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SOUND SIMPLIFICATION PROCESSES AMONG NAJDI ARABIC LEARNERS OF ENGLISH: A PHONOLOGICAL ANALYSIS[1]

PROCESSOS DE SIMPLIFICAÇÃO DE SOM ENTRE APRENDIZES DE INGLÊS DO ÁRABE NAJDI: UMA ANÁLISE FONOLÓGICA

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ABSTRACT

This paper investigated the phonological simplification processes employed by native speakers of Najdi Arabic to modify complex English consonant sequences. To that end, the study measured the frequency of each simplification process that appeared in the data and examined relevant characteristics. Upon their consent, 42 participants with varying levels of English proficiency were invited to produce 21 English words that contained consonant sequences in different positions, including initial, medial, and final. Furthermore, the sequences included groups of two, three, and four consonants. The data were recorded and analyzed using the Praat software package to identify the simplification strategies that appeared. The findings revealed five main strategies employed by Najdi speakers. These strategies were insertion, voicing, deletion, metathesis, and fricativization. Among these processes, insertion emerged as the most frequently employed and was mostly found in two-consonant sequences, even though modifications introduced on three consonant sequences dominated in general. The second-most common strategy was voicing, followed by deletion. In contrast, metathesis and fricativization were relatively rare. In addition, the participants would sometimes combine two strategies rather than using only one to deal with a problematic consonant sequence.

Keywords: English, Foreign Language, Najdi Arabic, Phonological Simplification, Phonology.

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RESUMO

Este artigo investigou os processos de simplificação fonológica empregados por falantes nativos do árabe najdi para modificar sequências complexas de consoantes do inglês. Para esse fim, o estudo mediu a frequência de cada processo de simplificação que apareceu nos dados e examinou características relevantes. Após seu consentimento, 42 participantes com diferentes níveis de proficiência em inglês foram convidados a produzir 21 palavras em inglês que continham sequências de consoantes em diferentes posições, incluindo inicial, medial e final. Além disso, as sequências incluíam grupos de duas, três e quatro consoantes. Os dados foram registrados e analisados usando o pacote de software Praat para identificar as estratégias de simplificação que apareceram. As descobertas revelaram cinco estratégias principais empregadas por falantes de najdi. Essas estratégias foram inserção, vozeamento, exclusão, metátese e fricativização. Entre esses processos, a inserção surgiu como a mais frequentemente empregada e foi encontrada principalmente em sequências de duas consoantes, embora as modificações introduzidas em sequências de três consoantes dominassem em geral. A segunda estratégia mais comum foi a vozeamento, seguida pela exclusão. Em contraste, metátese e fricativização eram relativamente raras. Além disso, os participantes às vezes combinavam duas estratégias em vez de usar apenas uma para lidar com uma sequência consonantal problemática.

Palavras-chave: Inglês, Língua estrangeira, Árabe Najdi, Simplificação fonológica, Fonologia.

Introduction

Sound simplification is one of the most common types of language change. It concerns the processes by which the intrinsic phonological rules and systems of a language undergo certain alterations in what can be described as an operation of adjustment, adaptation, and natural evolution. It gives evidence that no language can ever exist in a state of immutable stasis but evolves in its different components, including phonology. Generally speaking, sound simplification processes occur with complex phonological patterns to make the sounds of a given language more natural and easier to articulate. In the context of second language learning phonology, however, these sound simplification processes tend to have specific characteristics.

The aim of the present study was to determine the sound simplification processes employed by Najdi Arabic speakers from Saudi Arabia who were learning English as a foreign language, as a typical case of how simplification processes affect complex English consonant sequences when articulated by a foreign language learner. A sizable number of previous studies has examined phonological simplification in all its complexity across a wide variety of world languages. Many scholars have examined this phenomenon from a synchronic point of view, with a focus on the way processes of simplification currently manifest across different

speakers, dialects, and contexts. Others have studied it diachronically by characterizing the evolution of sound features over time, aiming to trace the emergence and development of different types of sound change in given languages and determine the factors that motivated them. In another area of research, contrastive studies have proved illuminating in their investigation of the various forms of phonological simplification cross-linguistically. In this respect, however, the simplification strategies employed by Arabic-speaking learners of English as a foreign language have so far only been sporadically investigated, a gap that the present empirical study has sought to address.

