EUROPEAN ACADEMIC RESEARCH
Vol. VIII, Issue 3/ June 2020

Impact Factor: 3.4546 (UIF)
DRJI Value: 5.9 (B+)

ISSN 2286-4822
www.euacademic.org

# Phonotactic Cruciality of English Initial and Final Consonant Clusters' Pronunciation on Sudanese EFL Undergraduates

JAMAL UTHMAN NOGOUD
English Language Programme, Nahda College;
Prof. AHMED BABIKER AL-TAHIR
College of Languages, Almughtaribeen University;
Dr. KHALED HASSAN ALI
English Language Department, Omdurman Ahlia University;
Dr. NAGLA TAHA BASHRIE
College of Languages, Sudan University of Science and Technology

**Abstract**

*This study identifies Sudanese EFL undergraduates' phonological errors in pronouncing English words involving ICCs and FCCs and its causes. It's also carried out to investigate the effectiveness of methods, materials and activities used for teaching English phonotactics. A mixed approach is adopted to analyse the data of this study which is obtained by two instruments. The first test is composed of a word-list reading task consisting of 24 words. The second instrument is an observation with 15 checklist items. These items are purposefully designed by taking into consideration the different variables and theoretical framework of this study. The participants are 60 females and males second year students from Al-Neelain University, Sudan University of Science and Technology, Almughtaribeen University and Nahda College who undertake the test; 15 from each. The researcher attends an hour-and-a-half lecture on consonant clusters and phonotactics at Al-Neelain University and Nahda College with third year students to conduct the observation. The findings reveal that Sudanese EFL undergraduates mispronounce English involving ICCs and FCCs. It also reveals that unrequired pause, epenthetic vowel, deletion and replacement of consonant sound/s, and consonant-vowel position conversion are the causes of the*

*mispronunciation. Moreover, the methods, materials and activities used for teaching phonotactics aren't effective and lack many principles of teaching pronunciation. Finally, the researcher recommends that EFL instructors should provide students authentic audiovisual materials. It's also highly recommended that EFL students should be aware of the phonotactic differences between their MT and TL.*

**Key words:** phonotactic constraints, consonant cluster, ICCs, FCCs, Sudanese EFL undergraduates.

## 1. INTRODUCTION

One of the fundamental purposes of learning a foreign language is to acquire a native-like pronunciation or fluency. Many students of English as a Foreign Language (henceforth, EFL) encounter difficulties in learning English and these difficulties are based on the linguistic differences between English and their mother tongue (henceforth, MT) language such as semantic, syntactic, morphological and phonological differences.

This study is concerned with the phonological aspects of English and Arabic because phonology is considered as the vein of pronunciation beside phonetics. Yule (2014, p.40) defines phonology as "the description of the systems and patterns of speech sounds in a language". Thus, this study, in particular, is concerned with the nature of phonotactic system of English and Arabic syllable structure of words involving consonant clusters and its performance by Sudanese EFL undergraduates; phonotactics in phonology is defined as "the arrangements of the distinctive sound unit or phoneme" (Richards and Schmidt 2010, p.444). English syllable is composed of two elements the onset (at the beginning of the word) with one, two or three consonants and the rhyme which is divided into peak/nucleus usually vowel and coda (at the end of the word) with one, two, three or four consonants (in small cases), hence the syllable must consist of a peak but it may have no onset (zero onset) or coda (zero coda) and maybe both (Roach 2009, pp.56-60).

The nature of syllable structure of words involving consonant clusters of both languages is different; English has far more consonant clusters than Arabic (Kenworthy 1987, p.125). In the onset syllable or initial consonant clusters (henceforth, ICCs), English ICCs can be made of either two ICCs as in stick /stɪk/ or three ICCs hence, the first consonant sound is usually /s/ such as street /stri:t/ (McMahon 2002, p.106) and in the coda syllable or final consonant clusters (henceforth, FCCs) English FCCs can be made up of two FCCs as in help /help/, three FCCs such as next /nekst/ or four FCCs as in texts /teksts/ (Roach 2009, pp. 59-60). On the other hand, Arabic language syllable structure does not permit ICCs at all (Al-Hattami 2010, p.360). Thus, any Arabic onset syllable consists of consonant (henceforth, C) and vowel (henceforth, V) as in /kɪtab/ book, in the coda syllable or FCCs Arabic has only two FCCs such as /bɪnt/ girl (Bishr 2000, pp.506-510).

Al-Hattami (2010, p.360) states that the difference between English and Arabic phonotactic system is likely to create problems of pronunciation to native speaker of Arabic learning EFL. O'Connor (1998, p. 2) attributes these difficulties to the age in which the learner picks up the characteristic sound of the target language (henceforth, TL) as well as to the native language of the learner and its different characteristics from the TL which are quite strong and very difficult to break. Brown, on the other hand, (2007, p.3) views these errors as an important indicator of the learning process. Thus, the study at hand identifies and analyses Sudanese EFL students' performance of English phonotactic syllable structure involving ICCs and FCCs. Broselow (1984 as cited in Gass and Selinker 1994, p.72) asserts that:

> *Errors involving consonant clusters generally occur when these clusters must be analysed as belonging to syllable structure which are not permitted in the native language, and that the mispronunciation of the clusters represent an attempt by the language learner to bring second language forms into conformity with first language restrictions defining possible syllable.*

