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The investigation of fortition in Arabic loan words of the Russian language

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ABSTRACT

Comparative phonetics studies the pronunciation of loan words and the transformation of phonemes in two or more related and unrelated languages. Occasionally, a loan word contains a phoneme unique to the donor language, one that is rare or non-existent in the phonological system of the recipient language. Consequently, the phonetic form of the loan word is altered according to the phonological and morphological rules of the recipient language to facilitate easier pronunciation for its speakers. In this study, the target language is Russian. We aim to analyze the types of fortition in the adaptation of Arabic words to the phonetic rules of the Russian language. All Arabic loanwords undergo various phonetic transformations when entering the Russian language. Our research methods include descriptive, library study and comparative phonetic. The research findings can be useful in phonetic courses for Iranian students majoring in Russian language and also in the study of loanwords as a part of lexicology. The data are the result of a study of 132 loanwords extracted from the Dictionary of Foreign Words, published in Moscow in 1984, by A. V. Lekhin, S. M. Lokshina, F. N. Petrov and L. S. Shaumyan. The results indicate that borrowing Arabic words into Russian often involves the phonetic process of fortition, which includes conversions such as fricative to plosive, glide to fricative, devoicing, and gemination.

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1. Introduction

1-1. Problem statement

Phonetics is a science that investigates the phonetic aspects of language and shows how the sounds of language and speech are produced, how phonemes combine and transform into one another, and how they participate in forming meaningful units of language—morphemes (prefixes, roots, suffixes, and endings)—as well as words (Bagriantseva et al., 2011: 93).

Phonetics, depending on the research method, subdivides into historical and comparative phonetics. In historical phonetics, we study the phonetic changes and their reasons over time. However, in comparative phonetics, as M. B. Popov explains, there are unique tasks for phonologists, encompassing their field of interest in the methodology of teaching a foreign language, especially Russian (Popov, 2014: 6).

According to Moghbel Ghahremani and Nemati, comparative phonetics seeks to identify the patterns of influence between phonemes by examining the phonetic systems of two languages from different linguistic families, while still considering their mutual influences. Additionally, comparative phonetics aims to study the pronunciation of loanwords in the recipient language to uncover phonetic retrospectives (Moghbel Ghahremani and Nemati, 2017: 88-89).

1-2. Importance and innovation of the topic:

Among the phonological changes in loanwords, the process of fortition can be mentioned, a common phenomenon among linguistic phonological processes, which is divided into various types at the consonant level, such as: devoicing, conversion of fricative to plosive, conversion of approximant to fricative, types of assimilation, insertion, degemination, etc. In pronouncing a fortis consonant, more respiratory force is used than its corresponding lenis consonant.

Philippe Ségéral and Scheer Tobias point out that the processes of lenition and fortition in reconstructed Slavic consonants are considered to be adjacent processes such as palatalization and are considered rare phenomena. In their opinion, lenition and fortition only occur if the linear principle also allows this in the absence of a melodic effect in the segmental unit (Ségéral and Tobias, 2008: 512).

In the present research, the recipient language of loanwords is Russian, and the donor language is Arabic. The author aims to investigate one of the processes of adaptation of Arabic words to the phonological rules of the Russian language, namely fortition when entering this language. Our research methods include library study and descriptive method from the perspective of comparative phonetics. This research is the first attempt to investigate the fortition process in Arabic loanwords in the Russian language. The results could be useful in Russian phonetics lessons for Iranian students studying Russian language teaching and in the study of loanwords as part of lexicology.

1-3. The question:

A consonant, which requires more respiratory effort than another, is considered a fortis consonant. According to Jacobson and Halle's characteristic theory, fortis is used to describe sounds that are produced with relatively more muscular effort and movement than lenis sounds and are also longer. In fortition, when a sound changes to a stronger sound, voiced sounds change to voiceless, fricatives to plosives, and approximants to fricatives. In the present study, "changes related to the fortition process in Arabic loanwords after entering the Russian language in their pronunciation and phonetic representation are examined."

2. **Definition of concepts, terms, tools and Information collection method:**

Loanwords enter the source language as a result of economic, political, and cultural relations between the people of a country and the people of other countries from the foreign language of these people. Depending on the intensity of use of these types of words, the lexical system of the native language also undergoes changes and evolution, and these words enter the circle of rarely used into frequently used vocabulary and may not even be considered as foreign words by the speakers of the source language. Loanwords of a language can be divided into two categories in terms of linguistic origin: 1) Loanwords of the same family that have been taken from ancient Slavic languages; 2) Loanwords of foreign words that have been borrowed from other languages such as Greek, Latin, Turkish, Scandinavian languages, Western European languages, etc. The present study is based on the loanwords of the second category and through the borrowing of words from Arabic.

