Consonantal Assimilation in Four Dialects of Jordanian Arabic

Wael Zuraiq[a], Maisoun Abu-Joudeh[b]∗

[a] Department: Department of English Language and Literature, Hashemite University, Zarqa, Jordan.
[b] Department of English Language and Literature, Hashemite University, Zarqa, Jordan.
∗Corresponding author.

Received 17 November 2012; accepted 6 January 2013

Abstract
The current study investigates assimilation between consonants across word boundaries in four dialects of Jordanian Arabic. Sixteen native speakers of the 4 dialects provided the production part (four from each dialect). Another 16 trained listeners heard the phrases, and readings were transcribed. The paper reports a number of asymmetries along the dimensions of place, manner, voicing and directionality. These asymmetries are corresponding to earlier typological works in the literature (e.g. Mohanan, 1993; Jun, 1995) and a few which are not. The study presents rich linguistic data, contributing as the basis for a valuable cross-dialectal study of consonant assimilation in JA. Consonant assimilation in the four dialects provides excellent support for the results of some previous studies on assimilation in consonant clusters.

Key words: Arabic dialects; Consonant assimilation; Place; Manner; Voicing

INTRODUCTION
Phonological assimilation (a speech feature resembling another feature in a neighboring segment in less careful speech) has been viewed as a purely linguistic phenomenon (Kohler, 1991 & 1992; Mohanan, 1993; Hansson, 2001; Rose & Walker, 2004, Jun 1995 & 2005, and many others). Phonological assimilation occurs either within a word or across words. It may occur between vowels, between consonants, or between vowels and consonants. A wide spectrum of features may be involved in the process such as place, manner, voicing, vowel height, vowel rounding, and nasalization. The phenomenon is found in many languages (English, Arabic, Catalan, Korean, and many other languages). Assimilation is accounted for by underspecification theory, by feature geometry, and by generative phonology. In OT, it is viewed as the competition between Faithfulness and Markedness constraints for both articulatory and perceptual constraints, see Steriade (1995, 2001), Myers (1997), and Boersma (1998). The purpose of the current study is to demonstrate that a complete account of assimilation is supposed not only to include all factors governing the linguistic process to occur and to be licensed, but also to specify when the blocking process may occur. In this study, we examine consonant place assimilation together with voicing and emphasis in four different regional dialects of Jordanian Arabic (JA). The main goal of the paper is to present a comprehensive data source for the assimilation behavior in the language. Although it is not possible to draw neat boundaries within Jordanian Arabic, it consists of four regional dialects: Ammanian Dialect (AD) is spoken in the capital city by almost 2 million people who are dialectally analogous to Palestinian Arabic, RNUD is spoken by another 2 million people who are considered native village dwellers especially in the northern part of the country, GD is spoken by black farmers, almost 1 million, in the Jordan valley area, and BD is spoken by nomadic tribes, 1 million, in the desert area from the northern to southern side.
1. **METHOD AND DATA**

To investigate the patterns of consonant assimilation in JA, the researchers created phrases that represent all \( C_1C_2 \) combinations (\( C_1 \neq C_2 \)) across word-boundaries. Given that JA has 28 consonants, and [j] and [w] do not occur in word-final position, there are a total of \((28-2)*(28-1)=702 \) phrases for each dialect. All \( C_1C_2 \) clusters are intervocalic. Since the four dialects may differ in the lexicon, other phrases were constructed when needed. BD, for instance, breaks consonant cluster by inserting [rn] suffix at the end of some nouns but not in the possessive structure (of-structure) and not in verbs - this required using different phrasal structure.