Literature Review

An extensive body of research has been conducted on the topic of phonological simplification in all its linguistic and cross-linguistic complexity. The literature has progressed from groundbreaking studies laying the theoretical foundations and main principles for the study of phonology to examinations of specific manifestations of phonological simplification patterns within or across certain languages. For instance, phonological simplification has been examined in light of the theory of language universals, which advocates the belief in a common basis of all human languages. Chomsky's (1975, 1986) work on general sound laws and his theory of universal grammar was crucial in refuting the view that languages were widely separated from each other by widely different systems, as found in the influential sociolinguistic studies of Joos (1957), for example. Conversely, working on the formulation and testing of hypotheses about the precise limits within which natural languages may vary, Chomsky contended that "human languages differ in some respects, but in other respects they are all cut to a common pattern" (p. 29). In the same vein, Greenberg's (1963) pioneering work showed that all languages, regardless of their geographic or genetic affiliation, had a core set of sounds that obeyed certain universal principles. Of considerable importance as well were the surveys of world phonological systems undertaken by Trubetskoy (1939) and Hockett (1955).

Chomsky and Halle (1968) associated the way languages change with tendencies toward simplification in their phonological systems. Languages have been shown to evolve by reducing complex sounds and favoring more perceptually salient forms. Chomsky and Halle insisted that the process of phonological simplification is not random but is attributed to "universal principles" that can be found across all languages. In this vein, Greenberg (1963) asserted that as a recurring process across the world's languages, phonological simplification is driven by the universal human tendency to ease articulation and reduce perceptual complexity. He claimed that this process is the manifestation of universal phonological and cognitive constraints on language. The notion of perceptual and phonological complexity has also been highlighted by linguists such as Kiparsky (2003b), who claimed that phonological change is guided by innate principles shared by all humans, where complex structures are eliminated and sounds are neutralized in specific environments.

In the work of Kiparsky (2003a) and Bybee (2001), the simplification of phonological structures is understood as motivated by both articulatory ease and perceptual clarity. These simplifications, while varying across languages, reflect deeper cognitive constraints that apply universally across all human languages. This view was shared by Blevins (2004), who argued that phonological reduction is a universal response to cognitive and articulatory constraints.

In cross-linguistic studies, the seemingly universal nature of phonological simplification processes is explained on the one hand by what is believed to constitute shared cognitive resources all humans possess for language processing and on the other hand by the constraints on the articulatory and auditory systems that exist for all spoken languages (e.g., Goldstein et al., 2007; Hayes, 2009; Lin, 2015; Prince & Smolinsky, 2004).

The examination of this universal trait of phonological simplification within any language (in the present study, the Najdi dialect of Arabic) therefore involves a deep study of the language's internal linguistic patterns, related universal cognitive and perceptual features, and constraints on the articulatory and auditory systems that lead to phonological simplification. It must also consider the diachronic aspect

in the progression of sound patterns over time. In fact, it is noteworthy that the diachronic approach to language universals, notably exemplified by Blevins (2004), came to the same conclusions about the universality of phonological simplification. Blevins examined phonological traits, including processes of reduction and simplification, as related to historical change and evolution. That work provided a perspective on how phonological simplifications emerge across languages, supporting the idea of universal processes of phonological reduction.

Studies extending the theory of language universals to phonological universals have proposed that languages show tendencies toward certain syllable structures, notably the consonant-vowel (CV) structure, which is the most common syllable type across languages (Greenberg, 1963). In the 1970s and 1980s, Comrie (1971) made a major contribution to the study of linguistic universals through his examination of phonological patterns in a number of languages in relation to syntactic and morphological universals. His model proved particularly useful for the study of cross-linguistic patterns in phonological systems, as they consider phonological universals within the context of the whole linguistic structure in which they occur. Comrie came to the conclusion that certain phonological features, such as the distinction between voiced and voiceless sounds or the presence of nasals, are universal tendencies in human languages.

