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Phonological Processes in Oran Dialect: An Autosegmental Analysis

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Abstract

This research provides a detailed analysis of some of the phonological processes found in Oran-spoken Arabic, a dialect of Algerian Arabic, adopting the autosegmental framework and feature geometry. This framework was selected because of its effectiveness in identifying and analyzing multiple phonological processes in context. Oran- spoken Arabic is one of the varieties spoken in the north-west of Algeria, serves as the focus of this study. Since the researcher is from Oran, she served as the primary informant. The researcher audio-recorded herself narrating stories and subsequently transcribed the recordings verbatim. Using autosegmental and diagrammatic representations, the analysis uncovered the presence of the following phonological processes, assimilatory processes like regressive assimilation: obstruent devoicing and voicing, and place assimilation. The analysis also uncovered the existence of non-assimilatory processes, namely, syncope (vowel deletion), epenthesis (insertion), and major class change. Notably, the findings of the study contribute to the understanding of Arabic dialectal variation and provide a basis for further phonological investigation since this study uncovers only some of the phonological processes manifested in Oran-spoken Arabic. In addition, it helps to understand the sound system of this dialect in detail, and it provides evidence for or against the existing theories. Moreover, the study has laid the foundation for future researchers to examine this dialect in depth and uncover more processes. Furthermore, the findings of this study are important to the field of Speech-Language Pathology (SLP), contributing to identifying typical and atypical sound patterns. Overall, the research offers valuable insights for both theoretical research and practical applications.

Keywords; Autosegmental; Assimilation; Non-assimilatory processes; Non-linear analysis; Oran dialect; Phonological processes.

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Introduction

There are several processes that affect the phonetic realizations of phonemes. According to Schane (1973, p. 49), "when morphemes are combined to form words, the segments of neighboring morphemes become juxtaposed and sometimes undergo change… all such changes will be called phonological processes which show how sounds change during their vocal communication." Phonological processes are rules applied to ease the pronunciation of words in language (So & Dodd, 1995). Because of their inherent laziness, human beings tend to simplify pronunciation by undergoing a set of phonological processes. Accordingly, "these processes are salient in the sense that they try to sort out the articulatory obstacles" (Donegan, 2002, p. 4). Thus, phonological processes are used to make the production of complex utterances easier and to enhance articulation. Phonological processes have attracted many researchers, particularly phonologists, who attempt to uncover how these processes can take different shapes and forms in various parts of the world, using both linear and non-linear approaches.

This study aims to uncover some of the phonological patterns manifested in Oran-Spoken Arabic, a dialect of Algerian Arabic, and to explain the processes within an autosegmental and feature geometry framework. Oran Arabic is believed to be a Bedouin-based urban koiné, arising from a mixture of dialects brought into the city by immigrants coming from different areas of Algeria (Miller, 2007; Labed, 2016). It has also been said that the Oran dialect is one of the pre-Hilali sedentary dialects. The most noteworthy feature that catches one's eye in this dialect is the lack of interdental fricatives (Guerrero, 2015) (see Table 1).

Table 1: The Consonant Phonemes in the Arabic Dialect of Oran

	bilabial		labio-dental		dental		sibilant		prepa-latal		palatal		velar		uvular		pharyn-geal		laryn-geal	
Glottali-zation	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+
voiceless occlusives	p				t	ṭ							k		q				ʔ	
voiced occlusives	b				d	ḍ							g							
voiceless affricate									č											
voiceless fricatives			f				s	ṣ	š				x				ḥ		h	
voiced fricatives							z		ž				ġ				ʕ			
nasals	m				n															
laterals							l													
vibrants							r	ṛ												
semicon-sonants	w										y									

Source: Guerrero (2015, p. 274)

Known as 'darʤa' in the Algerian context, Oran-Spoken Arabic is typically used in everyday communication, at home, in the street, and in different social activities. The analysis identified a number of phonological patterns, namely, assimilation, epenthesis, syncope, and major class change. This piece of research is divided to two main parts theoretical and practical. In the second, the researcher will identify some of these phonological processes manifested in Oran-spoken Arabic using the non-linear approach.

1. *Autosegmental Phonology*

The non-linear approach came as a response to the problems that could not be solved using the linear model that dominated generative phonology at the time. According to the linear approach, phonological representations are linear strings of segments. According to Spencer (1996), phonological rules are represented linearly, in one continuous straight line. However, this approach was criticized by many scholars. One of the researchers' concerns was that the linear approach does not provide a sufficient understanding of phonological representations. In addition, it does not capture what Spencer (1996) stated as "the essential characteristics commonplace of phonological processes" (p. 149). The need for a new approach that could address these problems, and others such as tone, gave birth to the non-linear, i.e., the autosegmental approach.