Four native speakers (2 males and 2 females) from each dialect (AD), (RNUD), (GD), and (BD) produced the phrases and stimuli were recorded. The judgment of whether assimilation has occurred is made by 4 native listeners from each dialect, too. Participants were asked to read the list of phrases at a normal speaking rate and to repeat the phrase three times. Assimilation was considered present only if the percentage of assimilated tokens exceeded 60%. When assimilation occurs, we provide data for each dialect. But if they all agree not to assimilate, only RNUD will be illustrated. In the following two sections, we report the results for stem-stem assimilation. Data will depend mainly on (RNUD) since it is spoken by the native village dwellers and is totally independent from Palestinian Arabic. Yet, if other dialects show any differences in the patterns from the one found in (RNUD), they will be illustrated in relevant sections. We hypothesize that similar assimilation patterns across dialects are consistent with typological constraints and divergence across the four dialects is caused by speech rate since it is considered to be an important difference across JA dialects. One phonetic feature common to all Arabic dialects is the presence of the so-called emphatic consonants, written here as [ær]. These consonants are produced with a secondary constriction in the posterior vocal tract (Lehn 1963, Al-Ani 1970, Card 1983, Davis 1995, Zawaydeh 1999, Watson 2002, among others).

1.1 \( C_1 \)=noncoronals and \( C_2 \)=coronal

1.1.1 Place Assimilation

Labials and dorsals are never targeted by coronals for place assimilation in RNUD, GD, AD, and BD1 (with nouns) and BD2 (with verbs) as shown by the following examples:

\[ \text{D1.} \]

- RNUD: /kalaam naaғirs/ ['incomplete speech']
- GD: /tʃalaam naaғirs/ ['incomplete speech']
- AD: /kalaam naaғirs/ ['incomplete speech']
- BD: /tʃalaamın naaғirs\textsuperscript{ın}/ ['incomplete speech']

\[ \text{D2.} \]

- [kalaam naaғirs]

\[ \text{D3.} \]

- [kalaam taarixi]

\[ \text{D4.} \]

- [kalaam safih]

\[ \text{D5.} \]

- [falaf naadʒı̈ h]

\[ \text{D6.} \]

- [falaf naaғı̈ m]

\[ \text{D7.} \]

- [falaf trı̈ ʒaari]

\[ \text{D8.} \]

- [falaf saaxın]

\[ \text{D9.} \]

- [galb daafi]

\[ \text{D10.} \]

- [silı̈ k taaɫı̈ f]

\[ \text{D11.} \]

- [malı̈ k daahjı̈]

\[ \text{D12.} \]

- [farg saaʃı̈ t]

\[ \text{D13.} \]

- [harb sahil]

1.1.2 Voicing Assimilation

Labials and dorsals are never targeted by coronals for voicing assimilation, as illustrated by examples D3-D6 and D11-D13. This is also true for other dialects.

1.1.3 Emphasis Assimilation

Unsurprisingly, labials and dorsals, also true for other dialects, are never targeted by coronals for emphasis assimilation, as emphatic labials and dorsals are not part of JA’s consonant inventory. This is shown in D14-D15.

\[ \text{D14.} \]

- [kalaam s’abi] ['a boy’s speech']

\[ \text{D15.} \]

- [sarag s’abi] ['he rubbed a boy']

1.2 \( C_1 \) and \( C_2 \)=noncoronals

1.2.1 Place Assimilation

Place assimilation does not occur if the two adjacent consonants are both noncoronals. This is shown in D16-D21.

\[ \text{D16.} \]

- [hag yanamı̈ tı̈ n] ['the price of a goat']

\[ \text{D17.} \]

- [hag yanamı̈ ] ['the price of a goat']

\[ \text{D18.} \]

- [ha’ yanamı̈ ] ['the price of a goat']

\[ \text{D19.} \]

- [hag yanamı̈ tı̈ n]
The price of a goat

More examples on adjacent noncoronals from RNUD:
D17. /galb gaasi/  [galb gaasi]  ‘a ruthless heart’
D18. /faraay kulli/  [faraay kulli]  ‘a full blankness’
D19. /hub faani/  [hub faani]  ‘a fading love’
D20. /raf baali/  [raf baali]  ‘a shabby shelf’
D21. /srlrk baali/  [srlrk baali]  ‘a smashed wire’

1.2.2 Voicing Assimilation

If two adjacent noncoronal sounds differ only in voicing, they undergo voicing assimilation. But when they differ in any other features, then voicing assimilation is blocked. The non-application of voicing assimilation is illustrated by examples D18-D21. Voicing assimilation is shown in D22-D23.

