ISSN Online : 2709-4030
ISSN Print : 2709-4022
Vol. 6 No. 1 2022

PHONEMIC COMPARISON OF ARABIC AND ENGLISH

Muhammad Nadeem Chohan
PhD scholar (Applied Linguistics)
University of Management and Technology
NasimTalib
M.Phil (Applied Linguistics)
Salma Aftab
Fateh-e-Hina Khalil
M.Phil Scholar
University of Management and Technology

Abstract

Arabic is considered a religious and sacred language for Pakistani Muslims. It is because the Holy Quran was revealed in the Arabic language. Arabic is taught in all educational institutes as a subject especially in religious institutes. The holy Quran, Hadith, Sunnah and theology of the Muslims are taught in the Arabic language in Pakistan with their Urdu translation. Arabic and Englishbelong to different families of languages. Arabic is one of the Semitic languages whereas English is the West Germanic language. Both Arabic and English manifest themselves through various dialects based on diversified geographical areas. According to Ethnologue 2019, there are 24,900,000 speakers of Arabic in Saudi Arabia whereas the total number of Arabic speakers in the world are 273,989,700. On the other hand, English is spoken as a first language by 379,007,140 speakers and the total number of English speakers in the world is 1,132,366,680 (Ethnologue, 2019)**.** Arabic is used as a religious language by Pakistani Muslims and all the Muslims in the world have special respect and attachment toward the Arabic language.No significant work has been done on its phonology in Pakistan. The present research article is an effort to explainthe phonemic comparison of Arabic and English. The inventories of both the languages are used as data and the Levenshtein algorithm is used as a theoretical framework in this research. Both the inventories are analysed to compute the ratio of differences and similarities between the phonemes of these languages. The result of the present research shows that both Arabic and English have a phonemic similarity level of 71.69% whereas the index of difference is 28.3%.

Key Words: Arabic, English, Phonemic Differences, IPA, Levenshtein algorithm, Islamic education.

Introduction

Arabic, as a name,(العربيةal-*ʻarabīyah*or عربي/عربى *ʻarabī*) is used for the descendants of the Classical Arabic language. As being the language the 6th century AD, The Arabic language has various varieties in the domain of literature and speaking. Literary Arabic which is used in the literature of the Arab is also termed Modern Standard Arabic. This variety of Arabic language is utilized formally in the documents of written form and also spoken in the domains of media, education and formal occasions. This variety is used as an official form of the Arabic language.Before joining the Arab League, Moroccans used Moroccan Arabic as an official language for some time in 1912.

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Different varieties of spoken Arabic are used in the vast areas of the Middle East and North Africa. The modern standard Arabic dialect is originated from the Holy Quran which is called the Quranic or a classic Arabic language. There are two varieties which are treated as formal varieties of the Arabic language, they are grouped among the Literary Arabic. It is given the status of the official language, which is used in almost 26 states. This is the liturgical language of Islam (the religion of Muslims living all around the globe)

The name English has been derived from a Germanic tribe named Angles which migrated towards England, one of the areas of Great Britain(Hogg, Burchfield, 1992). The Germanic family of languages is very wide that has, Frisian, like Dutch,English, and German along with some other languages in it. French, Latin and some of the Northern Germanic languages have greatly influenced the vocabulary of the English language (Dalton, 2011). It took 4100 years to progress and develop the English language. The Anglo-Saxon settlers brought the west Germanic dialect of the English language in England almost in the fifth century AD. All the early varieties/ forms of the English language were collectively named Old English. After that started the Middle English that started was started by the Normans on conquering England. At this age, it was greatly affected by the French language. In the late 15thcentury, when the printing press came into this city, English grew towards its primary modern form. When the Bible of King James was started being printed and the Great Vowel Shift began, it shifted the impact of the British Empire. From the seventeenth to the twentieth century, modern English started spreading through technology. The rise of the USA as a superpower paved the way for developing Modern English. After this, it hold the position of an international language that was widely used in media,science, law and international trade (Algeo, J., & Butcher, C. A., 2013). Almost 379,007,140 peopletransfer their views in English and used it as their L1, in addition to it 753,359,540individuals use it as their L2. It is used as L1 and L2 by more than 100 nations around the globe (Ethnologue, 2019)

Arabic is the religious language of Muslims. The Quran, Sunnah, Hadith and Muslim theology is taught in **Arabic** with Urdu translation. The **Pakistani** diaspora living in the Middle East has further increased the number of people who can speak **Arabic** in**Pakistan**.

