings indicated that participants encountered difficulties stemming from English spelling conventions and their lack of awareness of English phonological rules.

In an attempt to enhance EFL learners' pronunciation skills, Ma, Mei and Qian (2024) examined the benefits of a pronunciation course supported by a corpus-based language pedagogy (CBLP) to improve EFL students' pronunciation in using segmental and suprasegmental aspects. Using pre- and post-tests, surveys and interviews, they gathered data from seventy-four EFL learners at a university in China. The results of the study showed that students gained substantial improvement in both aspects: segmental and suprasegmental. This was evident in their reading accuracy, phonetic accuracy, and pronunciation fluency. The results also revealed that the CLBP-supported approach was useful as it positively impacted the participants' spoken language in various aspects, including awareness of phonological features, and listening and speaking skills. Similarly, in Saudi Arabia, Alzahrani and Alqurashi (2023) employed a flipped classroom approach with video-based instruction, yielding improvements in segmental accuracy. Web-based tools such as YouGlish and speech recognition applications like Speechnotes have also been tested, with results indicating that authentic audio input and immediate feedback support learner progress (Nasim et al., 2022; Aljabr, 2025). Theoretical frameworks such as Optimality Theory have been further applied to analyse Saudi learners' tendency to simplify final consonant clusters, with studies emphasising the need for early and explicit instruction in marked phonological forms (Al-Yami & Al-Athwary, 2021).

Despite these advances, gaps remain in understanding the long-term impact of these interventions, the variation in learner performance across different proficiency levels, and the influence of regional dialects within the Kingdom. Therefore, this study seeks to expand the existing body of knowledge by analysing pronunciation difficulties among Saudi undergraduates, focusing on both vowels and consonant clusters. The findings aim to contribute to more informed curriculum design and more effective pronunciation pedagogy within the Saudi EFL context. To achieve this goal, the study tries to answer the following research questions:

RQ1: What are the types of errors made by Saudi EFL learners in pronouncing vowels and consonant clusters?

RQ2: What are the sources of these errors?

Methods

This study followed a descriptive qualitative research approach with analytical elements. It aimed to identify and examine the pronunciation challenges experienced by Saudi EFL learners in terms of their types and sources. The focus was mainly on vowel sounds and consonant clusters. Instead of involving experimental manipulation or statistical hypothesis testing, the study sought to describe naturally occurring pronunciation patterns and explain them through phonological theory. The study is qualitative as the researcher relied on gathering and interpreting spoken data; he recorded and phonemically transcribed the participants' utterances using IPA. The researcher employed a descriptive approach to document the participants' pronunciation of specific vowel phonemes and consonant clusters and the types of deviations that occurred. Successively, an analytical aspect was introduced to deduce the cases of these deviations, drawing on interlanguage theory and Eckman's (1977) Markedness Differential Hypothesis to elucidate the impact of Arabic phonotactics and English orthography. Through this, the study aimed to find out the types and sources of difficulties that Saudi EFL learners encounter in the pronunciation area. The results of the study were expected to provide some pedagogical insights into enhancing the teaching and learning of pronunciation in the Saudi EFL context.

The participants were twenty undergraduate Saudi EFL learners enrolled in the Department of Curriculum and Instruction, University of Jeddah, Saudi Arabia. At the time of data collection, they were aged between 18 and 22. They are native speakers of Arabic and had intermediate proficiency based on the institution's placement test. Each participant was required to read aloud a list of ten sentences containing more than 100 English words, targeting problematic vowel sounds and initial and final consonant clusters (see Appendix). Sessions were recorded and data were transcribed using IPA symbols. To identify the errors, the author relied on the Oxford Advanced Learner's Dictionary and consulted a native English speaker to validate the correct pronunciation of the list. Similarly, the transcription of the recorded data was validated by an expert in the field.