D22.
RNUD: /hag kaamrl/  [hak kaamrl]  ‘a complete right’
GD: /hag tʃaaml/  [hag tʃaaml]  ‘a complete right’
AD: /haʔ kaamrl/  [haʔ kaamrl]  ‘a complete right’
BD: /hagṛn tʃaamlɛn/  [hagṛn tʃaamlɛn]  ‘a complete right’
BD2: /marag kamrl/  [marak kamrl]  ‘Kamil passed by’

D23.
RNUD: /tʰax yanamɛ/  [tʰay yanamɛ]  ‘he shot a goat’
GD: /tʰax yanama/  [tʰay yanama]  ‘he shot a goat’
AD: /tʰax yanamɛ/  [tʰay yanamɛ]  ‘he shot a goat’
BD: /tʰax yɛnɛtɛn/  [tʰay yɛnɛtɛn]  ‘he shot a goat’

1.2.3 Emphasis Assimilation

Given that emphatic labials and dorsals are not part of JA’s consonant inventory, emphasis assimilation is not relevant here.

1.3 C1=coronal and C2=noncoronal

1.3.1 Place Assimilation

When C1 is a coronal nasal /n/, it assimilates in place to a following labial or velar stop (oral or nasal), as shown in examples D24-D27. This occurs in all dialects except for AD and in the case of nouns ending with /In/ in BD.

D24.
RNUD: /tin baladi/  [tim baladi]  ‘local fig’
GD: /tin baladi/  [tim baladi]  ‘local fig’

D25. /den majjit/  [dem majjit]  ‘a dead loan’

More examples from RNUD:
D26. /laban kamrl/  [laban kamrl]  ‘Whole yogurt’
D27. /dʒb̪r̪ɡ gaasi/  [dʒb̪r̪ɡ gaasi]  ‘solid cheese’

In all dialects, a coronal nasal /n/ does not assimilate in place to a following fricative, as shown in D28-D29, illustrations are from RNUD.
D28. /laban fawwaːr/  [laban fawwaːr]  ‘a boiling yogurt’
D29. /den xaːraːn/  [den xaːraːn]  ‘a lost loan’

Unsurprisingly, /n/ does not assimilate in place to a following pharyngeal /h/ or /ʔ/, as a pharyngeal nasal is articulatorily impossible. This is shown in D30-D31.
D30. /laban haami/  [laban haami]  ‘a very hot yogurt’
D31. /laban ɣaad/  [laban ɣaad]  ‘a plain yogurt’

Coronal plosives /t, d, t̪, d̪/ do not assimilate in place to a following labial nasal as seen in D40-D41, but not to a velar plosive, as in D32-D39. And as we can see in D33-D35, voicing and emphasis assimilation also occur concomitantly when place assimilation occurs. But this does not occur in AD and BD. Notice that JA does not have a velar nasal /ŋ/ underlyingly.

D32.
RNUD: /samaad baladi/  [samaab baladi]  ‘national fertilizer’
GD: /samaad baladi/  [samaab baladi]  ‘national fertilizer’
AD: /samaad baladi/  [samaad baladi]  ‘national fertilizer’
BD: /smaadɛn baladi/  [smaadɛn baladi]  ‘national fertilizer’
BD: /fargdʰɾd frid/  [fargdʰɾd frid]  ‘sit down far-off’

More examples from RNUD
D33. /zet baladi/  [zeb baladi]  ‘a local oil’
D34. /mat’aːt baladi/  [mat’aːab baladi]  ‘national rubber’
D35. /bedɛ baladi/  [beb baladi]  ‘local eggs’
D36. /bet karim/  [bet karim]  ‘a generous family’
Voicing Assimilation

Voice assimilation between a coronal \( C_1 \) and a noncoronal \( C_2 \) occurs on condition that \( C_1 \) assimilates in place to \( C_2 \). This is illustrated by examples D33-D34. Given that place assimilation only occurs when both \( C_1 \) and \( C_2 \) are oral stops, this observation is in line with the generalization that voicing assimilation only occurs when all other surface features of the two consonants are identical (cf. §1.2.2). The only underlying feature that may differ between \( C_1 \) and \( C_2 \) without blocking voicing assimilation is emphasis. See §1.3.3 on emphasis assimilation below.