Therefore, Sudanese EFL undergraduates insert an epenthetic vowel sound to break the string of consonant clusters to suit their MT language phonotactic system, for example, the word 'play /pleɪ/' becomes /pɪleɪ/ they intrude the vowel sound /ɪ/ to split the sequence of two ICCs /p/ from /l/ and another example of FCCs is the sequence of

/kst/ in the word 'next /nekst/' becomes /nekəst/ or /nekɪst/ they insert the vowel sounds /ə/ or /ɪ/ to split the sequence of three FCCs /kst/ (Swan and Smith 2001, p.198). This epenthetic vowel insertion is divided into two types: (a) anaptyxis; when a vowel (usually /ɪ/) is inserted to break two consonants cluster as (CVC instead of CC), and (b) prosthesis; when a vowel is inserted before the cluster as (VCC instead of CC). Both types are commonly used to simplify English cluster by speakers of many other languages such as Korean, Amharic, Tiv (spoken in Nigeria), and most Arabic dialects (Darcy & Thomas, 2019; Gashaw, 2016; Mbha & David, 2014; Al-Samawi, 2014).

To avoid subjectivity, the study at hand uses a computer software program "Praat" to analyse the participants' speech. Praat allows forming waveforms and spectrograms of the speech sound. Thus, the analysis of this study does not depend on the aural skill or listening of the researcher but is more objective; the whole analysis is computer-based.

## 2. THE PROBLEM

Sudanese EFL undergraduates perform a large number of pronunciation errors particularly in the phonotactic system of syllable structure involving ICCs and FCCs. Thus many Sudanese EFL undergraduates break the sequence of these clusters by an unrequired pause or inserting an epenthetic vowel sound to ease their pronunciation and suit their MT language phonotactic system of the structure of consonant clusters in the onset and coda syllable. That is, they initially insert the mid central /ə/ or high front /ɪ/ short vowels as in /əsku:l/ or /ɪsku:l/ instead of /sku:l/. Regarding the unrequired pause consider the following figures with the word 'kept /kept/':

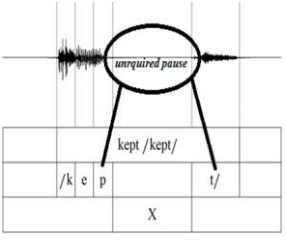



**Figure 1** the incorrect pronunciation of the word kept

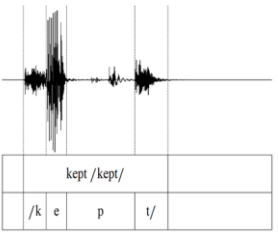



**Figure 2** the correct pronunciation of the

word kept

## 3. RESEARCH OBJECTIVES

1. To investigate Sudanese EFL undergraduates' performance in pronouncing English words involving ICCs and FCCs.
2. To identify phonological errors that Sudanese EFL undergraduates perform in their pronunciation of English syllable structure involving ICCs and FCCs.
3. To verify the effectiveness of the method, textbook and activities which are used in teaching or lecturing the sound system of English language to Sudanese EFL undergraduates.

## 4. RESEARCH QUESTIONS

1. To what extent do Sudanese EFL undergraduates pronounce English words involving ICCs and FCCs correctly?
2. What are the causes of the incorrect pronunciation of English words involving ICCs and FCCs performed by Sudanese EFL undergraduates?
3. How effective are the method, materials and activities used in teaching English phonotactics to Sudanese EFL undergraduates?

## 5. RESEARCH HYPOTHESES

1. Sudanese EFL undergraduates mispronounce English words involving ICCs and FCCs.
2. The causes of Sudanese EFL undergraduates' incorrect pronunciation of English words involving ICCs and FCCs are unrequired pause, vowel insertion and consonant deletion.
3. The method, materials and activities used in teaching English phonotactics to Sudanese EFL undergraduates are not effective for improving pronunciation skill of the students.

## 6. SIGNIFICANCE OF THE STUDY

Pronunciation is one of the most important skills that nearly all EFL students struggle to master as personally the researcher also struggled. In fact, according to the best knowledge of the researcher,

few studies have been carried out in the area of pronunciation errors in the context of Sudan, particularly, the pronunciation of English phonotactic system of syllable structure involving ICCs and FCCs. Therefore, this study is considered to be significant since there have been few attempts made to identify and analyse the nature of phonotactics in English syllable structure involving ICCs and FCCs performed by Sudanese EFL undergraduates.

Thus, the first and foremost significance of this study is to help Sudanese EFL undergraduates better their performance in pronouncing English phonotactic of syllable structure involving ICCs and FCCs and to pay attention to their pronunciation errors and to have native-like pronunciation as well. It also benefits EFL teachers to have advanced knowledge of their students' pronunciation errors of English syllable structure involving ICCs and FCCs and prepare proactive remedial activities. Moreover, it can benefit textbook writers and syllabus designers to focus on such errors. Furthermore, it contributes to filling the gap in the literature in the field of phonology as general and more specifically the phonotactic system of English ICCs and FCCs in the context of Sudan and the Arab world. Finally, it contributes a solution to the problem of pronouncing English syllable structure involving ICCs and FCCs by EFL students.