The non-linear approach was proposed by John Goldsmith (1976) in his dissertation, which dealt with tonal phenomena in Bantu languages. The autosegmental framework was originally used to describe tone in tone languages, in which pitch is contrastive, meaning that it influences meaning. Clements (1976) developed the theory to include vowel harmony and nasal harmony. Then, McCarthy (1979) developed this theory in the context of verbal derivation in Classical Arabic. Autosegmental phonology proposes that phonetic representation consists of multiple simultaneous sequences of segments, governed by fundamental constraints on how these different levels of sequences can be interconnected or "associated." This approach allows for one-to-many representations (e.g., long vowels and geminate consonants), many-to-one representations (e.g., affricates), and one-to-one associations (Mahadin, 1994).

Autosegmental phonology analyzes sounds across several autonomous levels called tiers. Clements and Keyser (1983) suggest a three-tier representation: the syllable tier (σ), the CV-tier, and the segmental tier. The CV-tier consists of the [C] and [V] elements dominated by consonant and vowel segments. The segmental tier (also called the quality or melody tier) consists of bundles of feature matrices that represent consonant and vowel segments. Each tier is linked to another with association lines. The autosegmental approach has proven useful in solving many phonological issues, such as tone. This has motivated many researchers to refine this approach and extend the multi-tier representations to feature configuration. The idea that features can be independent has led to organizing them in terms of a tree structure. This type of representation is known as feature geometry. The root is essentially a holding position, and the remaining nodes (features) are all associated with this root, providing specifications to the segment. The tree illustrates that all features show a degree of autonomy.

The utility of this approach lies in its various advantages, such as stability and the elimination of the features [+syllabic] and [+long]. The model also re-described assimilation as a spreading process instead of copying the features of adjacent sounds. It explains compensatory lengthening and distinguishes between fake and true geminates. In addition, it uses logic to explain phonological processes, as opposed to the arbitrariness of the linear approach. Autosegmental phonology proposes a set of principles and constraints, such as the Obligatory Contour Principle (OCP), which prohibits two identical elements at the melodic level (Goldsmith, 1976). The second constraint, crossing association, prohibits crossing different tiers during the mapping process because it is considered universally ill-formed; as a result, the rule is blocked. Thirdly, assimilation is viewed as a spreading process. The fourth principle is the linking constraint: "association lines in structural description are interpreted as exhaustive" (Hayes, 1986, p. 331). The fifth principle is that every matrix must consist of individual features organized under a hierarchy. The sixth principle is the stability effect of phonological rules. The last principle is well-formedness. All these advantages and the accurate mechanisms of the non-linear approach have motivated the researcher to adopt this framework in her research.

2. Theoretical background

Phonological processes can be defined as mental substitutions that are phonetically motivated. When phonemes are combined to form words, the segments of phonemes placed next to each other may be influenced and undergo change. These changes may occur in initial, medial, or final positions, or in stressed vowels, etc. All these changes are referred to as phonological processes. Phonological processes can occur either through the spreading of features, i.e., assimilatory processes, or through the polarization of features across stretches of speech, i.e., dissimilation. Assimilation is subdivided into three categories: regressive, reciprocal, and progressive assimilation. Regressive assimilation occurs when a sound acquires features of a following sound. Pavlik (2009) notes, "regressive assimilation takes place in all languages where the sound undergoes change under the influence of a following sound" (p. 8). Vowel nasalization is a case of regressive assimilation found in English, as in the words *can* /pin/. On the other hand, progressive assimilation takes place when a sound becomes more like the preceding sound. In English, the plural marker may be either /s/, /z/, or /iz/. This depends on the sound that precedes it. For example, in the word *cats* /kæts/, the plural allomorph is pronounced [s] because it is preceded by the voiceless sound /t/, so both [s] and [t] agree in voicing, as both are [-voiced]. The third type of assimilation is reciprocal assimilation, or coalescence. It occurs when two adjacent sounds influence each other mutually, resulting in changes in both. In English, coalescent assimilation occurs when /t/ or /d/ plus /j/ merge into /tʃ/ or /dʒ/. For example, *don't you* becomes /dəʊntʃu/, and *soldier* becomes /ˈsəʊldʒə/. This process simplifies pronunciation in connected speech (Roach, 2009).

Assimilation is the most common process in all languages. According to the linear approach, assimilation is described as a process in which a sound becomes similar to an adjacent sound to facilitate articulation. This occurs when two sounds come together and either merge or change into a new sound, i.e., coalescence. In the autosegmental model, assimilation is seen as a process where features spread to a neighboring segment. In the Jerash Fallahi dialect, spoken in Jerash, Jordan, the alveolar nasal /n/ changes its place feature to bilabial due to the spreading of the labial feature to the left; thus, it is pronounced as /m/ (Jaradat & Mahadin, 2018). Carr (1993, p. 38) claimed, "assimilation is a phonological process that generally results from morpheme concatenation." Concatenation of morphemes involves the addition of an affix to a base form.

Non-assimilatory or syllable structure processes influence how consonants and vowels are distributed within a word. These processes can lead to the deletion or insertion of consonants and vowels, the coalescence of two segments into one, or a change in a segment's major class features, etc. Any of these processes can result in alternations to the original syllable structure.