3. **Research method and data collection process:**

The present research method is descriptive-analytical with a comparative phonetic approach: an attempt to study and analyze, based on the foundations of linguistic phonetics, the processes of fortition and phonological changes in Arabic loanwords imported into the Russian language. Since the focus of the research is on examining phonological features and comparing the phonetic systems of the two languages, the paper focuses on a detailed analysis of linguistic data at the phonetic and phonological levels, in a case-by-case and comparative manner, classified under the "comparative descriptive-analytical method" in the classification of linguistic research methods.

The research data is a collection of 132 Arabic loanwords in the Russian language, which are taken from the Dictionary of Foreign Words by A. V. Lekhin et al. (Moscow, 1984 ed.). The data were previously collected and classified within an academic research project and in the present article for phonological analysis. The data collection method is library/documentary within theoretical linguistic studies and comparative phonology.

4. **Literature review:**

Arabic loanwords constitute part of the loanwords of the Russian language, and of course, most of the research in this regard has been conducted in the field of lexicography and semantics of Arabic loanwords in the Russian language. For instance, M. G. Chalub Alqadimi examined Arabic loanwords in the Russian language from both semantic and etymological perspectives (Alqadimi Chalub, 2010).

Additionally, another notable study in this field focuses on loanwords within the lexical system of the Russian language. This research was conducted by A. N. Bakhtriarova and F. G. Fatkulina (Bakhtiarova and Fatkulina, 2015). M. Moradi and Z. Ghorbani Madavani have researched semantic assignment in Arabic loanwords to Russian (Moradi and Ghorbani Madavani, 2020), while V. V. Reztsova analyzed the thematic classification of these words in Russian (Reztsova, 2011). Moreover, A. N. Bakhtiarova's paper on the phonetic assimilation of loanwords into the Bashkir language is noteworthy (Bakhtiarova, 2016), considering the phonetic similarity in Arabic loanwords that entered the Russian language through the Bashkir language.

M. Moradi analyzed phonetic elision in Arabic loanwords in Russian, focusing on aphaeresis, syncope, and apocope elision (Moradi, 2022). Regarding the fortition process, one can refer to the article titled "The Study of Fortition Process in Sistani Dialect Based on Autosegmental Phonology" by M. Delaramifar and A. A. Ahangar. This study investigates the fortition processes in the Sistani dialect, as spoken in the Sistan region located in the north of Sistan and Baluchestan province, using the framework of Autosegmental Phonology by Goldsmith (1976) (Delaramifar and Ahangar, 2023).

Using a socially-stratified conversational ultrasound tongue imaging speech corpus, Lawson and Stuart-Smith (2021) studied the lenition and fortition of /r/ in utterance-final positions. They examined the effects of boundary context, as well as other linguistic and social factors such as syllable stress, following-consonant place, and social class, on lingual gesture timing in /r/ and the strength of rhoticity.

Furthermore, Z. Imani and A. Ahangar, emphasizing the influence of French on Lebanese Arabic, investigated certain standard Arabic and Lebanese Arabic words using the Generative Phonetic Theory of Chomsky and Halle (1988). They also examined some phonological rules of these two variants, focusing on lenition and fortition (Imani and Ahangar, 2024).

This paper represents the first attempt to investigate various fortition phonological processes in Arabic loanwords within the Russian language. The following section will delve into this issue in greater detail.

5. Discussion

To study the phonological processes in Arabic loanwords in the Russian language more precisely, it is essential to first discuss the vowels and the phonetic system of the Arabic language. Arabic has six vowels, three of which are short vowels: "æ" or "a",

"ɪ", and "ʊ". The remaining three are long vowels: "a:", "i", and "u". According to M. Antaki, the simple vowels of Arabic include these phonemes:

1- /a/ an open, low, short, spread, and central vowel;

2- /ɪ/ a close, high, front, short, spread vowel;

3- /ʊ/ a close, high, back, short, and rounded vowel;

4- /a:/ an open, high, long, spread, and central vowel

5- /i/ a close, high, long, front, spread vowel;

6- /u/ a close, high, back, long, and rounded vowel (Antaki, 1993: 39).

Every language transforms over time and under various circumstances, such as geographic and cultural influences, language contact, and more. The result is the emergence of different varieties and forms" (Abuyi Mehrizi et al., 2020, p. 478). Russian is no exception.