The question of sound simplification has also notably been investigated from the practical perspective of speech production and language use in the work of Lindblom (1990a), who showed that phonological reduction was driven by efficiency principles. Lindblom claimed that simplification strategies are universal because they serve the goal of efficient communication. Languages tend to reduce phonetic complexity when possible, leading to processes of phonological simplification. This work suggested that simplification processes, such as elision, assimilation, and consonant sequence reduction, are common across languages because speakers tend to minimize effort in speech production, and in Kenstowicz's (1994) words, "for the sake of ease of articulation" (p. 78).

Within this framework, Bybee (2001) explored the relationship between phonological processes and usage patterns, arguing that phonological reduction

(e.g., simplification of sounds and deletion of unstressed syllables) is a product of language use guided by both universal tendencies and the frequency of forms in linguistic contexts. Bybee argued that phonological reduction is a functional adaptation that reflects the frequency and regularity of sound patterns, which are influenced by universal cognitive principles. Whether synchronic or diachronic in their approach, recent studies of phonological simplification have not only illuminated its universal dimension but also systematically established its typology, distinguishing and characterizing the different phonological changes it may introduce into the patterns of a language. Reduction, elision, assimilation, and metathesis are the most recurrent of these processes that linguists have identified across various languages.

Undoubtedly, the most common type of phonological reduction is the weakening or shortening of sounds. Several scholars have specified that this process mainly concerns unstressed vowels to ease articulation (e.g., Lindblom, 1990b, 1998). Like Russian, English offers a prime example of this tendency. Unstressed vowels in native English speech are typically reduced to a schwa, as in the utterance “it’s for you,” where the preposition “for” is pronounced like the word “fur.” Similarly, in the sentence “I want to talk to the doctor,” the preposition “to” and the article “the” are weakened to [ə] and [ðə], respectively. It is noteworthy that this is the way a native speaker of English would naturally articulate such sounds and that the lack of such reduced sounds in speech would be an indication of a non-native accent.

In addition to weakening sounds, reduction can also result in the altogether deletion of sounds. Kiparsky (2003b) referred to this process as elision and defined it as “a common simplification strategy in languages, where speakers omit phonemes, particularly vowels, to make speech faster and more efficient” (p. 45). A good example of this phenomenon in English is the phrase “next time” [nɛkstaɪm], where the [t] consonant in “next” is not pronounced. Spoken French offers many examples of this as well. Tranel (1987) observed that “Elision in French often occurs in rapid speech, where vowels are dropped from function words, and sometimes even from content words, particularly in casual conversation” (p. 82). For example,

the utterance “Je ne sais pas” (“I don’t know”) is often pronounced [ʒə n sɛ pa] or even [ʒə sə pa], where the /ə/ vowel in “ne” is reduced or elided in fast speech.

Vowel reduction is similarly conspicuous in spoken variants of Arabic. A representative example of this would be the Classical Arabic phrase ماذا تريد /mæðæ tʊriːdʊ/ (“What do you want?”), which is pronounced /əʃ triːd/ in certain Yemeni dialects. Another case of vowel elision can be seen in هذا في /fiː hæðæ/ (“in this”), which is pronounced [f hæðæ] without the long [iː] vowel in certain speech contexts and in some dialects, including Algerian, Moroccan, and Saudi Arabic.

Along with reduction and deletion, assimilation is another common type of phonological simplification. Huffman (1995) referred to assimilation as “the natural tendency for sounds in sequence to become more similar in articulatory features, thereby reducing effort in speech production” (p. 266). This can be seen in the Arabic example عندنا /ʕɪndænæː/ (“we have”), which is simplified to عنا [ʕænnæː] in Algerian and Tunisian dialects. The consonant [d] here is assimilated to the neighboring consonant [n].