3. Methodology

This paper adopted the qualitative paradigm. The data were collected by the researcher herself; she was the informant because she is a native speaker of this dialect. She recorded herself narrating several stories real and imaginary. The recorded stories were transcribed verbatim. A verbatim transcript means writing all the researcher has exactly said. Poland (1995) points out "The notion of a verbatim transcript … is limited to a faithful reproduction of the aural record." (p. 291). For more validity and reliability, other native speakers were observed and consulted to see whether there are some intra-dialectal differences. To ensure accuracy, the phonological processes that were identified were checked and validated by a professor specializing in phonology at the University of Jordan, Amman, Jordan. The analysis of the data identified several phonological processes.

4. Results and discussion

This section presents and discusses the findings of the study, starting with the different types of assimilatory processes, followed by the non-assimilatory processes. Each pattern will be explained in detail using the non-linear approach and feature geometry.

4.1 Assimilatory processes

4.1.1 Regressive assimilation

Prefix to stem voice assimilation

Regressive assimilation takes place when one sound becomes more like the sound that follows it. This natural process seems to be manifested in Oran-spoken Arabic. One type of regressive voice assimilation is prefix-to-stem. One obstruent changes its voice feature to agree in terms of voice feature of the following obstruent. In Oran dialect, when the present tense prefix /t/ is added to the stem, which starts with a voiced obstruent in its onset position the voiceless /t/ becomes voiced /d/. In other words, /t/ changes its voice feature when followed by a stem whose initial consonant is a voiced obstruent, agreeing in the voice feature (see table two below).

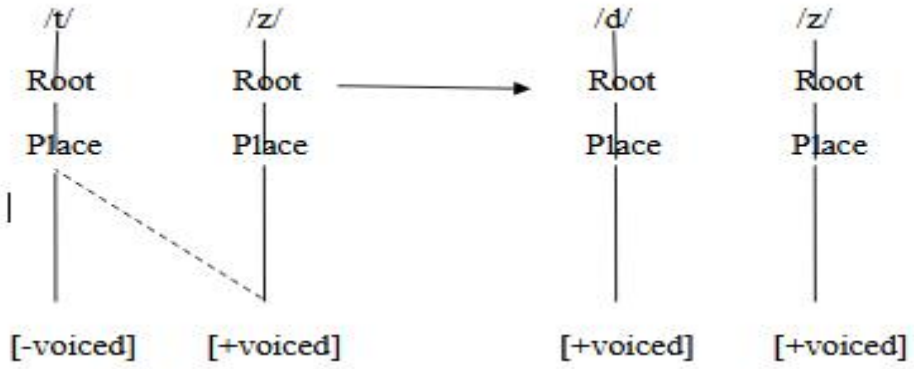
Table 2: Regressive Voice Assimilation in Oran Dialect.

Input	Output	Gloss
t- zaɣrət	d- zaɣrət	Trill (trilling cries of joy)
t-dəfi	d-dəfi	warm
t-vərni	d-vərni	she applies nail polish
t-di:r	d-di:r	Do

Source: Author's own data

The examples in table two represent regressive voice assimilation from prefix to stem, identified in Oran dialect. In terms of feature geometry, the representation of the voice assimilation of the word [t-zaɣret], which means 'trill' realized as [d-zaɣret] (see the diagram below).

Figure 1: Regressive Voice Assimilation in Oran Dialect



Source: Constructed by the author and revised by Prof. Mahadin (University of Jordan, Amman, Jordan).

However, it does not apply if the prefix /t/ is added to a word where a voiceless consonant, a liquid, or a nasal occupies the onset position (see table 3 below).

Table 3: Cases Where Regressive Assimilation (from stem to prefix) Does Not Apply

Input	Output	Gloss
t-rgus	*d- rgus	to dance
t-kbar	*d-kbar	to grow up
t-kteb	*d-kteb	to write
t-ʕayyi	*d-ʕayyi	He/she exhausts me.
t-maqaṣ	*d- maqaṣ	to cut
t-xwən	*d-xwən	to steal
t-pki	*d-pki	To cry

Source: Author's own data

Obstruent devoicing (from coda to onset)

Obstruent devoicing is also one of the types of regressive assimilation also known as anticipatory assimilation. The change occurs in the voice feature: a voiced obstruent [+voiced] becomes [-voiced], acquiring the feature of an adjacent obstruent. In Oran dialect, it happens between the coda and the onset of two adjacent syllables. In other words, the coda obstruent changes its voice feature to agree with the onset obstruent of the following syllable (see table 4).