Statement of the problem

Various researchers have studied the English languagephonemically in their research, and Arabic is no exception. However, the amount of work done onArabic phonology is very less in comparison to the English language. Even the phonemic features of Punjabi had been described by different researchers(Karamat, 2012; Dua, Aggarwal, Kadyan, & Dua, 2012; Goyal, V., & Lehal G.,2008).

No research describes the phonemic differences and similarities between the phonemic inventories of Arabic and English. Due to this, no one may have the idea of the index of the differences and similarities between Arabic and English. This research aims to bring out the index of differences and similarities between these two linguistic systems. As English is an international language and is widely spoken by the people in the world even by the Muslim communities, it is pertinent for Muslims to know the index of similarities and differences between English and Arabic. Arabic is the religious language of the Muslimsand it is taught in various Islamic institutes around the globe.

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The purpose of the study

The aim and the purpose of the present research article look into the inventories of both languages. It will reveal the different phonemes which are used in one language but not in the other one. The difference in the phonemes between these two linguistic systems may cause a problem in learning the other language. The study by revealing the similarities and differences may create an ease for the speakers who are willing to learn the other language.

Significance of the study

English is spoken by a large number of speakers as their second language throughout the world including Pakistan. A large number of speakers around the globe use English as their L2 along with their native language. The same situation also prevails in Pakistan, here in Pakistan English is used as an official language. A large number of Pakistani speakers who speak Punjabi as a native language also use English as it is an official foreign language (Maldonado Garcia, 2018).Islam is the religion of Pakistan and the language of Islam is Arabic. Learning the Arabic language is the desire of every Muslim so that he may well understand the injunction of Islam revealed by the Almighty in the form of the Holy Quran.The main objective of the present study is to analyze phonemic variations between Arabic and English, as it will help the Arabic speakers to learn English as their L2 and vice versa by manifesting the positive and negative transfer between these two languages.

Objectives

The chiefobjective of this study is to compute the similarity index between the phonemic systems of Arabic and English in terms of ratio. To compute this percentage the Levenshtein algorithm is used.A percentage of differences will also be yielded in terms of numbers.

Research Questions

1. What is the ratio of similarity between the consonants of Arabic and English?
2. What is the ratio of the differencebetween the consonants of Arabic and English?

Assumptions

Two languages that have an 85% of similarity index between them can be taken as the dialects of the same language (Maldonado García & Borges de Souza, 2014). The results of this result pave the way to assume that the ratio of the similarity between Arabic and English languages should not be greater than 80% in the light of their genric differences.

Limitation of the research

The present research article is limited only to the comparison of the consonant sounds of Arabic and English. The similarity level between the consonants of both languages is calculated numerically.

Literature Review

The modern Arabic language has taken its grammar as well as vocabulary from the divine book of the Muslims called the Holy Quran. Being the language of the divine book revealed from the Almighty, it lent its lexicon to other languages which are widely spoken in the various countries of the Islamic world like Turkish, Bosnian, Hindi, UrduPersian, Bengali. Literary Arabic served as a vehicle to transport the Muslim culture in Europe, in various fields of knowledge like mathematics, philosophy and science. It has borrowed words from Hebrew, Greek, Persian and

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Syria in the early centuries, Turkish in medieval times and contemporary European languages in modern times, mostly from English andFrench. Neither the English speaker can learn Arabic easily nor the Arabic speakers can learn English with ease as both of these languages belong to the different families of the languages. This difference between these languages may cause problems of mutual intelligibility based on the negative transfer and structural overlap English belongs to the Germanic and Arabic to the Semitic family of the languages (Dufour, 2017).As being descended from different language families both have differences in the domain of their phonology, grammar and lexicon that creates the negative transfer between these two languages.
The dialects of Modern English can be seen as the enhancement of dialectical areas which took place in the time of Old English. The small region of England has embraced the colloquial division in the present age. It also imparts the methods of how sounds are joined into different words. And give a clear picture of why specific phonetics are important to identify a word and describe why certain phonetics are essential to identify a word (Davenport, &Hannahs, 2013; Clark, &Yallop, 2011; Giegerich, 1992). It does not matter whether the sounds have been uttered correct, the purpose of the phonetic inventory is to explain and describe in a particular language. It researches the lingual spheres of man and its sounds. On the same lines, it also underscores the functions of speech sounds.