1.3.3 Emphasis Assimilation

Emphasis assimilation also only occurs between a coronal \( C_1 \) and a noncoronal \( C_2 \) when place assimilation also occurs. Therefore, similarly to voicing assimilation, emphasis assimilation only occurs when all other surface features of the two consonants are identical. Given that only coronal consonants can be emphatic, the emphasis assimilation here equates de-emphasis.

1.3.4 Interim Summary

Before delving into the more complex assimilation patterns between two coronals, we summarize the patterns of place assimilation seen so far. There are clear asymmetries regarding both triggers and targets along the dimensions of place and manner, and they are generally in line with the implicational hierarchies of Mohanan’s and Jun’s. These asymmetries are summarized in (1)-(5).

(1) Target manner:
   a. Nasals are more likely targets than stops.
   b. Stops are more likely targets than fricatives and nonnasal sonorants.

(2) Target place:
   Coronals are more likely targets than noncoronals.

(3) Trigger manner:
   a. Stops are better triggers than nasals.
   b. Nasals are better triggers than fricatives.

(4) Trigger place:
   a. Labials are better triggers than velars.
   b. Velars are better triggers than coronals.

(5) Position of target:
   \( C_2 \) assimilates to \( C_2 \).

As we can see, these asymmetries are generally consistent with the implicational hierarchies established by Mohanan (1993) and Jun (2005). Two patterns not predicted by, but also not in conflict with, the existing implicational statements are that nasals are better triggers than fricatives, and that labials are better triggers than velars. Jun (2005) does not commit to a comparison between nasals and fricatives or between labials and velars in their ability to trigger place assimilation. Neither Mohanan’s nor Jun’s works discuss patterns of what we call “minor place assimilation”—assimilation between two coronal consonants that differ slightly in place, e.g., alveolar vs. palatoalveolar. The following section discusses cases of minor place assimilation in JA. To preview the findings, we show that (a) place assimilation is more likely to happen when the sonorancy of the two consonant matches; (b) there are a number of asymmetries regarding triggers and targets of place assimilation; and (c) voicing and emphasis assimilation occur when the places of the two consonants
are identical, either underlyingly or as a result of minor place assimilation.

1.4 C1 and C2-coronals

1.4.1 Place Assimilation

Now we will consider coronal sounds from three different passive articulators: interdental, alveolar, and palatoalveolar. If two adjacent coronal sounds do not agree in sonorancy, no assimilation occurs. If the adjacent coronals agree in sonorancy, minor place assimilation occurs—which triggers voicing and emphasis assimilations, rendering the two coronals identical. Total assimilation involves the opposite where nasals trigger assimilation in nonnasals (RNUD and GD). This occurs in AD and BD. However, the process also involves the opposite where nasals trigger assimilation in nonnasals (RNUD and GD).

Within sonorants, nonnasals trigger total assimilation of the nasal /n/, but not vice versa, as shown in D65-D66. This occurs in AD and BD. However, the process also involves the opposite where nasals trigger assimilation in nonnasals (RNUD and GD).

Within nonsonorants, nonstridents assimilate to stridents (D67-D71), but not vice versa (D72-D76). Assimilation is total in that minor place assimilation is accompanied by both emphasis assimilation (D69) and voicing assimilation (D71). The process is clear in RUND and GD. In AD allophonic changes block the process where /θ/ becomes /t/ or /s/ and /ð/ becomes /d/. The process doesn’t occur in BD.

Examples D55-D60 show that when two coronals disagree on sonorancy, no assimilation takes place and this applies to the four dialects.

D55. /s’aar ʃab/ ‘he became a chap’
D56. /ʃaʃ raasi/ ‘bandage for head’
D57. /tin dʒabali/ ‘mountain’s figs’
D58. /s ardʒ naajım/ ‘a soft saddle’
D59. /l el daafi/ ‘a warm night’
D60. /ward laamrʃ/ ‘shining roses’

Within sonorants, nonnasals trigger total assimilation of the nasal /n/, but not vice versa, as shown in D61-D64.