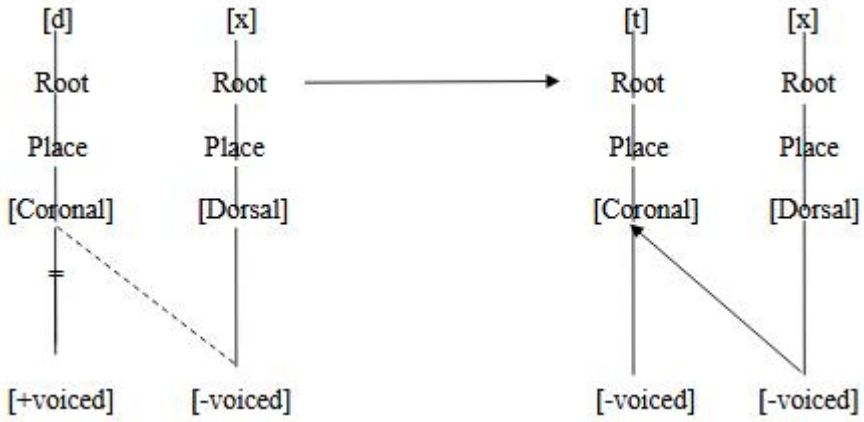
Table 4: Obstruent Devoicing in Oran Dialect

Input	Output	Gloss
nədxəl	nətxəl	I enter
ʔiʒtimaʕ	ʔiʃtimaʕ	meeting
ɣləbtni	ɣləptni	defeat me
təbki	təpki	she cries

Source: Author's own data

Table 4 demonstrates obstruent devoicing in Oran dialect. The first obstruent /b/ in /ɣləbtni/ assimilates and agrees in the voicing feature of the second obstruent /t/; consequently, it is articulated as /ɣləptni/.

Figure 2: Obstruent Devoicing in Oran Dialect



Source: Constructed by the author and revised by Prof. Mahadin (University of Jordan, Amman, Jordan).

Obstruent voicing

Obstruent voicing is another type of regressive assimilation. In this process, the voiceless sound in onset position requires the voice feature when it is followed by [+voiced], for example, /qədra/, which means "cooking pot" is realized as /gədra/. So, /q/ is [-voiced]; it requires the [+voice] feature from the following vowel. So, it is realized as the voiced sound /g/(see table 5 below).

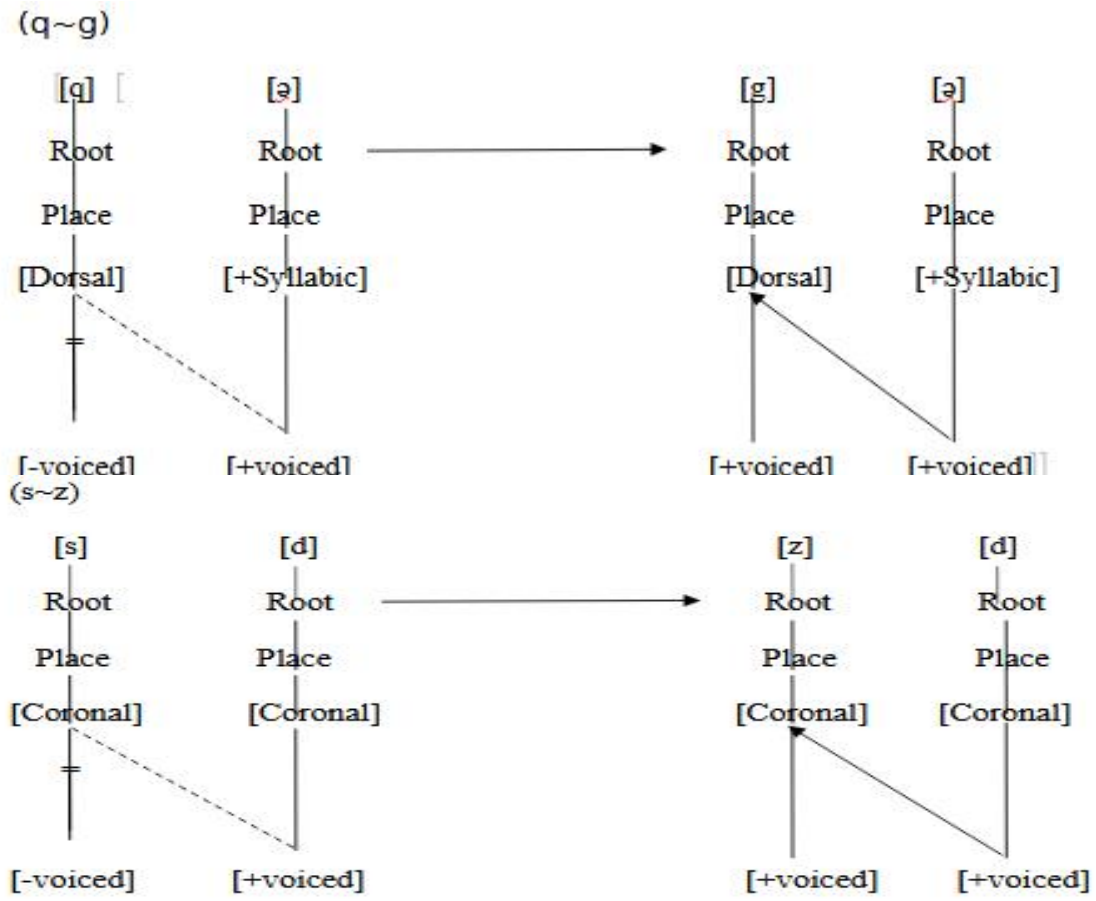
Table 5: Obstruent voicing in Oran Dialect

Input	Output	Gloss
qədra	gədra	Cooking pot
rfəd	rvəd	carries
qalb	galb	heart
qlaʕ	glaʕ	take off
qri:b	gri:b	near
sdər	zdər	breast

Source: Author's own data

Table 5 introduces several examples of obstruent voicing manifested in Oran Arabic. As demonstrated, the /q/ in /qalb/ changes its feature from [-voice] to [+voice]; therefore, it is articulated as [galb]. This pattern is well-explained using feature geometry (see diagram 3 below).