The distinction and relation between phonology and phonetics are controversial (Carr, 2008).

Phonology happens to be different with every language keeping its sounds in consonants and vowels in a particular language along with some other different sounds which are neither vowels nor consonants which may be termed as semi-vowels /w/, /r/, /j/ and laterals /l/ by showing the mixed properties of vowels and consonants (Roach, 2009).

So far as the smallest meaningful unit of phonology is concerned, it is a phoneme. For the replacement of any word, it has to have a concrete meaning similar to the words with which it is being changed. A slight difference in one sound can lead to twodifferent words and this tiny sound will be called a phoneme.For example, only /p/ and /b/ are different in /PAT/and /BAT/ are two different phonemes (Gimson, 1980).

A phonetic inventory gives a detailed description of the phonetic sounds present in the particular language. It is key to explain various sounds of a language that are pronounced correctly within a particular language. The table of consonant sounds is called consonantal inventory whereas the list of the vowel sounds is named as vocalic inventory(Maddieson, 1984). When we talk about consonant sounds, these sounds can be those in which the air from the lungs is obstructed, manipulated or narrowed by the interaction of different articulators. Consonant sounds can be classified based on their manner and places of articulation in various categories. Based on places of articulation these are classified into bilabial, labiodentals, dental, alveolar, palatal and glottal. Whereas based onthe manner of articulation, they can be divided into plosives, fricatives, affricates, nasals, and lateral and semivowels/approximants (Roach, 2009). There are 21 consonants in the English language, the letters that represent all these 21 consonants are B, C, D, F, G, H, J, K, L, M, N, P, Q, R, S, T, V, W, X, Y, Z.

These 21 consonant letters correspond to 24 consonant sounds which are given in figure 2.1 below. These sounds include the sounds having friction, closure and narrowing of the articulators. These sounds are produced by different active and passive articulators like teeth, lips

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tongue and the roof of the mouth. Articulators. The consonants are further categorized based on voicing, some are voiced and some are voiceless. This classification depends on the vibration of the vocal cords during their production (Roach, P., 2010).

The English and Arabic language consonant inventories are as follows:

		PLACE OF ARTICULATION							
		Bilabial	Labiodental	Dental	Alveolar	Post-alveolar	Palatal	Velar	Glottal
MANNER OF ARTICULATION	Plosive	p b			t d			k g	
	Fricative		f v	θ ð	s z	ʃ ʒ			h
	Affricate					tʃ dʒ			
	Nasal	m			n			ŋ	
	Lateral approximant				l				
	Approximant	w				r	j		

Figure English Inventory by Roach, 2010

	Bilabial		Labiodental		Dental		Alveodental		Palatal		Velar		Uvular		Pharyngeal		Glottal
	V	VL	V	VL	V	VL	V	VL	V	VL	V	VL	V	VL	V	VL	
Stop	β						δ δ	τ τ			κ		θ				ʔ
Fricative			ϕ		Δ Δ	T	ζ σ	σ	Σ				P	Ξ	η~	□	η
Affricate									δZ□								
Nasal	μ						ν										
Liquid							λ										
Tap/trill							4/ρ										
Glide	ω								φ								

Figure Arabic Inventory

Phonetic Similarity

Gooskens and Schneider (2016) state, that the word may be divided into two parts to calculating their similarity. The words which have the same transcription are not an identical term of their phonetics if they belong to two different languages.

Some distinctive metrics are used to calculate the difference and similarities between the various phonetic representation. The linguistic varieties and some cognate items are also compared to determine their differences and similarities by using the same metrics (Levenshtein, 1965).

