

Regressive Assimilation of the "t" in Saudi Northern Region Dialect of Arabic (SNRDA): An OT Account

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Abstract

Using Prince and Smolensky (1993) optimality theory, the focus of this paper is to provide an OT account for the total regressive assimilation process of the consonant "t" to the following coronal consonant manifested in Saudi Northern Region Dialect of Arabic (SNRDA). Contra Bakovic's (2005), interestingly, total assimilation takes place between two adjacent consonants and geminates are created; according to Bakovic epenthesis should apply to prevent formation of geminates. This assimilation process is also interesting when we know that other dialects of Arabic, Syrian, Libyan, Cairene, and San'ani, among other dialects, resort to voicing assimilation to avoid the formation of geminates. To account for this process, I will use the constraints: *Agree (feature)* (Beckman (1998) and Lombardi (1999)) and *No Gem* Bakovic (2005), Hall (2003 and 2006) and Rose (2000)) among other interacting marked-ness and faithfulness constraints.

Keyword: Regressive voicing assimilation, prefix "t-", coronal sound "t", Agree (feature), No Gem constraint

1. Introduction

Assimilation is a process in which a sound has become more similar or identical to the neighboring or adjacent influencing sound; for example, in English the sound "t" in the word fat is pronounced as "p" when the sound is followed by a word starting with the sound "p" like the word pig, /fæppɪg/; whereas the sound "n" in the word "in" is pronounced as "m" when the word is followed by a word starting with the sound "p" like the word place, /implies/; in the first example, assimilation is total whereas in the second example, it is partial. Moreover, assimilation can be regressive and it can be progressive; in the former, the following sound influences the preceding sound whereas in later, it is the preceding sound is the influencing sound. In both English examples given above, we have regressive assimilation. However, in the word pigs, the preceding voiced sound "g" influences the following voiceless sound "s"; that is why the sound "s" changes to "z"; thus, this type of assimilation is referred to as progressive assimilation, (Gimson, 1970) and (Roach, 2002)).

Using Prince and Smolensky (1993) optimality theory, this paper aims to provide an optimality theoretical (OT) account of a regressive assimilation process manifested in Saudi Northern Region Dialect of Arabic (henceforth SNBDA); in this dialect, the coronal consonant "t" assimilates to the following coronal non-sonorous consonant. The data interesting for two reasons, first, it shows that it is not only the coronal consonant of the second person or the third person feminine (singular or plural) in the imperfective tense "t-" in Arabic assimilates to the following coronal non-sonorous consonant in voicing Elgadi (1986), Harrama (1993), Abdunnabi (2000), and Elramli (2012) but also the consonant "t" surfacing in all positions including word boundaries assimilates totally to the following coronal non-sonorous consonant in voicing, place and manner.

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Voicing/palatalization Assimilation in Lithuanian voiceless non palatalized

- | | | | |
|-------------------------------|---------------|-------------------|--------------|
| 3. at-ko:pit̪i | “to rise” | ap-kal̪biet̪i | “to slaner” |
| voiced non palatalized | | | |
| 4. ad-gaut̪i | “to get back” | ab-gaut̪i | “to deceive” |
| voiceless palatalized | | | |
| 5. at̪i-p̪jaut̪i | “to cut off” | ap̪i-t̪iem̪di:t̪i | “to obscure” |
| voiceless palatalized | | | |
| 6. adi-biek̪t̪i | “to run up” | abi-g̪i:di:t̪i | “to heal” |

That is to say, in Lithuanian, epenthesis takes place to avoid adjacent identical consonants or adjacent consonants unassimilated for voicing or palatalization. To get adjacent assimilated consonants for voicing or palatalization results in regressive assimilation except when the result of applying regressive assimilation would jeopardize the avoidance of adjacent identical consonants by creating adjacent identical consonants; in such a case, assimilation is blocked and vowel epenthesis is triggered instead. Again, as for English past tense alternates, the two constraints Agree [voi] and NoGem thus jointly ensure the optimality of the epenthetic candidate [at̪i], which violates the lower ranked faithfulness constraint Dep (V). Next, I will present the data under discussion; contra to Backovic’s, interestingly, in this dialect, total assimilation takes place between two adjacent consonants and geminates are created; according to Bakovic’s analysis, epenthesis should apply to prevent formation of geminates. But before doing so, I include the following two tables of the vowels and consonants inventories found in the dialect.