Figure 3: Obstruent voicing in Oran Dialect



Source : Constructed by the author and revised by Prof. Mahadin (University of Jordan, Amman, Jordan).

However, there are several exceptions to this pattern. Not all words in the Oran dialect undergo this type of assimilation. In certain cases, sounds remain stable despite the phonological environment. For example, words like qabla /ˈqɑblɑ/ (“before”), qrit /qriːt/ (“I read”), qudra /ˈqudrɑ/ (“ability”). These exceptions demonstrate that regressive assimilation in Oran dialect is not fully predictable. Notably, this process does not occur when the voiceless obstruent is followed by a nasal or a voiceless consonant, as illustrated in the data below.

Table 6: The Non-Occurrence of Obstruent Voicing in Oran Dialect

Input	Output	Gloss
qfəl	*gfəl	He closed
qmuʒa	*gmuʒa	Shirt

Source: Author’s own data

4.1.3 Nasal homorganic assimilation

Nasal place assimilation is a known phonological process, identified in many languages and dialects. It occurs when a nasal phoneme assimilates the place feature of another following consonant in its environment. In one case, an underlying coronal nasal assimilates to an immediately following obstruent, yielding a homorganic nasal obstruent (see the data below).

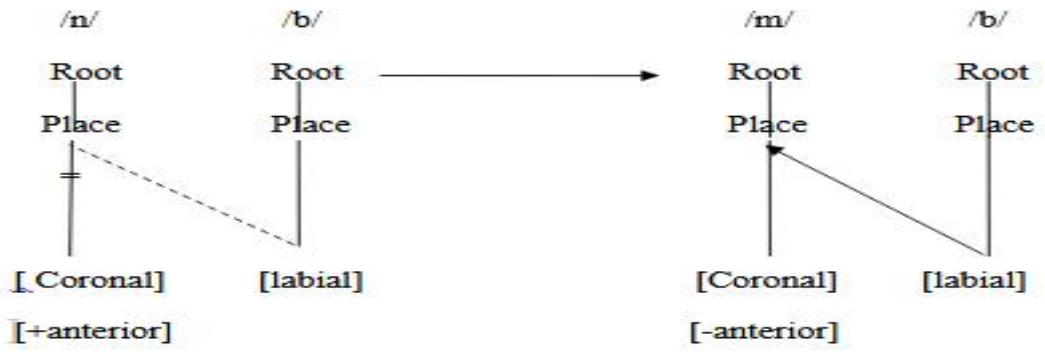
Table 7: Homorganic Nasal Assimilation in Oran Dialect (n∼m)

Input	Output	Gloss
mn-baʔd	mm-baʔd	later
mn-bʔiːd	mm-bʔiːd	from far
mn-maka	mm-maka	from Meka
mn-bara	mm-bara	from outside
jnbah	jmbah	bark
mn-maj	mm-maj	from may

Source: Author’s own data

Consider the following derivation of the words /mnbaʔd/, which means “later”, /mn-bara/, which means “from the outside” are realized as /mm-baʔd/ and /mn-bara/ respectively. The next word /tnktul/, which means “to be killed”, is realized as /tŋktul/. The sound /ŋ/ is commonly used in areas to the west of Oran. This process is best explained using the non-linear approach, particularly feature geometry, as illustrated in diagrams 4 and 5.

Figure 4: Homorganic Nasal Assimilation in Oran Dialect (n∼m)