Schepens et al. (2013) made various attempts to define the boundaries among various linguistics systems by using the phonetic and phonemic tools interchangeably. It holds significance to understanding different cross-linguistic patterns (Hard castle & Beck, 2005). In this type of research, the researchers should not ignore the ever-changing IPAs of different languages. This change is of much importance as it accommodates different speech sounds in the domain of phonology and phonetics. IPAs are revised and formulated time and again because of the ever-changing phenomenon of the world's languages. Some sounds are in sharp contrast in the various languages of the world. Some sounds are shared commonly among various languages

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and some are found different from language to language. This ever-changing phenomenon of sound has nothing to do with the abilities that God has bestowed on humans to produce the different varieties of sounds. Some of the sounds are entirely different and some are found in the form of allophones (Simpson, 2014).

LevenshteinDistance

Levenshtein distance (LD) is used as a framework for this study. It is used to measure the similarity or difference between strings. The Levenshtein distance in number calculates the similarity and difference between the strings.

The largernumber of Levenshtein distancesshows that both strings have maximum differences.This algorithm was developed by Russian Scientist Vladimir Levenshtein in1965.The Levenshtein distance may also be analyzed, as "kitten" and "sitting" have a difference of three strings.

1. Kitten → sitten (substitution of "s" for "k")
2. sitten → sitten (substitution of "i" for "e")
3. sittin → sitting (insertion of "g" at the end).

Methodology

Both quantitative and qualitative approaches are utilized to determine the differences and similarities on phonemic level, between the said inventories. So far as data is concerned the inventories of both Arabic and English languages are taken to get data. The present research is expositoryand it is aimed to compute the index of the phonetic similarity and differences between Arabic and English spoken in the various parts of the globe. The recent study is limited to the comparison of consonant sounds only.

Framework

The Levenshtein algorithm is applied as a framework in this research. This algorithm provides a thorough ratio of the phonemic similarity and differences index between both linguistic systems by comparing their consonant sounds present in their respective inventories (through their transcription into IPA). The Levenshtein algorithmhas already been usedas a framework in different studies (MaldonadoGarcía& Borges de Souza, 2014; Heeringa, 2004;Sanders& Chin, 2009; Chohan, M.N., &García, M.I.M. 2019)

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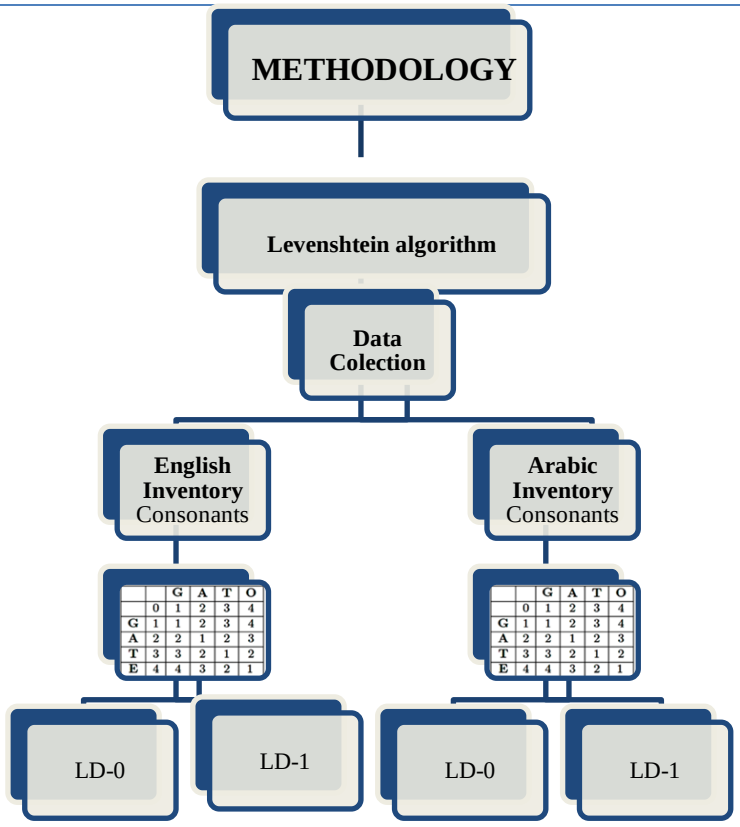

Figure.Framework flow chart

The flow in the figure provides the way how the present research was performed and how the Levenshtein algorithm has been used to calculate the phonemic similarities and the differences between English and Arabic.