According to A. N. Bakhtiarova and F. G. Fatculina, the pronunciation of some Arabic phonemes is challenging for Russian speakers due to differences in the consonant systems of the two languages. Russian has 36 consonants, while Arabic has 28. Additionally, Arabic includes consonants that do not exist in Russian. These phonemes are: "dental fricatives /ذ/ (/ð[g]/) and /ث/ (/Θ[g]/), emphatics /ذ/ /ð[g]/ and /ث// Θ[g]/, emphatics /ص/ /sˤ/, /ظ/ /ðˤ/, /ض/ /ɖˤ/, and /ط/ /tˤ/, as well as glottals like hamza /ء/ /ʔ/, /ح/ /ħ/, and /خ/ /x/" (Bakhtiarova and Fatculina, 2015, p. 6125).

Ala'a Emad Obeidat and Radwan Salim Mahadin have acknowledged that: "Arabic is considered to be one of the languages that has retained its identity for a very long period and has been known as a donor to many languages, such as Spanish and some African languages. It has also borrowed [words] from other languages, including English, French and Persian. <…> "Trask (1996: 18) also justified the need for borrowing by pointing out the "gap" which appears in the lexicon of the borrowing language. Moreover, other linguistic factors that might affect the adaptation process, such as prestige and attitude, degree of bilingualism, and the frequency of use, should be taken into consideration (Abu Guba, 2017: 33; cited in Imad Obeidat and Radwan Salim, 2024: 3).

Subsequently, we will discuss some phonetic processes in Arabic loanwords in Russian. At each step, we will first provide the definition of the phonetic process, followed by examples presented in a table. The table will include the written form and phonetic representation in both Arabic and Russian, using the APA alphabet. For a more precise understanding of the process, we will examine the phoneme before it enters Russian and the position of the syllable where the process occurs.

5-1. Fortition process

Fortition is a phonetic process in which a weak and lenis sound changes to a strong and fortis one. In contrast, there is the lenition process. Another term for fortition is strengthening. For example, a fricative or lateral consonant may transform, such as

[v] changing to [b] and [t] to [d] as a plosive sound. "In fortition, voiced phonemes transform to unvoiced, fricatives to plosives, and approximants to fricatives. Specifically, the devoicing of /l/ in the word 'satl' "سطل" [satl̥] is considered a fortition process" (Modarresi Ghavami, 2015, p. 144).

In producing a fricative consonant, a narrow gap is formed in the speech canal as the speech organs approach each other. The airstream passes through this gap with difficulty, creating friction with the speech organs, which results in the production of a fricative consonant.

The disorientation of the air behind this gap produces a hissing sound, which is characteristic of a fricative consonant. This hissing sound is more recognizable in voiceless fricatives than in voiced ones. The reason is that, in voiced phonemes, the airstream must pass through the vocal folds before reaching the place of articulation. Consequently, the amount of airstream behind the narrow gap of a fricative phoneme is significantly less in voiced phonemes compared to voiceless ones.

On the other hand, the vibration of local folds masks some of this hissing sound. Common fricatives in different languages include: /f/, /X/, /ð/, /θ/, /z/, /s/, and /ɤ/. Various classifications can be presented, one of which is based on the type of gap—flat or grooved. For example, in producing the sound [s], the tongue is grooved, and in producing the sound [θ], the tongue is flat. And "sibilant" is a term used for fricatives like [s] and [ʃ]. The characteristic of sibilant sounds is that the channel they create to produce sound is dental, alveolar, or post-alveolar. This creates an accelerating airstream that moves towards the edge of the teeth, producing a hissing sound. Sibilants include: [dʒ], [tʃ], [ʒ], [ʃ], [z], [s], [v], and [f]. The remaining fricatives without this characteristic are called nonsibilants.

Zahra Karimibavaryani and Aalieh Korde Zafaranlu Kambozia also explain the phonological strength in the occurrence of fortition process, according to the concept of "positional strength", regarding the approach of Foley's theory (Foley, 1977) in Persian: "Based on positional strength, some positions are stronger than others. Based on the "intertial development principle", elements in strong positions undergo fortition" (Bavaryani and Korde Zafaranlu, 2023: 216). Accordingly, strong positions include: syllable onset, postnasal position, and after a stressed vowel (Bavariani and Kord Zafaranlou, 2023: 217).

L. L. Kasatkin and others refer to fortition as "pharyngealization," derived from the Greek word "pharynx." They explain: "When producing a fortis consonant, narrowing and reduction of the airstream occur in the pharynx area due to the backward movement of the tongue, which is called 'pharyngealization.' Thus, fortis consonants are pharyngealized. Additionally, during the pronunciation of a fortis consonant, velarization can occur, involving the raising of the tongue tip towards the velum" (Kasatkin et al., 2011:

314). They identify four consonants — /k/, /g/, /x/, and /ɣ/—as fortis velarized phonemes.