## 7. LITERATURE REVIEW

### The Notion of Syllable

The speech sounds of all languages are organised into larger units to represent phonologically a significant grouping of segments called syllable. Every word in English has at least one syllable and many others have two, three, four, five or more syllables. Syllable is a phonological unit which is challenging to state its exact definition but relatively easy to recognise. Almost all adult speakers of English, regardless of their linguistics background, agree that the words phone, phoneme, phonetics, phonotactic, suprasegmental and incomprehensible are comprised of one, two, three, four, five, six syllables respectively.

Collins and Mees (2013, p. 16), for example, define syllable in a rough way as "a unit larger than a phoneme and smaller than a word". In a precise way, though, Finegan (2015, p. 126) describes

syllable as a phonological unit compromised of one or more sounds which are divided into two components. In general, a syllable is a structural unit in phonology that combines the individual speech sounds in one word according to the phonotactic constraints of a particular language which varies across languages.

**Maximal Onset Principle**

Despite the simplicity of counting how many syllables a particular word has (of course sometimes with the help of the nucleus), it is often confusing to intuitively state where a syllable ends and the next one begins in a polysyllabic word. When English speaker is asked to split a polysyllabic word such as 'abstract' /æbstrækt/ into syllables, they face challenges with the intervocalic consonants. For example, should they split up the consonants /bstr/ (1) as a coda of the first syllable */æbstr.ækt/, (2) as the onset of the second syllable */æ.bstrækt/ or (3) simply divide them into both positions /æbs.trækt/ or /æb.strækt/? Based on this division, the first assumption is impermissible English coda as long as these four consonants never cluster to form English coda. Apart from the first open syllable with the short vowel /æ/ violates the rule of stressed syllables, the second assumption is also disallowed onset in English, so long as English phonotactics restricts onset to be not more than three consonants. However, with regard to English final and initial sequence constraints, the last assumption /æbs.trækt/ and /æb.strækt/ would form possible English syllables as long as they do not violate its phonotactic system.

Thus, the phonotactic system of the language gives an invaluable asset and clue to answer such questions of syllabification and syllable boundary. Codas, as in many languages, are highly restricted or even disallowed as in Hawaiian (Gussenhoven & Jacobs, 2017, p. 48). In many other languages, onsets are obligatory components of a syllable as in Arabic (Ghador, 2008, p. 160). While in others, all syllables must consist of an onset and a nucleus which means that they lack codas (Yavas, 2011, p. 138).

All these facts indicate that, cross-linguistically, onsets are prioritized over codas. For this priority, it is assumed that any series of intervocalic consonants are assigned to an onset rather than a coda position. This assumption is applicable whenever there is indeterminacy on syllables with cluster of consonants so that the

syllable on the right ends up with the maximal admissible number of consonants that satisfies the requirements of English ICCs. As a matter of fact, there is a highly reliable evidence in the structure of English syllables which supports the above mentioned assumption that is the application of Maximal Onset Principle (henceforth, MOP) is the applicable solution to the problem of syllabification. MOP in short, implies that when there is a syllable with intervocalic consonants in a particular word, the choice is always to place as many consonants as possible to the onset and as few as possible to the coda (McMahon, 2002, p. 111). However, keep in mind that these clusters do not violate the phonotactic constraints of the language. This means that the word 'abstract' /æbstrækt/ which is syllabified above with two different and yet possible English syllables, is syllabified as /æb.strækt/ rather than /æbs.trækt/ by appealing to the MOP which assigns /str/ to the onset of the second syllable (Radford, et. al. 2009, pp.81-2).

**The Importance of Pronunciation and Its Instruction**

The supreme goal of teaching/learning a language is to enable the learners to/be able to communicate in the TL. Therefore, progress in almost every aspect of language acquisition/learning depends largely on the contribution made by communication – to understand and to be understood – which can only be achieved by the cornerstone of communication 'pronunciation'. Unfortunately, many teachers are not aware of the importance of this cornerstone. These teachers pay enough attention to such areas of language as grammar, vocabulary and productive and receptive skills (Harmer, 2007, p. 248). This negligence of teaching pronunciation is attributed to many reasons as stated by Harmer (ibid):

1. Teachers feel nervous when they deal with sounds and intonation.
2. Teachers feel that explicit pronunciation teaching make things worse.
3. Teachers think that pronunciation learning is very difficult and tedious for learners.
4. Teachers believe that learners are able to acquire perceivable accent without explicit instruction.

5. Learners believe that learning pronunciation is a waste of time.
6. The lack of high quality and suitable teaching and learning materials.
7. Lack of time to practice the pronunciation activities.

It's not only Harmer who claims the negligence Gilakjani (2011, p. 1); Hismanolglu & Hismanolglu (2011, p23); Celce-Murcua et al. (1996, p. 2) express that pronunciation is the least favourite language area to be taught in classes as compared to such areas of language as grammar, vocabulary and the four language learning skills.

No doubt that grammar and vocabulary are important elements of language teaching/learning, but unless speakers pronounce those elements properly, their communication will never be successful (Harmer, 2007, p248). It's customary that native speakers understand every speech despite its grammatical errors, if it's spoken in accurate pronunciation (ibid). Hence, it's even obvious that every child struggles to acquire the pronunciation of their MT much earlier than its grammar.