Results

Vowels

The transcription is based on the participants' pronunciation of the target sentences. The front mid vowel /e/ becomes front close /ɪ/ in most of the examples due to its non-existence in the phonemic inventory of the participants' L1. It is substituted by the closest alternative /ɪ/. Thus, e → ɪ as 'end' → /ɪnd/, 'seven' → /sɪvn/, 'then' → /ðɪn/, 'red' → /rɪd/, 'pen' → /pɪn/, 'ten' → /tɪn/, 'explanation' → /ɪkspləneɪʃɪn/, 'read' (pt.) → /rɪd/, and 'texts' → /tɪkst/. However, the data showed some examples of English spelling's impact on the pronunciation of this sound. For example, it is replaced by /ə/ and /ɪː/ as 'any' → /ənɪ/ and 'read' (pt.) → /rɪːd/, respectively.

Learners' inability to differentiate /e/ from /ɪ/ is confirmed by their use of the latter instead of other sounds as well in context where 'e' is part of the word's spelling, such as /ə/ as 'open' → /ɔːpɪn/, influenced by the spelling. The influence of spelling is also seen in the pronunciation of /ə/. For example, it is pronounced /ʊ/ as 'of' → /ʊf/, 'to' → /tʊ/, and 'pronunciation' → /prʊnaʊnsɪeɪʃɪn/.

The back short vowel /ɒ/ seems to be difficult for Arab EFL learners in terms of its pronunciation. This can be attributed to two reasons: first, it does not exist in the Arabic phonemic inventory, and second, Arab learners rely on the spelling to pronounce words, as in Arabic, where the correspondence between spelling and pronunciation is one-to-one. Most of the participants replaced it by /ʊ/ as 'stopped' → /stʊpt/, 'got' → /gʊt/, 'of' → /ʊf/, 'on' → /ʊn/, and ʊ 'got' → /gʊt/. The participants in this case were influenced by their L1 and resorted to spelling to find a substitute. This shows the interplay between L1 and L2 in the pronunciation of certain sounds.

The vowel /ʌ/ is pronounced /ə/ and /aʊ/ by all participants. Thus, 'one' → /wən/, and 'pronunciation' → /prʊnaʊnsɪeɪʃɪn/, respectively. The first example demonstrates the impact of the spelling where the sound /ʌ/ is not represented orthographically, whereas the second example shows the reliance of the participants on the verb 'pronounce'.

The long vowel /ɜː/ does not exist in Arabic, which makes it difficult for most learners. They replace it either by /eɪ/ or /ɔː/ depending on the orthographic representation of the word. According to the data, if the word has a letter such as 'i' or 'e' indicating the possibility of being a front vowel, it is pronounced /eɪ/ as 'first' → /feɪrst/, 'shirt' → /ʃeɪrt/, 'girls' → /geɪrlz/, and 'learn' → /leɪrn/. If the word has a letter that anticipates a back vowel such as 'o', it is pronounced /ɔː/ as 'working' → /wɔːrkɪng/, and 'words' → /wɔːrdz/. Here, the pronunciation error can be attributed to both L1 and L2. In other

words, L1 does not have /ɜ:/, whereas the no one-to-one spelling-pronunciation correspondence of L2 led to the incorrect pronunciation. The impact of spelling can also be exemplified by the substitution of /u:/ for /ɔ:/ as in 'poor' → /puː/.

Four diphthongs are identified as problematic for the majority of the participants. These are /əʊ/, /eə/, /ɪə/, and /ɔɪ/. All the participants committed errors in the production of the first three diphthongs. However, the fourth one seems less problematic since two-thirds of them pronounced it correctly. Mostly, all participants replaced /əʊ/ by /ɔ:/ as 'go' → /gɔ:/, 'clothes' → /klɔ:ðz/, 'open' → /ɔ:pɪn/, 'most' → /mɔ:st/, 'phones' → /fɔ:nz/, 'going' → /gɔ:ɪng/, and 'homes' → /hɔ:mz/. Another substitute was /ʊ/, which was dominant in 'only' → ʊnlɪ/, and 'don't' → /dʊnt/. Both L1 and L2 can be the cause of these errors. The interference of L2 is a stronger predictor of the error since it does not have /əʊ/ in its phonemic inventory, whereas the reliance on L2's spelling remains only a possibility.