Accordingly, the Arabic loanwords that have undergone the fortition process are represented in the following table:

Table No. 1: fortition in Arabic loanwords of the Russian language

Row	The written form of the word in Arabic	Phonetic representation in Arabic	The written form of the word in Russian	Pronunciation of the word according the APA	Phone before the phonetic process	Phone after the phonetic process	Translation into English
1	الغول	/ʔalɣul/	алго́ль	[algól’]	[غ] [ɣ]	[г] [g]	Algol), a bright multiple star in the constellation of Perseus, known as the Demon Star
2	غزل	/ɣazal/	газе́ль	[gaz’él’]	[غ] [ɣ]	[г] [g]	Ghazal, a form of amatory poem or ode
3	غازٍ، الغازى	/ɣa:z/ /ʔalɣa:zi/	га́зи́	[gáz’i]	[غ] [ɣ]	[г] [g]	Ghazi (name of warriors who led campaigns against the Byzantine Empire)
4	الكُحل	/ʔalkʊħl/	алкого́ль	[alkagól’]	[ح] [ħ]	[г] [g]	Alcohol
5	حمادة	/ħama:da/	гамада́	[gamadá]	[ح] [ħ]	[г] [g]	Stone desert
6	حَرَم	/ħaram/	гаре́м	[gar’ém]	[ح] [ħ]	[г] [g]	Harem
7	حرمل الشائع	/ħarmalʊʃ:a: ʔeʕ[i]/	га́рмала	[gármala]	[ح] [ħ]	[г] [g]	Peganum harmala (Spand or Syrian sedab - a type of plant from the Phytaceae family)
8	حشيش	/ħaʃiʃ/	гаши́ш	[gašíš]	[ح] [ħ]	[г] [g]	Hashish
9	صاحِب	/sˤa:ħıb/	саги́б	[sagíb]	[ح] [ħ]	[г] [g]	Saheb (used in medieval India to address the

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							position of lord, sir)
10	وادِ، الوادى	/wa:dın/ /ʔalwa:di/	ва́ди	[vád’i]	[و] [w]	[в] [v]	Wadi (dry valleys with temporary or periodic water flows in the deserts of North Africa and Saudi Arabia)
11	وزير	/wazir/	визи́рь	[v’iz’ír’]	[و] [w]	[в] [v]	vizier, minister
12	ذُرَّة	/ ð[h]ʊr:a/	дурра́	[dur:á]	[ذ] [ð[g]]	[д] [d]	pearl
13	قاضِ، القاضى	/kˈa:ɖˤ/ /ʔalkˈa: ɖˤi/	ка́ди(й)	[kád’i(j)]	[ض] [ɖˤ]	[д] [d]	City judge
14	العضادة	/ʔalʕ[i]ɪɖˤa:da/	алида́да	[al’idáda]	[ض] [ɖˤ]	[д] [d]	Alidade, a sighting device or pointer for determining directions or measuring angles in astronomy
15	رمضان	/ramaɖˤa:n/	рамада́н	[ramadán]	[ض] [ɖˤ]	[д] [d]	Ramadan
16	نظير السمت	/naðˤirʊs:amt/	нади́р	[nad’ír]	[ظ] [ðˤ]	[д] [d]	The nadir, a point in the sky that lies below the horizon and opposite the zenith.
17	نُوّاب	/nov:a:b/	набо́б	[nabób]	[و] [v]	[б] [b]	Title of the "Muslim" rulers of India, upstart
18	صاحِب	/ sˤa:ħıb/	саги́б сахи́б саи́б	[sagíb] [saxíb] [saíb]	[ص] [sˤ]	[c] [s]	Saheb (used in medieval India to address the position of lord, sir)

19	صوفى	/sˤufi/	суфи́зм	[suf’izm]	[ص] [sˤ]	[c] [s]	Sufi, a Muslim ascetic and mystic
20	خَليفَة	/xalifa/	кали́ф	[kal’íf]	[خ] [x]	[к] [k]	caliph
21	خِلافَة	/xɪla:fa/	калифа́т	[kalifát]	[خ] [x]	[к] [k]	caliphate
22	المجسطى	/ʔalmʊʤasʇˤi/	альмаге́ст	[al’magést]	[ج] [d͡ʒ]	[г] [g]	The Almagest, mathematical and astronomical treatise on the apparent motions of the stars, written by Claudius Ptolemy

According to the table above, various fortition processes in Arabic loanwords of the Russian are as follows:

1) the transformation of a fricative consonant into a plosive one:

A) transformation of fricative uvular voiced velar /غ/ /ɣ/ in Arabic (without equivalent in Russian) into plosive non-nasal devoiced velar /г/ /g/ in Russian:

- in the second syllable of the word “альго́ль” [algól’];

- in the first syllable of the word “газе́ль” [gaz’él’];

- in the first syllable of the word “га́зи́” [g”áz’í];

b) transformation of the devoiced lenis pharyngeal fricative /ح/ /ħ/ (which has no equivalent in Russian) into the voiced velar plosive /г/ /g/ in Russian:

- in the third syllable and the coda of the last syllable of the word “алкого́ль” [alkogól’];

- in the first syllable of the word “гамада́” [gamadá];

- in the first syllable of the word “гаре́м” [gar’ém];

- in the first syllable of the word “га́рмала” [gármala]; (the word “الشائع” is deleted from the word’s structure.