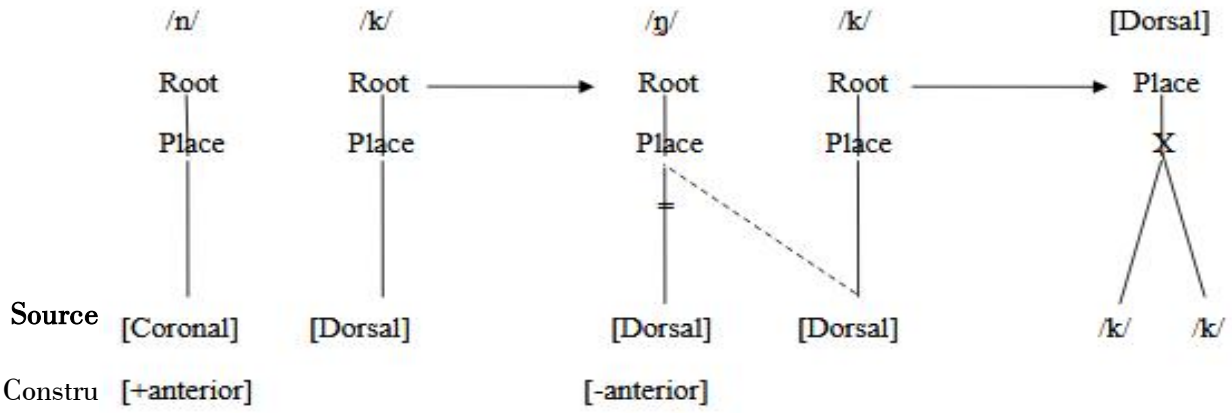
Source: Constructed by the author and revised by Prof. Mahadin (University of Jordan, Amman, Jordan).

Table 8: Homorganic Nasal Assimilation in Oran Dialect (n∼ŋ)

Input	Output	Gloss
tənktul	təŋktul	to be killed
tənglaς	təŋglaς	to be removed
tənkteb	təŋkteb	to be written

Source: Author's own data

Figure 5: Homorganic Nasal Assimilation in Oran Dialect (n∼ŋ)



cited by the author and revised by Prof. Mahadin (University of Jordan, Amman, Jordan).

4.2 Non-assimilatory processes

4.2.1 Epenthesis

Vowel epenthesis or insertion is another process manifested in Oran Arabic dialect. In this process, the shwa [ə] is inserted between the second and the first consonant when the prefix /t/ is added to the verb in the passive participle. To avoid a triconsonantal cluster in onset position and violating the complex onset constraint, the shwa [ə] is epenthesized between the prefix /t/ and the first consonant of the verb. It is a repair strategy to avoid a cluster of three consonants, which is not allowed in Oran-spoken Arabic. It is important to mention that this process is not specific to Oran Arabic but can be observed in other dialects as well. The same rule applies to other languages and dialects like the Chaoui, a Berber dialect spoken in Algeria (Idir, Mahadin; 2022). Oran-spoken Arabic permits complex consonant clusters; however, the maximum allowed cluster in onset position is two consonants (see the data in table 9).

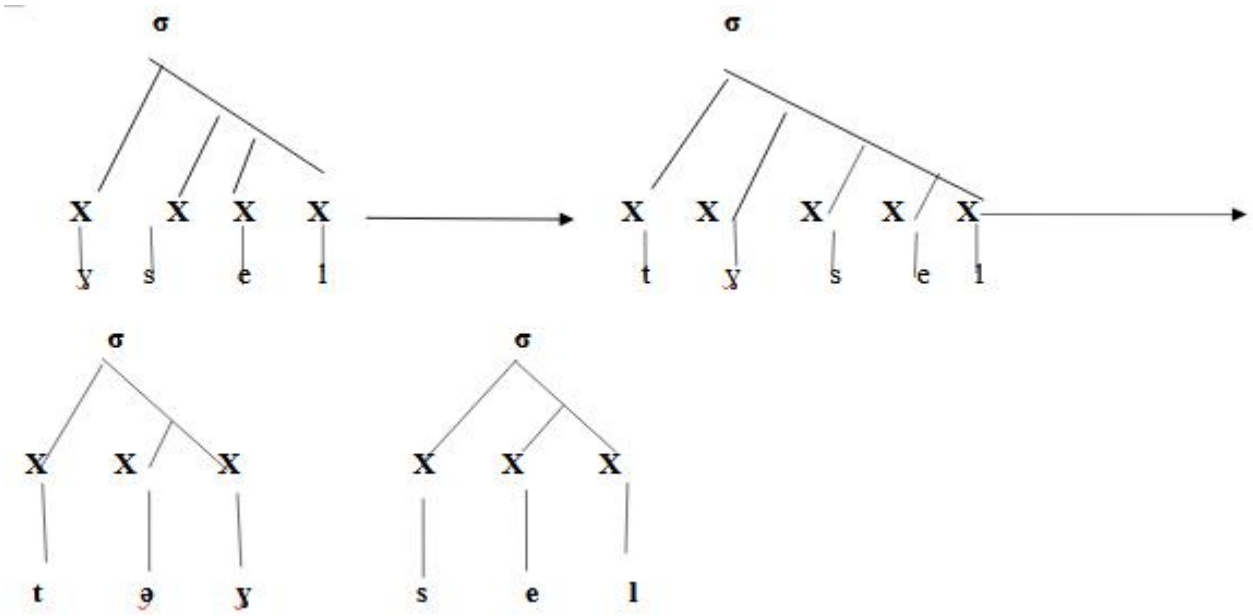
Table 9: Epenthesis in Oran Dialect

Input	Output	Gloss
rsam	tərsam	Was painted
ɣsəl	təɣsəl	was washed
bnəw	təbna	was built
kli:t	təklet	Was eaten

Source: Author's own data

As demonstrated in figure 6, the verb [ɣsəl], which means "to wash" consists of two consonants in onset position, and when the prefix /t/ is added to the verb in the passive participle, the shwa has to be inserted to avoid this complex pattern. As a result, this verb is realized as [təɣsəl]:

Figure 6: Epenthesis in Oran Dialect



Source: Constructed by the author and revised by Prof. Mahadin (University of Jordan, Amman, Jordan).