Lastly, metathesis is a form of simplification in spoken language, where speakers reorder or transpose the phonemes of a word in a way that helps facilitate smoother transitions between sounds and makes them easier to articulate (Bybee, 2001; Labov, 1972). In her contrastive study of metathesis in English and Arabic, Igaab (2018) defined metathesis as a morphophonemic process of inversion of two sounds that can be consonants or vowels, adjacent or non-adjacent. In English, the adjacent /k/ and /s/ are inverted in such cases as [æks] for “ask” and [æstəɹɪks] for “asterisk.” Another example Igaab gave was the expression “pretty good,” which is pronounced “purty good” in certain dialects of English. Igaab likewise found abundant cases of metathesis in Makkan and Cairene Arabic. For example, /yantafið/ (“he shakes”) becomes [yitnafið] in Makkan Arabic and [yitnifið] in Cairene Arabic, /iltaqa/ (“they meet”) is [atlaga] in Makkan Arabic, /iħtaraq/ (“to burn oneself”) is [atħarag] in Makkan Arabic and [itħaraʔ] in Cairene Arabic, /sulħufaːh/ (“turtle”) is [suħlufah] in Makkan Arabic and [ziħlifah] in Cairene Arabic, and /milʕaqah/ “spoon” is [miʕlaga] in Makkan Arabic and [maʕlaʔa] in Cairene Arabic.

Building on the previous literature covering other dialects of Arabic, the present study examined the Najdi dialect of Arabic, spoken in Najd, a central region of Saudi Arabia, and the native dialect of the researcher. It examined simplification processes acting on complex consonant sequences word-initially, word-medially, and word-finally. The study focused on specific simplification processes that are common in world languages and have been found in other dialects of Arabic. The study contributes to the development of the typology of these phonological simplifications while accounting for them both synchronically and diachronically. To this end, the study sought to answer the following research questions:

1. What phonological processes are used the most by Najdi Arabic speakers when modifying English consonant sequences?

2. Does the position of the consonant sequence in a word (initial, medial, or final) play a role in the choice of simplification strategy?

3. Does the number of consonants in the sequence (two, three, or four) play a role in the choice of simplification strategy?

Study Methods

This study drew on the same dataset used previously in Alkhonini (2025) to test the extent to which recoverability and bisyllabicity could account for learner errors. The present study, in contrast, used the data to explore the kinds of simplification processes used by learners to modify consonant sequences and the influence of the position of the sequence in the word and the number of consonants in the sequence on the strategy used.

Materials

The target words in the study consisted of 21 English words containing sequences of two, three, or four consonants. Namely, 17 words had a two-consonant sequence (e.g., flag), three had a three-consonant sequence (e.g., armed), and one had a four-consonant sequence (extreme). The consonant sequences could appear in initial, medial, or final position, and some target words had consonant sequences

in more than one position, such as “plastic” (initial and medial), “draft” (initial and final), and “confident” (medial and final). All target words were produced by the participants within the carrier phrase “I said [target word] once.” Appendix 1 lists all of the target words used in the study.

Participants

A total of 42 Najdi Arabic speakers participated in the study. Their ages ranged from 19 to 28. All of them reported having started learning English as a foreign language in Saudi Arabia at the age of 7 or later, and their English language proficiency varied from beginner to advanced. They were all born in the Najd area, and most of them were raised in Najd as well, except for three participants who were raised elsewhere in Saudi Arabia. At the time of the study, all participants were students at Majmaah University, where the researcher worked.

Experimental Procedure

To select the sample, the researcher asked some instructors at Majmaah University to invite their students to participate in the study. Those who agreed to participate were asked to fill out a consent form and a demographic questionnaire (see Appendix 2). This questionnaire collected information regarding their current age, the age at which they first started learning English, their place of birth and upbringing, and whether they had any hearing or speaking impairments. Afterward, the participants were asked to go to a language lab, where they were individually audio-recorded producing the target words. Each target word was produced twice within the designated carrier phrase, in addition to some distracters.

The researcher used the Praat software package (Boersma & Weenink, 2025) to record and analyze the data. All target words were annotated in Praat as either correct or simplified. Furthermore, each instance of simplification employed by the participants was labeled as insertion (adding extra vocal element in the cluster, e.g., #vCCX, #CvCX, #CCvX), deletion (omitting one or more elements from the cluster, e.g., #C^1C^2X >> #C^1X or #C^2X), or something else, such as voicing (turning a voiceless consonant into a voiced one).