- in the first syllable of the word “гаши́ш” [gaší́š];

- in the second syllable of the word “саги́б” [sagíb].

c) the transformation of the voiced fricative dental /ذ/ /ð[g]/ in Arabic (which has no equivalent in Russian) into the voiced plosive alveolo-dental non-nasal /д/ /d/ in Russian:

- in the first syllable of the word “дурра́” [dur:á];

d) the transformation of the voiced lateral affricate /ض/ /ʤˤ/ in Arabic (which has no equivalent in Russian) into the voiced plosive alveolo-dental non-nasal /д/ /d/ in Russian:

- the second and third (the last) syllable of the word “قاضى” or “القاضى” “ка́ди(й)” [kád’i(j)]; in the second variant of the

Arabic word, the article “al” is deleted from the word’s structure.

- in the third syllable of the word “алида́да” [al’idáda];

- in the third and last syllable of the word “рамада́н” [ramadán];

d) the transformation of the fricative dental, represented in the IPA and Arabic phonetic alphabet as /ðˤ/ or /ẓ/ (which has no equivalent in the Russian) into the voiced alveolo-dental non-nasal plosive /д/ /d/ in Russian:

- in the second syllable of the word “ نظير السمت” “нади́р” [nad’ír] in the Russian, after the fortition process the element “alsamt” is deleted from the word’s structure.

Regarding the pronunciation of the phonemes /ض/ and /ظ/ in the Russian it is observed that Russian speaker tend to pronounce them as /d/. From the perspective of ancient Arabic linguistics, the consonant /ض/ “is specific to Arabic and does not have similar sounds in other Semitic and non-Semitic languages (except for Habashi)” (Moghbel Ghahremani and Nemati, 2017: 89). Consonant /ض/ is “plosive and voiced phoneme. Its production involves the vibration of the vocal folds, followed by the airstream being blocked when it collides with the tip of the tongue and the roots of the upper front teeth. Upon the tongue's separation from the roots of the upper front teeth, a plosive sound is produced, which is /ض/, as pronounced in Egypt” (Moghbel Ghahremani and Nemati, 2017: 91).

Tamam Hassan, the Egyptian linguist, compares the pronunciation of /ض/ and /د/ and believes that both sounds are alveolo-dental, plosive, and voiced. However /ض/ , is pronounced emphatically, while /د/ is pronounced softly (Moghbel Ghahremani and Nemati, 2017: 92). The difference between the pronunciation of /ض/ and /ظ/ is that in Arabic, both are considered fricative, voiced, emphatic, and motbegha, a term derived from a verb meaning 'to stick.' Motbegha letters involve part of the tongue sticking to the palate. However, /ظ/ is pronounced with the tip of the tongue and the front teeth, while /ض/ is pronounced with the sides of the tongue and the adjacent molars. Additionally, /ض/ has a longer duration compared to /ظ/ (Moghbel Ghahremani and Nemati, 2017: 94-95).

«Itbagh is a phonetic process, which means “overlaying” and “unfolding”.” In other words during the pronunciation of motbegha-phonemes: “when you place the tongue in their position, you overlay it with that part of upper palate that faces you tongue … and the sound between tongue and upper palate will be enclosed up to the position of the letter; Put differently, itbagh is a feature that indicates the height of the tongue during pronunciation. This means that when pronouncing motbegha consonants, the body of the tongue rises to the part that causes the main blockage in the pronunciation position by engaging with other organs and is placed parallel to the palate. Itbagh can be considered a characteristic of secondary articulation, which differentiates between the first and

second consonants in the following pairs: "ظ-ذ", "ت-ط", "س-ص" (Payam, 2007: 26, quoting from Moghbel Ghahremani and Nemati, 2017: 97-98).