Similarly, none of the participants pronounced /eə/ or /ɪə/ correctly. These diphthongs seem not to be any part of their phonological competence. Examples such as 'there' → /ðeɪ/, and 'their' → /ðeɪ/ show this kind of erroneous substitution. Participants' L1 does not have these diphthongs, which can be the cause of this error.

Since two-thirds of the participants could pronounce the diphthong /ɔɪ/ correctly, it seems to be an easy sound for them and for almost all Arab learners of English. Despite its absence from the Standard Arabic inventory of phonemes, Arabs are familiar with this sound as it is used in most Arabic colloquial varieties. Teachers of EFL rarely hear errors in the pronunciation of words such as 'boy' or 'oil'. However, six participants could not pronounce /ɔɪ/ correctly in the word 'exploited'. Four participants replaced it by /ɔ:/, producing /ɪksplɔ:tɪd/ 'exploited'; the remaining two pronounced it as /ɪ/ and /eɪ/ as 'exploited' → /ɪksplɪtɪd/ and 'exploited' → /ɪkspleɪtɪd/, respectively. The reason of these errors could be attributed to the participants' level of proficiency or their unfamiliarity with this particular word.

Consonant Clusters

Even though Arabic allows two-consonant clusters in word-final position, many participants were not able to correctly pronounce the combinations /ðz/, /pl/, /lz/, and /ʃn/ in word-final position. To pronounce the required words, they employed two strategies of declusterisation: insertion of an anaptyxis or deletion of one of the consonants. According to the available data, as for the first strategy, the anaptyctic vowels used were /ʊ/ in /pl/ as 'people' → /pɪ:pʊl/,

and /ɪ/ in the rest of the consonant clusters as 'clothes' → /klɔːðɪz/, 'pronunciation' → /prʊnaʊnsɪeɪʃɪn/, and 'explanation' → /ɪkspləneɪʃɪn/. Thus, -CC > -CɪC or -CʊC. The deletion strategy entails the omission of the second element of the cluster, which is /z/, according to available data. This was seen in the pronunciation of /wɔːrd/ 'words', and /geɪrl/ 'girls'. Phonologically, this process can be translated as -CC > -C.

Arabic does not permit consonant clusters at word-initial position; all syllable onsets start with a CV. However, codas are limited to only two-consonant clusters. Therefore, as the number of consonants in a cluster increases, the pronunciation becomes more challenging for Arab learners of EFL. The analysis shows that three-consonant clusters were declusterised. This process involves the insertion of /ɪ/ as an anaptyctic vowel to ease the pronunciation of the difficult sequence, adding a new syllable to the word. Commonly, this insertion occurs after the first consonant, as 'spleen' → /sɪplɪːn/, 'splash' → /sɪplæʃ/, 'sprite' → /sɪpraɪt/, and 'screen' → /sɪkrɪːn/. However, some participants inserted it after the second element of the cluster. This process also adds an extra syllable to the word but reduces the first syllable into a two-consonant cluster, making the pronunciation easier as 'spleen' → /spɪlɪːn/, and 'sprite' → /spɪrɪt/. Accordingly, CCC- > CɪC-C or CCɪ-C. This behaviour indicates the interference of learners' L1 phonological system on acquiring the L2 system.

Although four-consonant clusters are allowed in the English codas, their occurrence is relatively rare. According to the available data, the participants encountered difficulty in the pronunciation of the word 'texts' as it comprises only a syllable with a heavy coda consisting of a four-consonant cluster. To overcome this difficulty, the participants omitted the final member of the cluster as 'texts' → /tɪkst/. Thus, -CCCC > -CCC. The cause of this error is L1.