Examples D61-D64 illustrate these generalizations in turn below.

Now w...
Within stridents, alveolars assimilate to palatoalveolars (D77-D78), and vice versa (D79-D80). This occurs in RNUD and GD but not in AD nor in BD. Notice that in D78, voicing and emphasis assimilation occur concurrently with place assimilation; moreover, since JA does not have /ʒ/ and /tʃ/, assimilation of the [continuant] feature is forced by structure preservation in D78.

D77.  
RNUD /kaaʃ ʃaraab/  
/kaaʃ ʃaraab/  
‘a glass of juice’
GD /kaaʃ ʃaraab/  
/kaaʃ ʃaraab/  
‘a glass of juice’
AD /kaaʃ ʃaraab/  
/kaaʃ ʃaraab/  
‘a glass of juice’
BD /kaaʃ ʃaraab/  
/kaaʃ ʃaraab/  
‘a glass of juice’
D78. /xalaʃ ʒ3rdal/  
/xaladʒ ʒ3rdaal/  
‘enough of dispute’
D79.  
RNUD /ʃaaʃ saalim/  
/ʃaaʃ saalim/  
‘whole tissue’
GD /ʃaaʃ saalim/  
/ʃaaʃ saalim/  
‘whole tissue’
AD /ʃaaʃ saalim/  
/ʃaaʃ saalim/  
‘whole tissue’
BD /ʃaaʃ saalim/  
/ʃaaʃ saalim/  
‘whole tissue’

Within palatoalveolar stridents, the fricative /ʃ/ assimilates completely to the affricate /ʒ/, and vice versa in both RNUD and GD, as in D81-D82. In AD, /ʒ/ is always pronounced /ʒ/.
D81.  
RNUD /baaʃ dʒ3rdaal/  
/balaadʒ ʒ3rdaal/  
‘stop disputing’
GD /baaʃ dʒ3rdaal/  
/balaadʒ ʒ3rdaal/  
‘stop disputing’
AD /baaʃ ʒ3rdaal/  
/balaadʒ ʒ3rdaal/  
‘stop disputing’
BD /dʒat əaanya/  
[dʒaθ əaanya]  
‘she came again’

Within nonstrident obstruents, all segments are triggers and targets of total assimilation (place, voice, and emphasis), as shown in D83-D98. We also observe the assimilation of [continuant] due to structure preservation in all these data. In AD, nonstrident obstruents are pronounced with a sibilant allophone.
D83.  
RNUD /bet əaani/  
[beθ əaani]  
‘a second house’
GD /bet əaani/  
[beθ əaani]  
‘a second house’
AD /bet t/s aani/  
[bet t/s aani]  
‘a second house’
BD /dʒat əaanya/  
[dʒaθ əaanya]  
‘a second house’
D84. /haraaʃ taʃbaan/  
[harrata taʃbaan]  
‘a tired farmer’
D85. /rad dəalil/  
[rad dəalil]  
‘a weak answer’
D86. /malaaθ daaʃi/  
[malaad daafi]  
‘a warm shelter’
D87. /arəd d’aawjr/  
[ard d’aawjr]  
‘a glowing land’
D88. /bedə əaamir/  
[beθ əaamir]  
‘small eggs’
D89. /dʒaat əumu/  
[dʒaθ əumu]  
‘a garlic-full dish’
D90. /gararaaʃ əaalmr/  
[gararaad əaalmr]  
‘unfair decisions’
D91. /ʃartə əaahir/  
[ʃarə əaahir]  
‘a clear provision’
1.4.2 Voicing and Emphasis Assimilation

As we have seen in the previous section, when C1 and C2 are both coronal obstruents, voicing and emphasis assimilation occur if minor place assimilation also occurs. The following data exemplify the application of voicing and emphasis assimilation when the places of the two consonants are identical underlyingly.