With all these explanations, due to non-compliance of two sounds "ض" and "ظ" with the phonology of the Russian language, Russian people convert them into the closest sound in their language /д/ /d/, a very common process in borrowing the words. Owing to Abul-hasan Najafi, the phonologic system of one language is more resistant to the other layers of that language and is not influenced by the other language (Najafi, 2001: 68; quoting from Moghbel Ghahremani and Nemati, 2017: 100).

e) the transformation of devoiced velar fricative /خ/ /x/ into devoiced velar plosive /к/ /k/ in the Russian:

- in the first syllable of the word "кали́ф" [kal'íf];

- in the first syllable of the word "калифа́т" [kalifát];

f) the transformation of voiced post-alveolar affricate /ج/ /d͡ʒ/ in Arabic (which has no equivalent in the Russian) into voiced velar plosive stop /г/ /g/ in the Russian:

- in the third (and the last) syllable of the word "альмагéст" [al'magést];

- in the third (and the last) syllable of the word "альмагéст" [al'magést];

2) the transformation of pharyngealized spirant fricative into non-pharyngealized fricative:

a) the transformation of devoiced alveolar pharyngealized spirant fricative /ص/ /(t)s'/ according to Arabic transcription) and /sˤ/ (according to international transcription) in Arabic into devoiced fricative alveolar spirant /c/ /s/ in Russian;

- in the first syllable of the word "суфи́зм" [suf'izm];

- in the first syllable of the word "صاحِب" that has three written forms in the Russian: "саги́б" [sagíb], "сахи́б" [saxíb], and "саи́б" [saíb];

3) the transformation of the approximant into the fricative consonant:

a) the transformation of velar bilabial sonorous glide approximant /و/ /w/ into fricative labial-dental obstruent /в/ /v/ in the Russian:

- in the first (or second) syllable of the words "الوادی", "وادِ", "альва́ди", "ва́ди" [vád'i], [al'vád'i];

- in the first syllable of the word "وزير", "визи́рь" [v'iz'ír'];

a) the transformation of the voiced fricative labial-dental /و/ /v/ in Arabic into the voiced bilabial plosive /б/ /b/ in Russian:

- in the second syllable of the word "набо́б" [nabób];

5-2. Devoicing process:

Devoicing is "a process, during which a voiced sound turns into a devoiced one. For example, the devoicing of /r/ at the end of the words such as "چتر" [ʧaṭr̥] or the devoicing of /b/ in the word "حبس", pronounced as [hab̥s]. In the International Phonetic Alphabet (IPA), devoicing is indicated by the diacritic sign [̥]. Devoicing is a fortition process" (Modarresi Ghavami, 2015: 260).

Additionally, devoicing is considered an assimilation process. Regarding the voicing and devoicing A. Valipour believes: “The classification of voicing in acoustic is different from a biological classification. <…> The concept of voicing (being vocal) and devoicing (being non-vocal) in this definition represents a proportion between the frequencies of sound waves. Being voiced means creating an exponential relationship in a group of sound waves <…> According to this specification, all of the vowels and nasals are vocal, while all of the consonants, except for nasals, are considered non-vocals. A subtle point in this classification could be that the voicing and devoicing of the sounds are calculated relatively and based on the maximum energy consumption. Under this categorization, the sounds with the highest energy consumption are vowels, after them, there are nasals, then voiced, and after them and at the lowest position with the minimum energy consumption devoiced are placed” (Valipour, 2014: 26-27).

Considering all of the above, devoicing of Arabic loanwords occurs in the following words:

Table No. 2: devoicing in Arabic loanwords of the Russian language

Row	The written form of the word in Arabic	The written form of the word in Russian	Phonetic representation in Arabic	Pronunciation of the word according the APA	Phone before the phonetic process	Phone after the phonetic process	Translation into English
1	لازَوَرد	лазури́т	/la:zaward/	[lazur’ít]	[د] [d]	[т] [t]	Lazurite, old name Azure spar
2	مَسجِد	мече́ть	/masʤɪd/	[m’ičet’]	[د] [d]	[т] [t]	mosque
3	ثعلب	са́леп	/Ɵ[g]aʕ[i]lab/	[sál’ep]	[ب] [b]	[п] [p]	salep

According to the table, we can see that devoicing happens in loanwords as follows:

1) the transformation of the voiced post-alveolar dental plosive /د/ /d/ into the devoiced post-alveolar dental plosive /т/ /t/ in Russian in the word “لازَوَرد” “лазури́т” [lazur’ít].