Although the pronunciation of individual consonant phonemes is not the focus of this study, a noteworthy process is observed. The velar nasal /ŋ/ creates a striking difficulty for all the participants. None of them pronounced it either medially or finally. It can be said that it does not exist in their phonological competence. The data showed that they replaced it with a sequence of two related consonants: the alveolar nasal /n/ and the velar stop /g/. Thus, ŋ > ng as 'singer' → /sɪngər/, 'singing' → /sɪngɪng/, 'working' → /wɔːrkɪng/, 'going' → /gɔːɪng/, and 'swimming' → /swɪmɪng/. The velar nasal /ŋ/ does not exist in Arabic, and hence the erroneous pronunciation of these words.

The following table summarises the main findings of the analysis according to sound type (vowel, diphthong, consonant), phonological process and source of difficulty.

Table 1
Summary of Results

Area	Patterns	Processes	Source(s)	Examples
Front vowels	e → ɪ	Substitution	L1 interference, orthographic effect	end → /ɪnd/, rnd → /rɪd/
Central vowels	ʌ → ə or aʊ	Orthographic influence and misgeneralisation	L2 spelling	one → /wən/, pronunciation → /prʊnaʊnsɪeɪʃɪn/
	ɜː → eɪ or ɔː	Substitution	L1 interference	first → /feɪrst/, working → /wɔːrkɪng/
Back vowels	ɒ → ʊ	Substitution	L1 interference, L2 spelling	stopped → /stʊpt/, got → /gʊt/
Diphthongs	əʊ → ɔː	Diphthong simplification	L1 absence of diphthongs	go → /gɔː/, open → /ɔːpɪn/
	eə, ɪə → eɪ	Diphthong simplification	L1 absence of diphthongs	there, their → /ðeɪ/
Initial clusters	Epenthesis	Anaptyxis	Arabic does not permit initial clusters	splash → /sɪplæʃ/, sprite → /sɪpraɪt/,
Final clusters	Epenthesis or deletion	Declusterisation, simplification	Arabic permits limited -CC	clothes → /klɔːðɪz/, words → /wɔːrd/, texts → /tɪkst/.

Discussion

The findings of the present study confirm and extend those of the previous studies that investigated difficulties encountered by Arab EFL learners in relation to English vowels and consonant clusters. The substitution patterns detected in the pronunciation of /e/, /ɒ/, and /ʌ/ support the previous studies

on Arabic-English phonological differences. For example, Jahara and Abdelrady (2021) found that Saudi EFL learners had a frequent confusion between /ɪ/, /e/, and central vowels, which agrees with the tendency in this study's participants to substitute /e/ with /ɪ/ and /ʌ/ with /ə/. Similarly, Naji and Almakrob's (2023) study found that Yemeni learners of English encountered difficulties pronouncing /e/, /ɒ/, and /uː/, supporting the finding of this study that /ɒ/, which does not exist in the Arabic inventory of phonemes, leads to systematic substitution errors. This confirms the role of negative transfer from L1, as indicated in the findings of Vinte and Mataruca (2024). These similarities in the findings across studies support Flege's (1995) assertion that mismatching between L1 and L2 phonological systems limits L2 sound acquisition.

The orthographic effect also emerged strongly in the present data. Reliance on the writing system added another challenge posed by English's opaque spelling system. For example, the substitution of /e/ by /ɪ/ and /ɒ/ by /ʊ/ shows how learners draw on familiar phonological categories when encountering English sounds that do not exist in Arabic. Furthermore, the mispronunciation of /ɜː/ as in /feɪrst/ for *first* demonstrates a dual impact of L1 interference and misleading orthographic cues. This echoes Al-Shalabi's (2021) and Roach's (2009), who claim that reliance heavily on English spelling results in persistent pronunciation errors.