Accordingly, pronunciation is not only the core and essential part of communication to become skilled in, but in the best case is an area of spoken language that leads to successful communication and add an invaluable and effective worth for the daily life interaction with others (Pennington and Rogerson-Revell (2019, p. 22). It's therefore being aware of the pronunciation aspects of language can be beneficial not only to the sound production, but also to produce comprehensible and intelligible speech. Harmer (2007, p. 248) emphasises that through formal pronunciation instruction students will not only learn the different sound and sound system but also improve their communication skill.

**What do adult EFL learners need to master the pronunciation of their L2?**

Yates and Zielinski (2009, p.17) propose four requirements to be met for everyone who endeavours to attain a native-like accent. First and foremost, apart from being exposed to the TL, adult EFL learners need **focussed support and instruction**. It's assumed that pronunciation learning isn't easy for adults as children. To that end,

most adult learners cannot learn an intelligible pronunciation without focused and explicit instruction. Secondly, as in every aspect of language learning and with a great deal in pronunciation, pronunciation learning needs **time and patience**. Improvement in pronunciation never happens overnight as in learning vocabulary items for example. Thirdly, **continuity**; to attain native-like pronunciation, learners need to practise speaking on a continuous basis. This means that intelligible accent can only be acquired through speaking continuously. The last requirement is **awareness**. One of the factors that affect pronunciation learning is the native language of the learner. Therefore, they need to be aware of their MT and notice how the extraction of their native language accent affects positively their TL's accent.

**What pronunciation teaching method works best?**

There is no a conclusive answer to this question. It's also known for almost all teachers, there is no a single method for teaching any aspects of language. Because learners and context vary from class to another, it is difficult if not impossible to suggest a single teaching approach. Therefore, as suggested by Yates and Zielinski (2009, pp.19-20), there are five principles that are crucial for teaching pronunciation and should be included in any teaching approach.

Firstly, pronunciation teaching should **start from scratch**; teachers should pay attention from the first day of starting teaching the language. Early exposure to the fundamental elements of pronunciation can help learners reach to the fact that English isn't a phonetic language which in turn help them to develop their grammatical as well as writing skills.

Secondly, teachers should **be proactive**; they should deal with pronunciation matters in advanced. Teaching pronunciation is not only about correcting errors, but rather teaching learners how to speak and avoiding those errors in advance through providing models and helping them to be aware of the sounds and sound system of English.

Thirdly, after starting from the scratch and being proactive, teachers need to **train their learners' ears and mouths**. Overcoming writing temptation is the first step to train ears and mouths. Therefore, focusing on training learners' ears and mouths

helps not only resist the temptation of writing, but it also encourages learners to have good pronunciation in spontaneous speech.

As a forth principle, teachers should entail a native speaker **model** and a plenty of **practise** time in their teaching approach. Learners should be exposed to authentic materials prepared by native speakers through listening and speaking preferably with native speakers too.

The fifth principle is to **avoid the fear of using essential technical terminology**. It's crucial for learners even those who are at their beginning to tackle pronunciation through its technical terminologies. To that end, teachers as well as learners should have a shared way to address pronunciation learning.

The researcher believes that, along with Yates and Zielinski's five principles, teachers should **be aware of their learners' MT**. the learners' MT plays an essential role in the process of acquiring a new language's sounds and sound system. To that end, teachers should acquaint their learners the differences between their MT and the TL. This acquaintance helps the learners to proactively avoid or decrease any MT transfer.

## 8. RESEARCH METHODOLOGY

To statistically analyse the data, the researcher adopts a quantitative design. The tools utilised for the data collection of this study are a test and an observation. The first test consists of a word-list reading task. This task is comprised of twenty four words and they are divided into two parts. The first part consists of twelve words with ICCs in three sections. The second part also consists of twelve words with FCCs in three sections, too. For this test, the participants are asked to read aloud the word-list reading task. The second instrument is an observation which is designed to provide a careful description of the teaching and learning process and to gather live data from naturally occurring situation. This observation consists of 15 checklist items which are purposefully designed by taking into consideration the different variables of the study and its theoretical framework. These fifteen checklist items are scaled with applied, partially applied and not applied. The participants of this study are 60 females and males second year students from four universities in Khartoum, Sudan 15 from each; Al-Neelain University, Sudan University of Science and

Technology, Almughtaribeen University and Nahda College who undertake the test. The researcher attends an hour-and-a-half lecture on consonant clusters and phonotactics at Al-Neelain University and Nahda College with third year students to conduct the observation. It's advantageous to mention that all participants speak the same Sudanese colloquial Arabic as their L1 and English as an L2.