Instrument

Phonetic inventories of Arabic and Englishwere used as an instrument for this research article. the phonemic inventory of the English language given by Roach (2015) and Arabic phonemic inventory by Amayreh, M. M. (2003). These inventories were charted on tables to compare them for the analysis and the Levenshtein algorithm was applied as a framework.

Data analysis

TheLevenshteinalgorithm was used to analyze the data in this research. The distance in terms of the number was measured by the Levenshtein Algorithm in tabulated form. The sounds of both the inventories were analyzed, the concurrent analysis would yield the differences between the two sounds. Kessler, in 1995 applied this algorithm to bring out the ratio of differences and similarities among the strings of the two dialects and languages. By applying this Algorithm, they were able to determine the distance between two dialects and languages. In the presentstudy, the Levenshtein distance is calculated phonemically between the phonetic inventories of the consonants of Arabic and English.

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Measuring phonemic Distance

Automated Similarity Judgment Program (ASJP) and Ethnologueused this particular system to determine thegenetics and language relations. Maldonado García(2014) also applied this method to calculate the index of similarity between Portuguese and English. Levenshteindistance is measured in the domain of phonemes in this study of Arabic and the English language.

Sounds with zero distance (Distance 0 or 100% Similarity)

Arabic and English are two separate languages belonging to two different language families. As both these languages belong to different families, they may have the chance of having phonemic similarity in terms of consonant sounds. These two languages may have less amount of structural overlap. This less amount of structural overlap may cause minimum mutual intelligibility between Arabic and English. The sounds having zero distance are given in the following table:

Table 1 Phoneme in Arabic and English having zero distance

Sr. No.	Arabic	English	Levenshtein Distance
1.	/π/	/π/	0
2.	/β/	/β/	0
3.	/τ/	/τ/	0
4.	/δ/	/δ/	0
5.	/κ/	/κ/	0
6.	/γ/	/γ/	0
7.	/ɸ/	/ɸ/	0
8.	/ϖ/	/ϖ/	0
9.	/σ/	/σ/	0
10.	/ζ/	/ζ/	0
11.	/Σ/	/Σ/	0
12.	/η/	/η/	0
13.	/μ/	/μ/	0
14.	/ν/	/ν/	0
15.	/N/	/N/	0
16.	/ρ/	/ρ/	0
17.	/λ/	/λ/	0
18.	/φ/	/φ/	0
19.	/τΣ/	/τΣ/	0
20.	/δZ/	/δZ/	0

In light of the above table,20 consonant soundshave zero phonemic distance. Because of the above analysis, Arabic and English have twenty phonemes which are being shared by the speakers of both the languages

Consonant Sounds with only One Character Difference or distance 1

Levenshtein algorithm found that some sounds are different in both languages. Some of the sounds are found present in the Arabic language but not in the English language. On the other hand, some sounds are found only in the English language but that is absent in the Arabic

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language. The difference in number will render the ratio of difference. The consonant which has the distance of 1is given in the following table:

Table 2Phonemes in English and Arabic has a distance of 1

Sr. No.	Arabic	English	Levenshtein Distance
1.	/ʊ/	––	1
2.	/ʈ/	––	1
3.	/□/	––	1
4.	/ɖ/	––	1
5.	/□/	––	1
6.	/□/	––	1
7.	/ɘ/	––	1
8.	/□/	––	1
9.	/Ξ/	––	1
10.	––	/Z/	1
11.	––	/π/	1
12.	––	/ϖ	1
13.	––	/ɪ/	1
14.	––	/γ	1
15.	––	/ŋ/	1

The above table shows that only 15 sounds are different in both languages. The first 9 are the sounds that are presented only in the Arabic Language whereas the next 6 sounds are those which are present only in the English language. To talk about the distance which is calculated by theLevenshteinAlgorithm is 1 only on the phonemic level. It shows that 15 sounds are completely different in both phonetic systems.