Concerning consonant clusters, the findings of this study resonate with those of Al-Saidat (2010), who concluded that Jordanian learners inserted anaptyctic vowels to simplify difficult clusters. The current participants' insertions of /ɪ/ in initial clusters to ease their pronunciation, such as /sɪpliːn/ for 'spleen' and /spɪrɪt/ for 'sprite', echo Al-Saidat's findings that L1 interference drives declusterisation strategies. Similarly, Hameed and Aslam (2015) observed both epenthesis and deletion among Arab learners when facing difficulties in consonant clusters, which were also evident in this study when participants omitted final /z/ as in /wɔːrd/ for 'words' and /geɪrl/ for 'girls' or inserted a vowel as in /klɔːðɪz/ for 'clothes'. This suggests that such strategies are widespread across Arab EFL learners, regardless of their local varieties.

Moreover, the difficulties posed by the three or four consonant sequences aligned with the findings of Altakhaineh, Al-Junaid, and Younes (2024), who reported greater problems with initial than final clusters among their participants. The tendency of the present participants to break down some initial or final clusters into CV structures supports Eckman's (1977) Markedness Differential Hypothesis, whereby the absence of these clusters in Arabic syllable structure predicts difficulty when learning them in any language, including English.

Finally, the process of cluster formation, as exemplified by the substitution of the velar nasal /ŋ/ by the new sequence /ng/ in all cases, reflects the absence

of the former in Arabic. This is consistent with the findings of Al-Rubaat and Alshammari (2020), who reported that Saudi EFL learners encounter challenges with unfamiliar sounds besides clusters. This shows that both segmental and syllabic-level difficulties continue due to the influence of both the L1 phonological system and L2 orthography.

Conclusion

The primary objective of this study was to investigate the impact of the phonological transfer and orthography on the pronunciation of Saudi undergraduate students, with a focus on vowel phonemes and consonant clusters. The results revealed systematic substitutions of English vowels and cluster simplifications. Many incorrect pronunciations were caused by the absence of equivalent sounds or clusters in Arabic, the spelling-driven alternatives, or both. The participants erroneously employed various substitution strategies to facilitate the pronunciation of the difficult vowels and strategies of deletion and epenthesis to simplify syllable structures. Substitution of absent vowels and simplification of clusters align with Arabic phonotactic constraints, while the use of spelling-driven alternatives reflects the depth of English orthography. This highlights the interplay of L1 interference and L2 orthographic influence, demonstrating the persistence of these errors despite formal instruction.

The findings of this study not only confirm but also expand earlier work by showing how phonological transfer and orthographic reliance interact. The previous studies often stressed one source of challenge over the other. However, this study demonstrates that learners' challenges in pronunciation are frequently caused by a dual impact of Arabic phonotactics and the irregularities of English orthography. Based on this, pedagogical strategies should integrate phonological training (e.g., practising difficult vowel phonemes and gradual cluster training) with explicit instruction on spelling-pronunciation discrepancies in order to enhance intelligibility among not only Saudi learners but also other Arab learners.

This study was limited by the sample size and controlled reading tasks. Researchers are encouraged to expand diverse dialects and experimentally isolate orthographic influence. They are also encouraged to conduct longitudinal and intervention studies.

Disclosure Statement

The author reported no potential conflicts of interest.

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Appendix A

List of sentences used in data collection

1. At the end, one of my friends got a permission to leave at seven.
2. First, go there and then get the new clothes.
3. Open the door and you will see most of the people are busy with their phones.
4. Use the red pen to write on the screen near the window.
5. The singer in the blue shirt has stopped singing.
6. Only ten girls could learn the pronunciation of 'spleen', 'sprite' and 'splash'.
7. I am working to explain the use of these words.
8. I don't need any different explanation.
9. I started to like going to the swimming pool.
10. I have read some texts about the homes of the poor people and how they are exploited.