## 9. RESULTS AND DISCUSSION

### Research question one

A. *To what extent do Sudanese EFL undergraduates pronounce English words involving ICCs and FCCs correctly?*

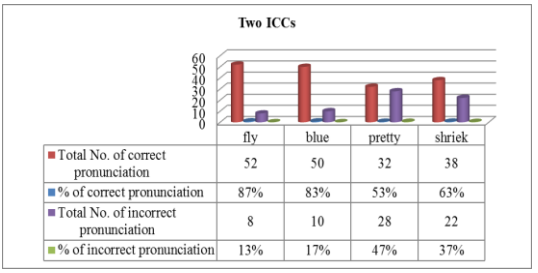
According to the table below, the results of the word-list reading task indicate that the mean marker of the correct answer on words involving consonant clusters, except Two ICCs, are significantly different than those of the incorrect ones. From these results, it's clear that Sudanese EFL undergraduates encounter tremendous problems in pronouncing English words involving ICCs and FCCs.

| Statistics | Two ICCs | | Two ICCs with /s/ | | Three ICCs | | Two FCCs | | Three FCCs | | Four FCCs | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CA | IC | CA | IC | CA | IC | CA | IC | CA | IC | CA | IC |
| **Mean** | 2.87 | 1.20 | 1.43 | 2.57 | 1.45 | 2.53 | .95 | 3.03 | .38 | 3.48 | .07 | 3.93 |
| **Mode** | 3 | *1* | 0 | *4* | 0 | *2* | 0 | *4* | 0 | *4* | 0 | *4* |
| **SD** | .929 | .988 | 1.307 | 1.307 | 1.185 | 1.171 | .928 | .974 | .643 | .911 | .252 | .252 |
| **Minimum** | *1* | *0* | *0* | *0* | *0* | *0* | *0* | *0* | *0* | *0* | *0* | *3* |
| **Maximum** | 4 | *4* | 4 | *4* | 4 | *4* | *3* | *4* | 2 | *4* | 1 | *4* |
| **Mean Difference** | -1.133 | | -2.567 | | -2.550 | | -3.050 | | -3.617 | | -3.933 | |
| **Sig.** | *0.000* | | *0.000* | | *0.000* | | *0.000* | | *0.000* | | *0.000* | |

*CA= correct answer *IC= incorrect answer

**Table 1. Mean, mode, SD, etc. for all scores of correct and incorrect answers**

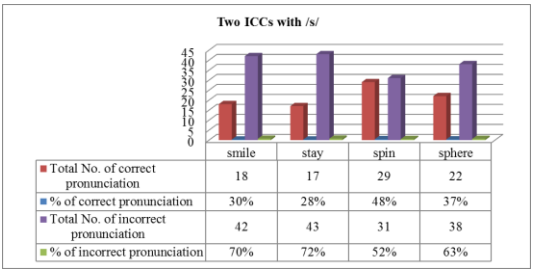
Figure three below shows a significant difference between the correct and incorrect answer of English word involving two ICCs in percentage scores. In the first two words, students don't face much problem in pronouncing the words 'fly' and 'blue', while in the other two words 'pretty' and 'shriek', more than 37% of the participants fail to correctly pronounce them.




| | fly | blue | pretty | shriek |
|---|---|---|---|---|
| Total No. of correct pronunciation | 52 | 50 | 32 | 38 |
| % of correct pronunciation | 87% | 83% | 53% | 63% |
| Total No. of incorrect pronunciation | 8 | 10 | 28 | 22 |
| % of incorrect pronunciation | 13% | 17% | 47% | 37% |

**Figure 3. Total number and percentage of Two ICCs correct and incorrect answer**

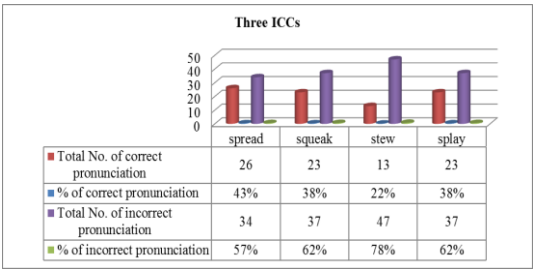
According to the figure below, the results of two ICCs with /s/ illustrate a statistically significant different between the correct and incorrect answer. The results indicate that more than 50% of the students fail to correctly pronounce all words.




| | smile | stay | spin | sphere |
|---|---|---|---|---|
| Total No. of correct pronunciation | 18 | 17 | 29 | 22 |
| % of correct pronunciation | 30% | 28% | 48% | 37% |
| Total No. of incorrect pronunciation | 42 | 43 | 31 | 38 |
| % of incorrect pronunciation | 70% | 72% | 52% | 63% |

**Figure 4. Total number and percentage of Two ICCs with /s/ correct and incorrect answer**

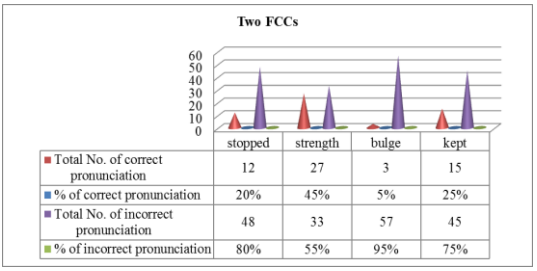
Based on figure 5 below, the results of three ICCs indicate that there a difference between the correct and incorrect answer. From the results, it's, again, evident that more than 57% of the participant mispronounce these words.




| | spread | squeak | stew | splay |
|---|---|---|---|---|
| Total No. of correct pronunciation | 26 | 23 | 13 | 23 |
| % of correct pronunciation | 43% | 38% | 22% | 38% |
| Total No. of incorrect pronunciation | 34 | 37 | 47 | 37 |
| % of incorrect pronunciation | 57% | 62% | 78% | 62% |