As we can see in the diagrams above, if the shwa is not inserted this will lead to the violation of the onset complex constraint. Once the shwa is inserted, the re-syllabification will occur. As a result, the word becomes bi-syllabic.

4.2.2 Syncope

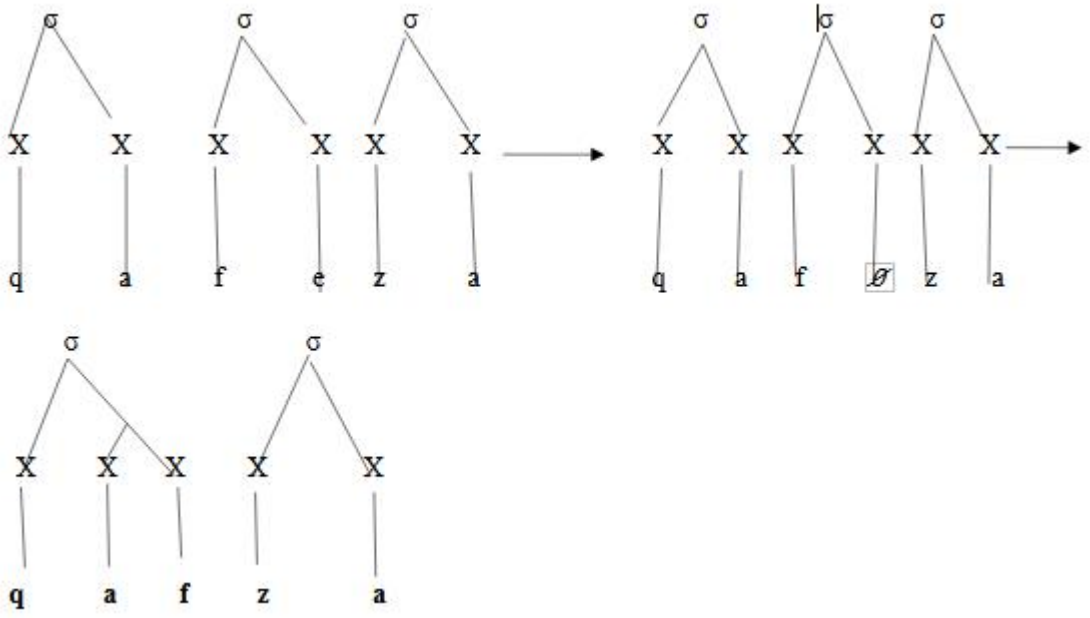
Syncope or deletion is another non-assimilatory phonological process manifested in Oran Arabic dialect. This process occurs within verbs which consist of two syllables; i.e. bi-syllabic words. When the feminine singular suffix /a/ is added to adjectives, the vowel of the nucleus of the ultimate syllable, the vowel /e/, is deleted. The pattern is well illustrated in the examples below (see figure 7).

Table 10: Deletion in Oran Arabic Dialect

Input	Output	Gloss
qafez	qafz-a	smart
labes	labs-a	dressed
raged	ragd-a	asleep
naqel	naql-a	cheated
nazel	nazl-a	descending