D99. RNUD/bas zalamI/ [bas zalamI] ‘but he is a man’
GD /bas zalamI/ [bas zalamI] ‘but he is a man’
AD /bas zalamI/ [bas zalamI] ‘but he is a man’
BD /raas zalamI/ [raaz zalamI] ‘a head of a man’
D100. /hirz saalIIm/ [hirz saalIIm] ‘a complete slice’
D101. /nus s’alIIm/ [nuz zalamI] ‘half a man’
D102. /xubIrI s’aad3/ [xubrs’ s’aad3] ‘a traditional bread’
D103. /nus s’alIIm/ [nus saalIm] ‘half safe’
D104. /bas s’ajjaad/ [bas’ s’ajjaad] ‘but he is a hunter’
D105. /bet t’awaabIrI/ [bet’ t’awaabIrI] ‘a multi-level house’
D106. /balad d’abaab/ [balad’ d’abaab] ‘a country of fog’

D107.

1.4.3 Interim Summary

When C1 and C2 are both coronals, we have observed that minor place assimilation only occurs when the sonorancy of the two consonants matches, and that there are the following asymmetries regarding targets and triggers:

(6) Target manner:
   a. Nasal sonorants are more likely targets than nonnasal sonorants.
   b. Nonstridents are more likely targets than stridents.
   c. Fricatives are more likely targets than affricates.

(7) Target place:
   a. Alveolars are more likely targets than palatoalveolars.
   (8) Trigger manner:
   a. Nonnasal sonorants are more likely triggers than nasal sonorants.
   Stridents are more likely triggers than nonstridents.
   b. Affricates are more likely triggers than fricatives.
   (9) Trigger place:
   a. Palatoalveolars are better triggers than alveolars.

(10) Position of target:
   c1 assimilate to c2.

Regarding voicing and emphasis assimilation, the generalization is the same as other C1C2 combinations: they occur provided that both C1 and C2 are obstruents and that they share the same place of articulation, either underlyingly or due to place assimilation.

1.5 DISCUSSION

The focus on Jordanian dialects facilitated examination of detailed data presenting adequate illustration of cases of assimilation consistent either with the phonological theory or with the sociolinguistic account of variation in speech rate. On one hand, there are assimilation patterns consistent with the established implicational hierarchies in Jun (2005) and Monahan (1993). On the other hand, there are cases where assimilation patterns are not present in all dialects. First, if C1 is a coronal nasal /n/, it harmonizes in place to a next labial or velar stop (oral or nasal in all dialects put aside AD in the case of nouns ending with /tn/ in BD). Second, Coronal plosives /t, d, t’/d’/ harmonize in place to a next labial plosive, but not to a velar plosive. However, this does not occur in both AD and BD. Third, within sonorants, nasals trigger in total assimilation of the nasal /n/, but not vice versa in AD and BD. In RNUD and GD, however, the process involves the contrary where nasals trigger assimilation in nonnasals.
Fourth, within nonsonorants, nonstridents harmonize with stridents, but not vice versa. Assimilation is total in that minor place assimilation is accompanied by both emphasis assimilation and voicing assimilation. The process is clear in RUND and GD. In AD allophonic changes block the process where /θ/ becomes /t/ or /s/ and /D/ changes into /d/. The process doesn’t occur in BD. Fifth, within stridents; alveolars assimilate to palatoalveolars and vice versa. This occurs in RNUD and GD but not in AD nor in BD. And in AD, nonstrident obstruents are pronounced with a sibilant allophone. The implicational hierarchies on regressive place assimilation established by Mohanan’s and Jun’s typological works are regularly present almost across all dialects in Jordan. It has been noticed that assimilation in Jordanian dialects is often conditioned by the similarity between the two adjacent consonants. The phenomenon is that the more similar the two consonants are, the more likely that they will assimilate to become identical. In the present paper, the researchers have presented an inclusive representation of consonantal assimilation in four dialects of Jordanian Arabic. The implicational hierarchies regarding place assimilation established by Mohanan’s and Jun’s typological works generally make the correct predictions in Arabic dialects of Jordan. Moreover, several generalizations give the impression to conflict with the established implicational hierarchies. For instance, AD and BD employ more careful speech than the other two dialects (RUND and GD).

REFERENCES