**Figure 5. Total number and percentage of Three ICCs correct and incorrect answer**

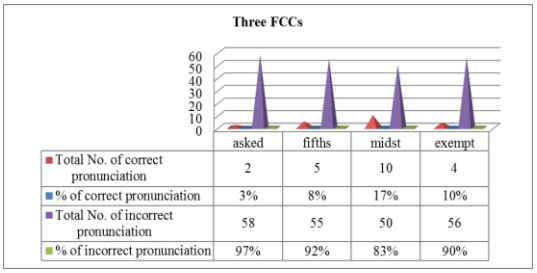
From the figure below, the incorrect pronunciation of two FCCs is significantly different from the correct ones. The results indicate that 95% of the participant mispronounce the word 'bulge', 80% mispronounce the word 'stopped', 75% fail to correctly pronounce the word 'kept' and 55% mispronounce the word 'strength.




| | stopped | strength | bulge | kept |
|---|---|---|---|---|
| Total No. of correct pronunciation | 12 | 27 | 3 | 15 |
| % of correct pronunciation | 20% | 45% | 5% | 25% |
| Total No. of incorrect pronunciation | 48 | 33 | 57 | 45 |
| % of incorrect pronunciation | 80% | 55% | 95% | 75% |

**Figure 6. Total number and percentage of Two FCCs correct and incorrect answer**

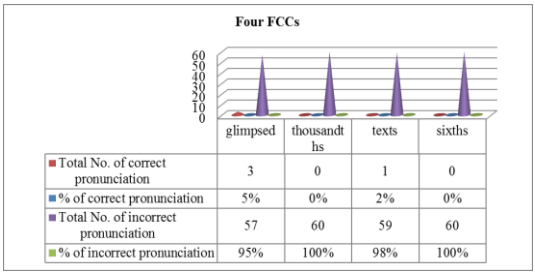
The results of three FCCs, as illustrated below, indicate that the percentage of the incorrect pronunciation is extremely higher than the correct one. From the results, more that 80% of the student mispronounce these words.




| | asked | fifths | midst | exempt |
|---|---|---|---|---|
| Total No. of correct pronunciation | 2 | 5 | 10 | 4 |
| % of correct pronunciation | 3% | 8% | 17% | 10% |
| Total No. of incorrect pronunciation | 58 | 55 | 50 | 56 |
| % of incorrect pronunciation | 97% | 92% | 83% | 90% |

**Figure 7. Total number and percentage of Three FCCs correct and incorrect answer**

As it's illustrated in figure 8 below, the results of the incorrect pronunciation of four FCCs are far more significantly different than their correct counterparts. The results indicate that all participants fail to correctly pronounce the words 'thousandths' and 'sixths'. With nearly the same, 98% and 95% participants mispronounce the words 'text' and glimpsed respectively.




| | glimpsed | thousandths | texts | sixths |
|---|---|---|---|---|
| Total No. of correct pronunciation | 3 | 0 | 1 | 0 |
| % of correct pronunciation | 5% | 0% | 2% | 0% |
| Total No. of incorrect pronunciation | 57 | 60 | 59 | 60 |
| % of incorrect pronunciation | 95% | 100% | 98% | 100% |

**Figure 8. Total number and percentage of Four FCCs correct and incorrect answer**

## Research question two

*B. What are the causes of the incorrect pronunciation of English words involving ICCs and FCCs performed by Sudanese EFL undergraduates?*

Accompanying the above results and the computer-based analysis (see appendix C for figures), the causes of the incorrect pronunciation are unrequired pause as in figure 9 above, vowel insertion as in figure 10 below, deletion of consonant segment in FCCs as in figure 11 below, replacement of consonant sounds and conversion of consonant vowel position as in figure 12 below.

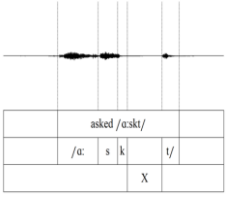



**Figure 9.** Example of unrequired pause

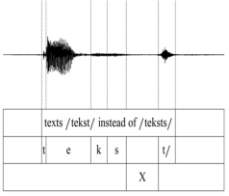



**Figure 11.** Example of consonant deletion

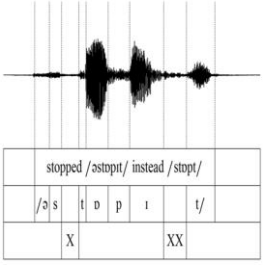



**Figure 10**. Example of vowel insertion in ICCs and FCCs

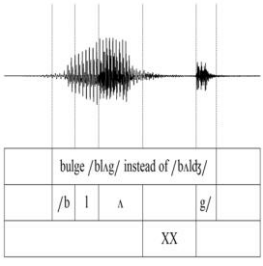



**Figure 12.** Example of consonant vowel position conversion and consonant

replacement

**Research question three**

C. *How effective are the method, materials and activities used in teaching English phonotactics to Sudanese EFL undergraduates?*

Based on the data gathered by the observation, the results show that lectures are delivered with no authentic audiovisual materials. In addition to that, in both classes, instructors don't provide tape/audio recording and speakers which are crucial for pronunciation classes. There is also no reference to the students' MT which means that instructors in both classes don't acquaint their students the differences between the phonotactic systems of both languages. Moreover, instructors rarely give their students opportunities to practice pronouncing English words involving ICCs and FCC. Furthermore, only 20-30% of the students participate in the activities. Finally, there is no remedy for any pronunciation mistakes in one of the classes while the other class has some.