Tabularized comparison and contrast of the consonants of both dialects

The distance that is measured in the above tables shows that those sounds which have the distance of zero are similar in both the inventories. On the other hand, the sounds which have the difference of one are considered different in both the inventories. The number of the same sounds along with their similarity index between both the languages are given in the table below:

Table 3Similarity index between English and Arabic Consonants

Dialectical Sounds	English and Arabic
Total similar consonant sounds	20
Total consonantal phonemic similarity	71.69%

On the other hand, to talk about the differences between the sounds of both the linguistic systems, the following table is self-explanatory:

Table 0Index of differences between English and Arabic consonants

Dialectical Sounds	English and Arabic
Total no of different consonant sounds	15

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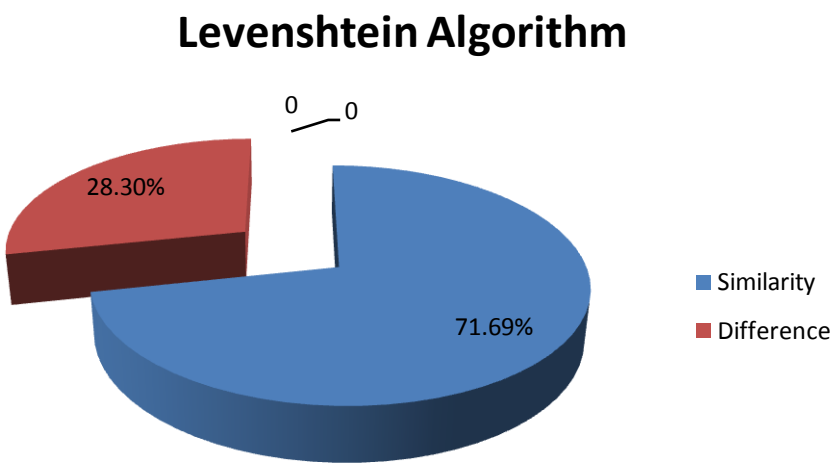
Total consonantal phonemic difference	28.3%

In the light of the above analysis, both Arabic and English have a phonemic similarity of 71.69%. In simple words, we can say that Arabic and English are 71.69% similar to each other. To talk about the index of difference between these two varieties of languages, the ratio of difference is 28.3%. The above-mentioned ratios of similarity and difference, in terms of number,show that English and Arabic are two different languages. There arefewer similarities and more differences between these two languages.



Similarity and difference index

The pie graph describes the ratio of differences and similarities between Arabic and English.

Discussion

In this research study, the sole aim of the researcher was to determine the differences and the similarities in terms of numbers in the domain of phonology.To get the required aim, the analysis was performed on the inventories of both languages by taking data of consonant sounds of both languages. Through the analysis, it was found that 20 consonant sounds are the same in both languages. These 20 sounds are those which are used by both the Arabic and English speakers in their daily discussion. There are 20 sounds in both languages which have a maximum similarity. This similarity index may cause positive transfer between them and can be helpful for the learners to learn better and fast. In terms of differences, 14 consonant sounds were found to be different in both languages. As these sounds have a distance of 1, they are taken differently. The sounds having zero measurements and 1 are tabulated separately.

Conclusion

The above discussion shows that the English language has 24 consonant sounds in its phonemic inventory whereas the Arabic language has 29 consonant sounds in its phonemic inventory.The total consonant sounds in both languages in terms of number are 53. From the total number of 53, 20 consonant sounds are those which are common in both languages. These are the sounds

that are found in both systems and are used by the speakers of Arabic and English languages. The similarity index in terms of the number between Arabic and English is 71.69% which is calculated by Levenshtein Algorithm. On the other hand, 15 consonant sounds are found to be different in both languages. These 15 sounds are those which are not common and shared by the speakers of both languages. The index of difference in terms of the number found between Arabic and English is 28.3%.The percentage of similarity and difference testifies the assumption, that the similarity percentages higher than 85% between the two linguistic systems generally indicate that both the systems are likely dialects of thesame language with which it is being compared (Maldonado García & Borges de Souza, 2014). The research shows that both Arabic and English languages are different from each other having more positive transfer than negative.the study will be of great help for the Arabic learner who is desirous to learn English as a second language and vice versa.

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