Statistical Analysis of the Data

Each participant produced all of the target words twice, resulting in a total of 1,764 instances for analysis. As previously stated, all target consonant clusters were annotated in Praat, and their accuracy was labeled with the strategy being used by participants when mispronounced. This information from Praat was then extracted into an Excel worksheet for further calculations, and R (R Core Team, 2024) was used for extracting figures and displaying results.

Results and Discussion

In this study, the participants modified the target words 616 times. Some of these modifications were made to consonant sequences and some were not. For example, the participants sometimes made errors when attempting to produce a target word simply because they did not know the word. In some cases, they mispronounced the target word in a way that did not affect a consonant sequence, e.g., "traceable" produced as *[tɹeɪkabəl], and in other cases, they replaced the target word with another word they already knew, e.g., "subtract" produced as [sɪnteɹ]. This type of error (N = 204) was labeled a mispronunciation and hence was not considered a modification to the consonant sequence since it occurred in a different position than the target sequence. The rest of the observed modifications (N = 412) concerned the target consonant sequences and were used for the data analysis.

In order to answer the research questions, the following subsections explore the phonological processes most frequently employed by the participants as well as the influence of the location of a given consonant sequence within a word and the number of consonants in the sequence. They are followed by a brief discussion of the limitations of the findings.

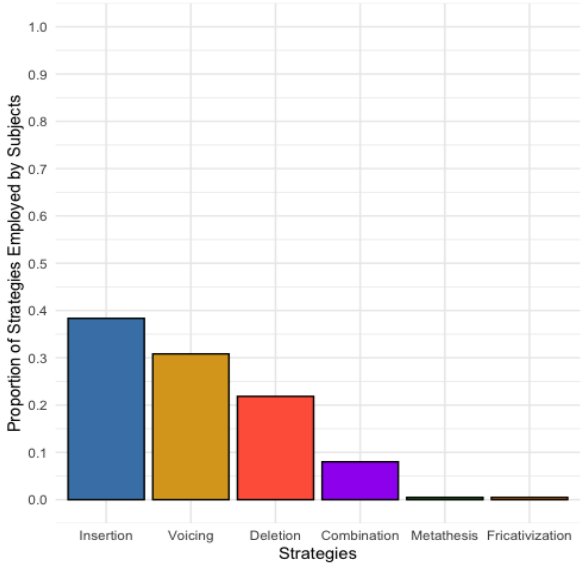
Types of Phonological Simplification Processes Employed

Five types of modifications were observed in the participants' productions of English consonant sequences: insertion, voicing, deletion, metathesis, and fricativization. Additionally, the participants used two combinations of those

processes. Figure 1 shows how frequently each modification process occurred in the data relative to the other processes. It should be noted that these modification processes were observed across all target words, i.e., words with two-, three-, and four-consonant sequences as well as words with initial, medial, and final consonant sequences, factors that are further explored in later sections.

Inserting a sound to ease the articulation of a consonant sequence was the most commonly used strategy in the data. It occurred 158 times, which amounted to 38% of all instances of analyzed modification, and it occurred in 16 words out of the 21 words in the stimuli. Among these, "armed" received the highest number of insertions, namely 45, produced as [aɹmVd], whereas "extreme" and "traceable" received the lowest number of insertions, only twice, as [eksVtɹim] and [tVɹeɪsabl]. Note that a capital V stands for an inserted vowel in the transcriptions. This was done since the quality and length of this element was beyond the scope of the study. Insertion always involved inserting a vowel either before or within consonant sequences. For instance, "clue" was pronounced by some participants as [Vkluː], and "fruitful" was pronounced by some participants as [fɹuːtVfʊl].

Figure 1 – Relative proportion of simplification strategies



One of the most common phonological simplification processes used by the participants was voicing. Voicing, in the case of this study, indicates that a

participant changed the voice quality of one or more consonants in a consonant sequence from voiceless to voiced. This occurred in 127 tokens and in 13 words of the stimuli. The words “practical” and “plastic” had the most instances of voicing (*N* = 33), where the participants turned the voiceless [p] into a voiced [b]. This could be expected since Arabic usually does not have the phoneme /p/. In contrast to voicing, devoicing was found only in one word, “board,” with the [d] changed to a [t] in only two instances.