As for the good practices of pronunciation elicited through the observation, in both classes the instructors employ technical terms during their lecture.

## 10. GENERAL DISCUSSION

The current study is carried out to identify phonological errors performed by Sudanese EFL undergraduates in pronouncing English words involving ICCs and FCCs. The researcher hypothesises that '*Sudanese EFL undergraduates mispronounce English words involving ICCs and FCCs*.' According to table 1 and figures 3-8, this hypothesis is proved to be true as most of the scores are more than 50% of mispronounced words. Furthermore, the mean difference between the correct and incorrect pronunciation ranges between -2.567 and -3.933, which significantly high difference.

Bearing in mind the participants of this study are EFL students, these results are in harmony with previous studies which show that EFL learner encounter problems in pronouncing English words with ICCs and FCCs (Gashaw, 2016; Al-Samawi, 2014; Mbha & David, 2014). One probable reason for having such problems in

pronouncing English words with consonant clusters is the different phonotactic system of both languages in which Arabic doesn't allow consonant clusters as in English. It only permits two FCCs with in very few words.

The second aim of this study is to identify the causes of the incorrect pronunciation of Sudanese EFL undergraduates. To achieve this goal the researcher hypothesises that '*The causes of Sudanese EFL undergraduates' incorrect pronunciation of English words involving ICCs and FCCs are unrequired pause, vowel insertion and consonant deletion*.' Based on the results obtain by the computer-based analysis using Praat, the data show that most of the incorrect pronunciations are caused by unrequired pause to break the sequence of consonant string in both positions; in the onset and cods. To the best knowledge of the researcher, this cause is firstly identified as a strategy used by EFL undergraduates to ease the pronunciation English words with ICCs and FCCs. It also reveals that the participants as many other EFL students insert an intrusive vowel to split the string of consonant clusters. Moreover, the findings show that Sudanese EFL undergraduates delete consonant sound/s in FCCs. Finally, the results demonstrate two more causes of incorrect pronunciation which aren't mentioned in this hypothesis; consonant replacement and consonant-vowel position conversion.

The findings of this study are compatible with previous studies in the general assertion that EFL students encounter difficulties in pronouncing English words with ICCs and FCCs in which they insert an epenthetic vowel (/ə/ or /ɪ/) to break the sequence consonant clusters (Darcy & Thomas, 2019; Gashaw, 2016).

As a last hypothesis, the researcher '*The method, materials and activities used in teaching English phonotactics to Sudanese EFL undergraduates are not effective for improving pronunciation skill of the students*.' According to the data gathered by the checklist and the results mentioned above, only two items out of the fifteen checklist items are applied in teaching English phonotactics which is a great deficiency and it lacks most of the required principles for teaching pronunciation mentioned in section 7 above.

## 11. CONCLUSION

This study aims to identify Sudanese EFL undergraduates' phonological errors in pronouncing English words involving ICCs and FCCs and the causes of these mispronunciations. It's also carried out to investigate the effectiveness of the methods, materials and activities used for teaching English phonotactics. Utilising two different instruments to collect the data, the findings demonstrate that Sudanese EFL undergraduates mispronounce English with ICCs and FCCs. It also reveals that unrequired pause, intrusive vowel insertion, deletion of consonant sound/s, replacement of consonant sound and consonant-vowel position conversion are the causes of these mispronunciations. Moreover, the methods, materials and activities used for teaching the phonotactic constraints to Sudanese EFL undergraduates are not effective and lack many principles of teaching pronunciation. Further to this conclusion, the researcher recommends that EFL instructors should provide the students authentic audiovisual material so as to offer the right model which motivates students to have native-like accent. It's also highly recommended that EFL students should be aware of the phonotactic differences between their MT and TL. Finally as a suggestion for further studies, researcher might carry out excremental studies using the literature mention in this study.

## REFERENCES

1. Al-Hattami, A. A. (2010). A phonetic and phonological study of the consonants of English and Arabic. *Language in India*. Vol. 10; 1930-2940.
2. Al-Samawi, A. M. (2014). Vowelizing English Consonant Clusters with Arabic Vowel Points (Harakaat): Does it Help Arab Learners to Improve Their Pronunciation?. *International Journal of English and Education*. Vol 3, 3; 263-282.
3. Bishr, K. (2000). *Phonetics*. Cairo: Dar Ghareeb. (Arabic book)
4. Broselow, E. (1984). *Transfer and Universal in Second Language epenthetic.* In Gass, M.s and Selinker, L. (Eds). (1993). *Language Transfer in Language Learning*. John Benjamins B.V.
5. Brown, H. D. (2007). *Principles of Language Learning and Teaching*. 5th edition. NY: Pearson Education. Inc.
6. Celce-Murcua, Brinton, D. M. & Goodwing, J. M. (1996). *Teaching Pronunciation. A reference for English of English to speakers of other language*. Cambridge: Cambridge University Press.
7. Collins, B. and Mees, I. M. (2013). *Practical Phonetics and Phonology: A resource book for students*. 3rd edition. Oxon: Routledge.