2) the transformation of the voiced alveolar dental plosive /د/ /d/ in Arabic into the devoiced alveolar dental plosive /т/ /t/ in Russian in the last position of the word “مَسجِد” “мече́ть” [m’ičet’];

3) the transformation of the voiced bilabial plosive /ب/ /b/ in Arabic into the devoiced bilabial plosive /п/ /p/ in Russian in the word “са́леп” [sál’ep];

The most common process of final weakening is devoicing of the consonants (Hyman, 1989: 260). In the Russian language, if the voiced consonants /б/ /b/, /в/ /v/, /г/ /g/, /д/ /d/, /ж/ /ž/, /з/ /z/ are

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placed at the end of the word and as the last phoneme of it, or before a devoiced consonant (/п/ /p/, /ф/ /f/, /к/ /k/, /т/ /t/, /ш/ /š/, /c/ /s/), they transform into their paired devoiced sound. In the word "العود" after devoicing of the phoneme /د/ /d/ after entering in the Russian and its transforming into /т/ /t/,

5-3. Gemination process:

Gemination is a process during which a simple phoneme is doubled. For example, the gemination of the first consonant of the present tense root of the verb "paridan" – "par" – in combination with the imperative prefix "be-" results in the pronunciation [beppar] in Persian. Gemination is considered a fortition process (Modarresi Ghavami, 2015: 71). Yadollah Samareh describes creating a geminate sound as follows: "Sometimes the preparation stage of one sound and the end stage of another sound merge. As a result of this juncture, these two sounds join and become a long juncture, usually the sum of the two junctures. This only happens with consonants, when two identical consonants or two consonants with the same place of articulation are placed next to each other. We call this phenomenon defective articulation. <…> In traditional phonetics and grammar, this phenomenon is called gemination, and the sound produced is called a geminate sound" (Samareh, 1999: 33-34).

Khazagerov and Moskvin, in their definition of gemination, respectively, believe that this process is a kind of lexical or phonological repetition at the syllable level (Khazagerov, 2009: 242 and Moskvin, 2006: 81, quoted in Markasova and Mitrofanova, 2024: 42). According to M. V. Bezbarudava, gemination is also of three types: lexical, including elements of a phonetic row, assimilation gemination, in which one element within a word is influenced by another element, and compound, that places similar sounds next to each other (Bezbarudava, 2022: 10).

In the analyzed Arabic loanwords, the process of gemination was observed in the following words:

Table No. 3: gemination in Arabic loanwords of the Russian language

Row	The written form of the word in Arabic	The written form of the word in Russian	Phonetic representation in Arabic	Pronunciation of the word according the APA	Phone before the phonetic process	Phone after the phonetic process	Translation into English
1	ليف	лю́ффа	/lif/	[l'júf:a]	[ف] [f]	[ф:] [f:]	Egyptian cucumber or Vietnamese luffa
2	مَولى	мулла́	/mawla:/	[mul:á]	[ل] [l]	[л:] [l:]	Mullah, Sir, spiritual position in Islam
3	شاطىء	шо́тты	/ʃa:ʈˤɪʔ/	[šót:ɨ]	[ط] [ʈˤ]	[t:] [т:]	The name of the dry pits in the northern part of the Arabian Desert and Africa, filled with salt lake water during the rainy season

1) In the word "ليف" "lif" after entering into Russian, occurs gemination process, changing it into a double-syllabled word, with a geminate devoiced fricative labial-dental consonant /f:/;

2) The simple dental post-alveolar lateral approximant /ل/ /l/ in Arabic transforms into the geminate /l:/ in the word "мулла́" [mul:á] in Russian.

3) We can see the gemination of devoiced dental post-alveolar ejective consonant /t'/ (/ʈˤ/ according to IPA) in the word "شاطىء" and its transformation into geminate devoiced dental plosive /т:/ /t:/ in Russian "шо́тты" [šót:ɨ];

It is worth mentioning that an ejective sound represents a phoneme "produced with an egressive glottalic airstream mechanism. Such phonemes exist in many African and Native American languages. Ejectives are always devoiced and mostly plosive. But their fricative type can also be produced. Ejectives are produced in bilabial [p'], alveolar-dental [t'] and [s'], and velar [k'] positions" (Modarresi Ghavami, 2015: 175).

6. **Conclusion**

In this research have been used the descriptive and comparative phonology methods to examine the Arabic loanwords. The results of the research are as follows:

1- According to the fortition process, it was observed that due to the different alphabetic-phonetic systems of Arabic and Russian, and the absence of certain Arabic sounds in Russian, a different, stronger phoneme is used in Russian. This substitution occurs to align with the phonetic representation and pronunciation rules of the Russian language.