In terms of frequency, deletion was the third-most common process after insertion and voicing, with 90 instances. Furthermore, deletion was found in 19 of the target words. The word that most often displayed deletion was “subtract,” where the participants usually deleted the final [t] or the medial [t], producing [sʌbtɹæk] or [sʌbɹækt], respectively. On the other hand, several words incurred deletion only twice, including “flag” as [læg] deleting the first consonant and “flawless” as [fɑːləs] deleting the second consonant. The only two words that never incurred deletion were “clue” and “traceable.” Deletion could occur with any of the consonants in a sequence, i.e., the first, the second, the third ([sʌbtækt]), or the fourth ([ekstim]). However, the second consonant in a sequence was the most likely to be deleted, followed by the first, third, and fourth.

The data highlighted the use of other strategies apart from insertion, voicing, and deletion, albeit less often, namely metathesis and fricativization. Metathesis was produced in one word by two participants (“board” mistakenly produced as “broad”). Another strategy was fricativization, in which a stop consonant becomes a fricative. One participant produced fricativization twice in the word “practiced” with the /p/ produced as [f].

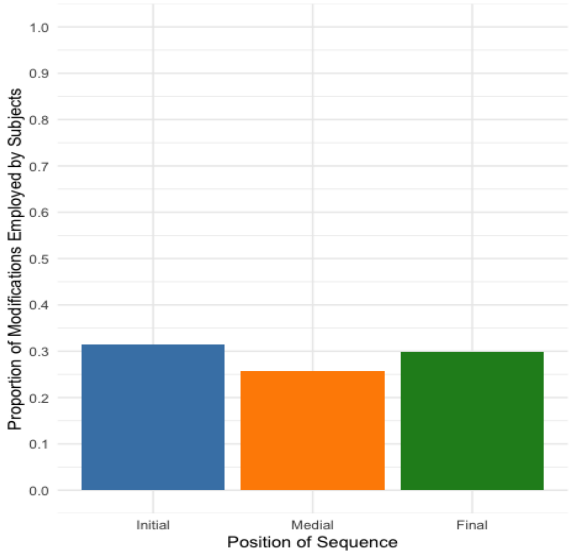
One of the patterns clearly observed in the data was the combining of two strategies: deleting two sounds, inserting two sounds, simultaneous insertion and deletion, simultaneous insertion and voicing, simultaneous deletion and voicing, and simultaneous metathesis and insertion. For instance, “stream” was produced once without the second and third consonants as [siːm], the word “armed” was epenthesized with two vowels as [aɹvmVd] by three of the participants, and “subtract” was produced by one of the participants as [sʌbVtɹækVt]. Another

example showing insertion and deletion in one word was “practical,” which one participant produced as [pVɹætɪkal]. Insertion and voicing were observed in some words, such as “prince” and “plastic,” which were produced as [Vbɹɪns] and [Vblastɪk] by three participants. Additionally, “practiced” was produced by four of the participants as [bɹakɪsd], showing voicing and deletion in the same word. Finally, metathesis and insertion were observed together once when a participant pronounced “armed” as [amɹVd].