8. Darcy, I. & Thomas, T. (2019). When blue is a disyllabic word: Perceptual epenthesis in the mental lexicon of second language learners. *Cambridge University Press*. pp. 1-19.
9. Finegan, E. (2015). *Language: Its structure and use*. 7th edition. Stamfrod: Cengage Learning.
10. Gashaw, A. (2016). Perception of English consonant clusters by Ethiopian EFL learners speaking Amharic as first language. Abyssinia Journal of Business and Social Sciences. Vol. 1; 1-6.
11. Gilakjani, A. P. (2011). A Study on the Situation of Pronunciation Instruction in ESL/EFL Classrooms. *Journal of Studies of English*. Vol 1. 1; 1-15.
12. Gussenhoven, C. & Jacobs, H. (2017). *Understanding Phonology*. 4th edition. NY: Routledge.
13. Harmer, J. (2007). The Practice of English Language Teaching. 4th edition. Essex: Pearson.
14. Hismanolglu, M. & S, Hismanolglu (2011). Internet-Based Pronunciation Teaching: An innovative route toward rehabilitating Turkish EFL learners' articulation problems. *European Journal of Educational Studies*. Vol 3. 1; 23-39.
15. Kenworthy, J. (1987).*Teaching English Pronunciation.* New York: Longman Inc.
16. Mbha, E. E. & David, W. T. (2014). A Constraint Based Study of the TIV Learners of English Phonotactics. *Innovare Journal of Social Sciences*. Vol 2. 2; 10-16.
17. McMahon, A. (2002). *An Introduction to English Phonology*. Edinburgh: Edinburgh University Press Ltd.
18. O'Connor, J. D. (1998). *Better English Pronunciation*. 2nd edition. Cambridge: Cambridge University Press.
19. Pennington, M. C. and Rogerson-Revell, P. (2019). *English Pronunciation Teaching and Research: Contemporary perspectives*. London: Palgrave Macmillan.
20. Radford, A., Atkinson, M., Britain, D., Clahsen, H., & Spencer, A. (2009). *Linguistics: An introduction*. Cambridge: Cambridge University Press.
21. Richards, J. C. & Schmidt, R. (2010). *Longman Dictionary of Language Teaching and Applied Linguistics.* 4th edition. London: Pearson Education Limited.
22. Roach, P. (2009). *English Phonetics and Phonology*: *A practical course.* 4th edition. Cambridge: Cambridge University Press.
23. Swan, M. and Smith, B. (2001). *Learner English, a Teacher's Guide to Interference and other Problems.* 2nd edition. Cambridge: Cambridge University Press.
24. Yates, W, & Zielinski, B. (2009). Give it a Go: Teaching pronunciation to adults. Sydney: AMEP Research Centre.
25. Yule, G. (2010). *The Study of Language.* 4th edition. New York: Cambridge University Press.

## Appendix A

**Test**

**Dear student** please read the following words **ONCE**, **clearly** and **loudly**.

| **Part One:** | | **Part Two:** | |
|---|---|---|---|
| **Section A:** | | **Section A:** | |
| 1. | Fly | 1. | Stopped |
| 2. | Blue | 2. | Strength |
| 3. | Pretty | 3. | Bulge |
| 4. | Shriek | 4. | Kept |
| **Section B:** | | **Section B:** | |
| 5. | Smile | 5. | Asked |
| 6. | Stay | 6. | Fifths |
| 7. | Spin | 7. | Midst |
| 8. | Sphere | 8. | Exempt |
| **Section C:** | | **Section C:** | |
| 9. | Spread | 9. | Glimpsed |
| 10. | Squeak | 10. | Thousandths |
| 11. | Stew | 11. | Texts |
| 12. | Splay | 12. | Sixths |

# Appendix B

## Observation

| Checklist Item | Applied | Partially Applied | Not Applied |
|---|---|---|---|
| 1. The instructor uses authentic audible materials. | | | |
| 2. The instructor uses authentic visual materials. | | | |
| 3. The instructor provides tape recording to enable the students record their own voices. | | | |
| 4. The instructor provides the students with sound system, speakers or headphones to enable them listen to their own recordings. | | | |
| 5. The instructor takes proactive stance to prevent possible future pronunciation problems. | | | |
| 6. The instructor draws the attention of her/his students to the fact that NO Arabic word begins with two consonants. | | | |
| 7. The instructor explicitly acquaints her/his students with the differences between the phonotactic system of English and their native (Arabic) language. | | | |
| 8. The instructor frequently gives the students opportunity to practise what s/he teaches in the class. | | | |
| 9. The students actively participate in the activities in the class. | | | |
| 10. The students actively practise what they are taught during their lectures. | | | |
| 11. More than 80 % of the students practise what they are taught during their lectures. | | | |
| 12. If there are any errors or mistakes, the instructor immediately remedies them. | | | |
| 13. The instructor corrects her/his students when they insert a vowel/s in consonant clusters | | | |
| 14. Students are highly willing to have a native-like accent. | | | |
| 15. The instructor employs technical terms during her/his lectures. | | | |