2- Changes related to fortition process in Arabic loanwords after entering the Russian language in pronunciation and phonetic representation include the following:

A) the transformation of fricative consonant into a plosive consonant:

a-1) the transformation of fricative uvular voiced velar /غ/ /ɣ/ in Arabic into plosive non-nasal devoiced velar /г/ /g/ in Russian in “алго́ль” [algól’], “газе́ль” [gaz’él’], “га́зи́” [gáz’í];

a-2) the transformation of the devoiced lenis pharyngeal fricative /ح/ /ħ/ into the voiced velar plosive /г/ /g/ in Russian in: “алкого́ль” [alkogól’], “гамада́” [gamadá],“гаре́м” [gar’ém],“га́рмала” [gármala],“гаши́ш” [gašíš],“саги́б” [sagíb];

a-3) the transformation of the voiced fricative dental /ذ/ /ð[g]/ in Arabic into the voiced plosive alveolo-dental non-nasal /д/ /d/ in Russian in the word “дурра́” [dur:á];

a-4) the transformation of the voiced lateral affricate /ض/ /ɖˤ/ in Arabic into the voiced plosive alveolo-dental non-nasal /д/ /d/ in Russian in: “قاضى” or “القاضى” “ка́ди(й)” [kád’i(j)],“алида́да” [al’idáda], “рамада́н” [ramadán];

a-5) the transformation of the fricative dental /ðˤ/ into the voiced alveolo-dental non-nasal plosive /д/ /d/ in Russian in the word “نظير السمت” “нади́р” [нади́р];

a-6) the transformation of devoiced velar fricative /خ/ /x/ into devoiced velar plosive /к/ /k/ in the Russian in “кали́ф” [kal’íf],“калифа́т” [kalifát];

a-7) the transformation of voiced post-alveolar affricate /ج/ /d͡ʒ/ in into voiced velar plosive stop /г/ /g/ in the Russian in “альмаге́ст” [al’magést];

B) the transformation of pharyngealized spirant fricative in Arabic into non-pharyngealized alveolar fricative in Russian:

b-1) the transformation of devoiced alveolar pharyngealized spirant fricative /ص/ /sˤ/ in Arabic into devoiced non-pharyngealized alveolar fricative /c/ /s/ in Russian in “суфи́зм” [suf’izm], “саги́б” [sagíb], “сахи́б” [saxíb], and “саи́б” [saíb];

C) the transformation of the approximant into the fricative consonant:

c-1) the transformation of velar bilabial sonorous glide approximant /و/ /w/ in Arabic into fricative labial-dental obstruent /в/ /v/ in Russian in “الوادى”, “وادٍ”, “альва́ди”, “ва́ди” [vád’i], [al’vád’i]; “вали́” [val’í]; “وزير”, “визи́рь” [v’iz’ír’];

D) the transformation of the fricative labial-dental /و/ /v/ in Arabic into the bilabial plosive in Russian:

d-1) the transformation of the voiced fricative labial-dental /و/ /v/ in Arabic into the voiced bilabial plosive /б/ /b/ in Russian in the word “набо́б” [nabób];

E) Devoicing:

e-1) the transformation of the voiced bilabial plosive /ب/ /b/ in Arabic into the devoiced bilabial plosive /п/ /p/ in Russian in the word “са́леп” [sál’ep];

e-2) the transformation of the voiced post-alveolar dental plosive /د/ /d/ into the devoiced post-alveolar dental plosive /т/ /t/ in Russian in the word “لازَوَرد” “лазури́т” [lazur’ít];

e-3) the transformation of the voiced alveolar dental plosive /د/ /d/ in Arabic into the devoiced alveolar dental plosive /т/ /t/ in Russian in the word “مَسجِد” “мечéть” [m’ičet’];

F) Gemination:

f-1) gemination of devoiced fricative labial-dental consonant /f/ in the word “ليف” “lif” and its changing into a double-syllabled word in Russian in “лю́ффа” [l’júf:a];

f-2) The simple dental post-alveolar lateral approximant /ل/ /l/ in Arabic transforms into the geminate /l:/ in the word “мулла́” [mul:á] in Russian;

f-3) the gemination of devoiced dental post-alveolar ejective consonant /t’/ (/t̪ˤ/ according to IPA) in the word “شاطىء” and its transformation into geminate devoiced dental plosive /т:/ /t:/ in Russian “шо́тты” [šót:ɨ];

3) Fortition might occur when sounds are placed next to stressed syllables. This phenomenon may be due to physical and acoustic effects on the sounds that cause them to be produced more obstructed, explosive, or forcefully. It can take place caused by changes in air pressure and the production of phones in the larynx and mouth. Moreover, linguistic and cultural influences can also play a role in this process. For example, in some languages, sounds may be produced approximately, but in other languages, the same sounds may be produced more obstructed and forcefully.

4) Devoicing can occur due to phonetic assimilation or the influence of nearby sounds in the phonetic environment. This process helps create smoother and more coordinated articulation of sounds within a word or sentence, leading to more natural and intelligible speech. In the case of assimilation, a sound may adopt the phonetic features of an adjacent sound; in other words, the sounds surrounding a particular segment can impact its articulation and cause changes in its voicing. For example, a consonant may be influenced by a neighboring consonant, resulting in it being produced as either voiced or voiceless.

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