Position of the Consonant Sequence in a Word

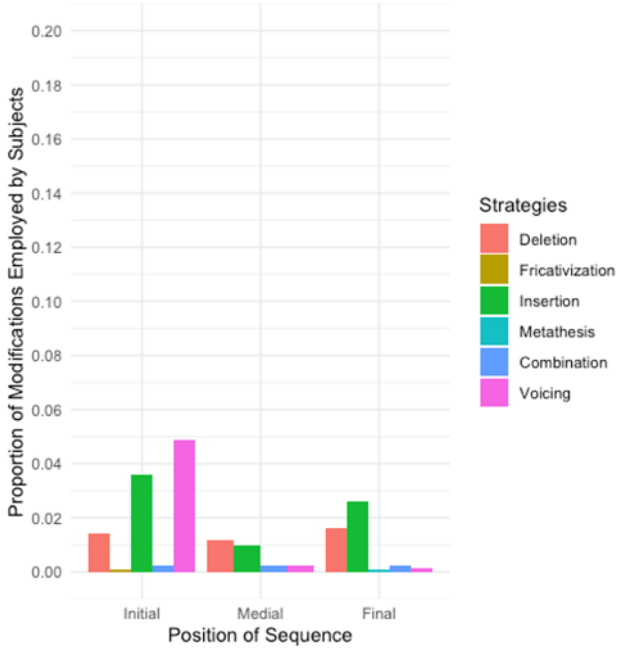
The position that a consonant sequence occupied within a word was taken into account when collecting and analyzing the data. The stimuli were designed to contain 16 initial, seven medial, and seven final consonant sequences in target words. The main purpose of this was to investigate whether one position might trigger modifications more often than the other positions. Another reason was to check if there was any relationship between the position and the type of modification employed by the participants. The data showed that the participants modified the consonant sequences nearly equally regardless of where the sequences occurred in a word. Initial (31.4%) and final (29.85%) positions were almost identical in terms of the proportion of modifications they received. Medial position saw the lowest proportion of modifications, with 25.7%, but was not far below the others. Figure 2 presents a visual depiction of this data.

Figure 2 – Position of modification within a word



With regard to the type of modification employed in each position, the data revealed some interesting findings. Insertion was observed most often in initial position with 90 instances, followed by final position with 65 instances, and medial position with only 25 instances. As for deletion, the difference between the three positions was minimal. The highest was final position, which had five instances more than initial position, which had seven instances more than medial position. The most interesting finding was for voicing; initial sequences scored the highest with 123 instances, while medial and final position scored substantially less, with only six and four, respectively. It should be noted, however, that initial position had four words that started with the [p] sound whereas there were no such words in medial and final position. The words that started with [p] were responsible for 102 of the voicing modifications in the data. This result was in line with Mitchell (1960), Weinberger (1987), and Flege (1987), who argued that /p/ is prone to being voiced by Arabic speakers when speaking English as a second or foreign language, given that sound's absence from Arabic's phonemic inventory, as noted above.

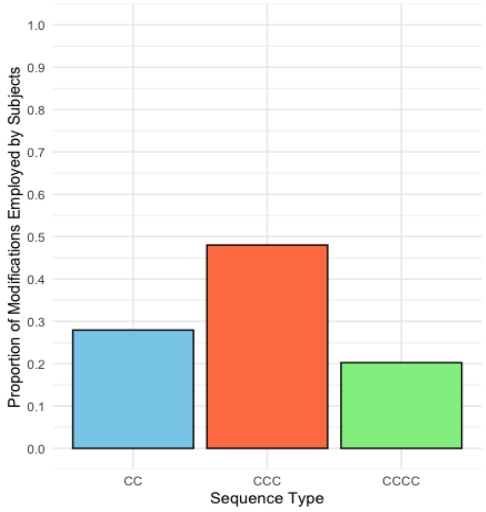
Figure 3 – Proportion of strategies employed in different word positions



Number of Consonants in a Sequence

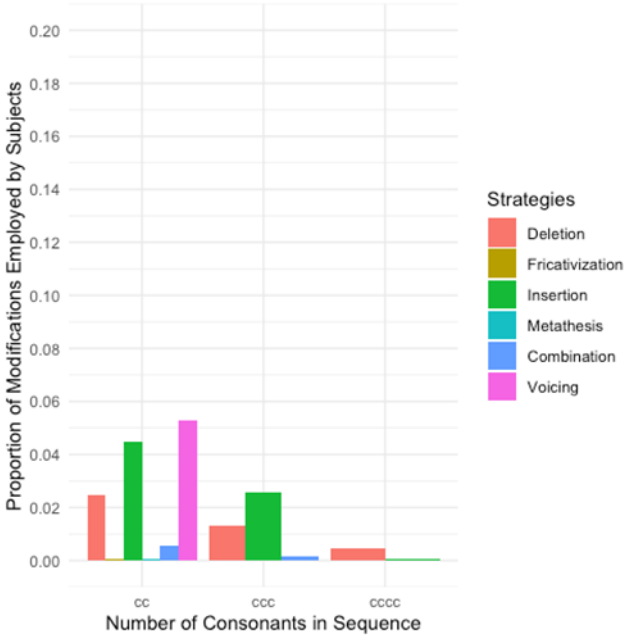
Most of the consonant sequences in the data (N = 26) were composed of two consonants. In addition to this, three words had three-consonant sequences and one word had a four-consonant sequence. The word that had four consonants in a row was “extreme,” but this sequence was in medial position, so its syllabicity might explain why it resulted in fewer modifications than three- and two-consonant sequences, which were obviously less marked than “extreme.” Between the other two types, it was not surprising to observe that a higher proportion of modifications was made to three-consonant sequences than two-consonant sequences. Out of a total of 252 three-consonant sequences, 121 (48%) were modified by the participants, whereas only 610 (28%) out of 2,184 two-consonant sequences were modified.