Source: Author's own data

Figure 7: Syncope in Oran Arabic Dialect

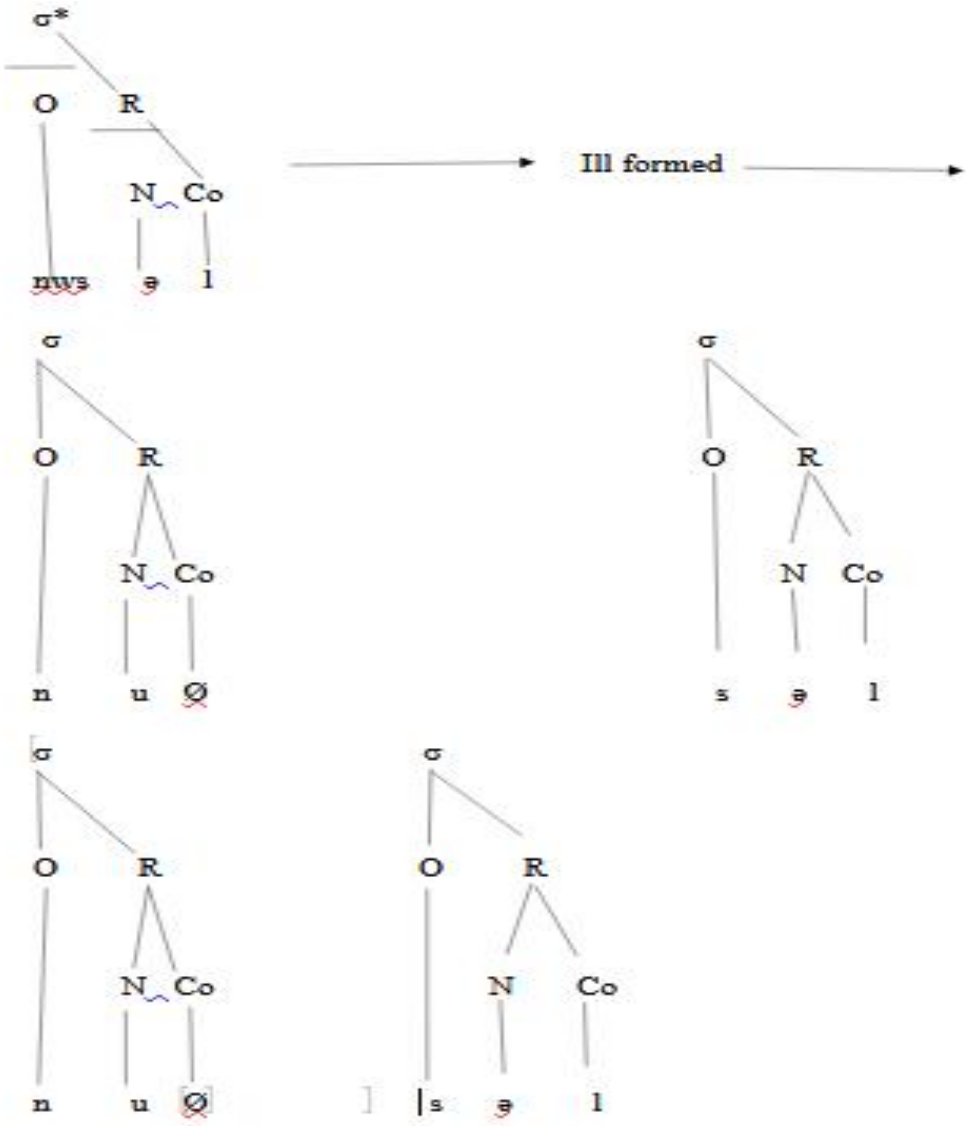


Source: Constructed by the author and revised by Prof. Mahadin (University of Jordan, Amman, Jordan).

4.2.3 Major class change

Major class change in Oran-spoken Arabic occurs when the present simple prefix is added to a tri-consonantal verb, which begins with a glide /w/, for example, the verb /wsal/, which means to arrive, is subject to a phonological process. When the present tense singular prefix is added to the verb [n-wsal] "I arrive", the glide changes to the vowel /u/ for the process of syllabification. Furthermore, this process occurs to avoid three consonant in onset position, violating the complex onset constraint. The latter prevents three consonants in the onset. Oran Arabic allows complex onsets; however, the maximal number is two consonants. When the glide [w] changes to [u], the process of re-syllabification begins. The vowel [u] becomes the nucleus of the first syllable, which has the prefix [n] as its onset. This process results in an open syllable without a coda. On the other hand, the second syllable is a closed syllable with the nucleus [ə], onset [s], and the coda [l]. All that have been said is explained in the diagrams below.

Figure 8: Major Class Change Manifested in Oran Dialect (w ~ u)



Source: Constructed by the author and revised by Prof. Mahadin (University of Jordan, Amman, Jordan).

For other examples of major class change consider table 11.

Table 11: Major Class Change Manifested in Oran Dialect (w ~ u)

Input	Output	Gloss
n-wsal	nusal	I arrive
n-wʒəd	nuʒəd	I get ready
n-wgəf	nugəf	I stand up
n-wshəm	nuʃəm	I have a tattoo

Source: Author's own data

Conclusion

Phonological processes occur naturally in fast or connected speech and operate under specific linguistic conditions or constraints. The type of phonological process depends on the surrounding context, resulting in different categories, including assimilatory and non-assimilatory processes. The primary goal of these processes is to simplify speech. Accordingly, this research aimed to uncover some phonological processes in Oran-Spoken Arabic and to identify the various contexts in which they occur, using autosegmental phonology and feature geometry. The analysis revealed several processes, such as regressive assimilation, namely, obstruent devoicing, obstruent voicing, and homorganic nasal or place assimilation. It also identified non-assimilatory processes like epenthesis, syncope, and major class change. These simplify speech, making it more fluid and efficient. All identified processes were analyzed using the non-linear model, also known as the autosegmental framework. The findings demonstrate that the use of autosegmental phonology and feature geometry is both effective and insightful for identifying phonological processes in any language or dialect. This approach enables researchers to organize their analysis in a clear manner, allowing even non-specialists to grasp the nature of phonological changes. Additionally, it helps uncover hidden patterns and contextual conditions that govern these changes. It is important to note that this paper does not cover all phonological processes present in the dialect. Due to time constraints, only a selection was examined. Moreover, this study provides a foundation for future research that will further explore phonological processes in Oran dialect.

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