Figure 4 – Modifications in relation to number of consonants in a sequence



As for the modification processes and their relationship to the number of consonants in a sequence, the researcher expected to find voicing inducing several processes in the two-consonant sequences because [p] was utilized as the first member of four words in this category. In fact, all instances of voicing (N = 133) were found in the two-consonant sequences. Insertion and deletion were observed in higher portions in the two-consonant sequences than the three-consonant sequences. Out of 2,184 two-consonant sequences, 113 (5%) had insertion and 62 (2.8%) had deletion, whereas out of 252 three-consonant sequences, 65 (25.8%) had insertion and 33 (13%) had deletion.

Figure 5 – Proportion of strategies for different consonant sequences



Limitations of the Study

Although this study offers new insights into what modifications Najdi Arabic speakers tend to use to simplify consonant sequences in English, it has limitations that future research could build on. First, the number of sequences included in the data was unbalanced, with 16 instances for initial sequences and only seven each for medial and final sequences. Second, there were far more two-consonant sequences (N = 26) than three-consonant (N = 3) and four-consonant (N = 1) sequences. This limited the researcher's ability to generalize from the results. To arrive at more robust findings, future research could benefit from incorporating more balanced data in terms of the number of consonants in a sequence and the number of sequences in each position of a word.

Conclusion

The present study explored the various phonological processes that Najdi Arabic speakers used to modify English consonant sequences. The focus of similar studies has been on whether speakers modify complex sequences (e.g., Broselow & Kang, 2013; Flege, 1995), what type of sequences trigger modification (e.g., Best &

Tyler, 2007; Broselow, 1983; Rose, 2000), and how to overcome these challenges (e.g., Alkhonini & Wulf, 2018; Derwing & Munro, 2005). This study explored which modification processes were used and how frequently participants used each of those processes. Moreover, the study offers data on whether the position of a consonant sequence in a word and the number of consonants in a sequence would affect the modification process employed by this group of speakers. To that end, 42 participants were asked to produce 21 English words that had 30 consonant sequences in various word positions. The findings showed that inserting a vowel to simplify these complex sequences was the most common strategy used by these participants. Changing the voicing of a consonant was the second-most common strategy, followed by deletion of a consonant. Other strategies were far less common, including fricativizing a stop, employing metathesis, and combining two strategies (e.g., deletion and insertion). Consonant sequences in all three positions (initial, medial, and final) showed modification in a similar manner. Voicing was observed mostly in initial position with two-consonant sequences, and words with a three-consonant sequence showed more modifications than two-consonant sequences.

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Appendix 1

I said clue once

I said confident once

I said flag once

I said plastic once

I said subtract once

I said stream once

I said draft once

I said traceable once

I said board once

I said prince once

I said extreme once

I said flawless once

I said practiced once

I said trouble once

I said fruitful once

I said classify once

I said grocery once

I said practical once

I said armed once

I said crucial once

I said grown once

Appendix 2

Please check the appropriate answer or fill in with the relevant information.

What is your age? _____

Do you have any hearing or speaking problems?

a. Yes. b. No.

In what city were you born and raised?

At what age did you start learning English?

Which level are you studying at in the university?