Phonemes inventories

Table 1: Consonant inventory

Manner ↓	Place→	Labial	Labio dental	interdental	Dental		Post-alveolar	Palatal	Velar	Uvular	Pharyngeal	Glottal
					Plain	Emphatic						
Plosive		b			t d	T ط D			k ² g	q ³		ʔ
Fricative		f		θ ð	s z	S ص Z	ʃ ⁴ dʒ		x ɣ		ħ ʕ	h
(Central) approximant		w					r	j				
(Lateral) approximant					l							
Nasal		m					n					

Table 2: Vowel Inventory

	Front		Central		Back			
					Rounded		Unrounded	
	Tense	lax	Tense	lax	Tense	lax	Tense	lax
High	ii	i			uu	u		
Mid								
Low			aa	a				

² The consonant “k” in certain phonological environments is fronted and affricated as “ts”.
³ The consonant “q” is phonetically released as the voiced velar stop variant [g], however, in certain phonological environments the “q” is fronted and affricated as voiced alveolar affricated variant [dʒ].
⁴ The consonant “ʃ” in certain phonological environments is fronted and affricated as “ts”.

Now, let us turn to the data under investigation. In SNRDA, the consonant "t" in all positions including word boundaries totally assimilates to the following coronal non-sonorous sounds in voicing, place and manner. See the following tables.

Table 3: Assimilation of the "t" in the Pro-clitic Imperfective Tense to Coronal Non-sonorous Sounds

The sound	Input	Output	The meaning
t	?it- tarrix	?it- tarrix	To record
θ	?it- θaaʃir	?iθ- θaaʃir	To talk much
ɖʒ	?it- ɖʒariħ	?iɖʒ- ɖʒariħ	To hurt
d	?it- daafiʕ	?id- daafiʕ	To defend
ð	?it- ðawwib	?ið- ðawwib	To melt
z	?it- zuur	?iz- zuur	To visit
s	?it- sallim	?is- sallim	To salute
ʃ	?it- ʃammis	?iʃ- ʃammis	To sunshine
S	?it- SaTir	?iS- SaTir	To slap
Z	?it- ZarriT	?iZ- ZarriT	To defecate
T	?it- Taalib	?iT- Taalib	To complain
D	?it- Daahir	?iD- Daahir	To demonstrate

We could see from table (3) that there is total regressive assimilation of the "t" to the following coronal non-sonorant consonants; it is clear, contra to Bakovic (2005), that total assimilation takes place between two adjacent consonants and geminates are created although according to Bakovic's epenthesis should apply. However, this total assimilation is not attested when the consonant "t" is followed by sonorant and non-coronal consonants.

Table 4: No Assimilation of the "t" in the Pro-clitic Imperfective Tense to Sonorant and Non-coronal Sounds.

The sound	Input	Output	The meaning
?	?it- ?amil	?it- ?amil	To hope
b	?it- ballil	?it- ballil	To wet
ħ	?it- ħamil	?it- ħamil	To carry
x	?it- xarrim	?it- xarrim	To punch
r	?it- raDiʕ	?it- raDiʕ	To nurse
ʕ	?it- ʕammir	?it- ʕammir	To build
χ	?it- χaazil	?it- χaazil	To wink
f	?it- fassir	?it- fassir	To explain
q	?it- qaatil	?it- qaatil	To fight
k	?it- kallim	?it- kallim	To speak
l	?it- laʕin	?it- laʕin	To curse
m	?it- maħiʔ	?it- maħiʔ	To whip
n	?it- nammi	?it- nammi	To raise
h	?it- hanni	?it- hanni	To congratulate
w	?it- walwil	?it- walwil	To yell
j	?it- jassir	?it- jassir	To ease

We could see from table (4) that regressive assimilation of the "t" to the following sonorant and non-coronal consonants does not take place. In the same dialect, the coronal consonant "t" also totally assimilates to the following coronal non-sonorant sounds in other pro-clitics, the "t" in the pro-clitic used in passivizing verbs and the "t" in the pro-clitic "mit" used in deriving past participial adjectives. However, regressive assimilation is not attested when the coronal "t" in both pro-clitics is followed by sonorant and non-coronal sounds. See tables(5), (6), (7) and (8) below.

Table 5: Assimilation of the "t-" in the Pro-clitic Used in Passivizing Verbs to Coronal Non-sonorous Sounds.

The sound	Input	Output	The meaning
t	?it- taaxaθ	?it- taaxaθ	was taken
θ	?it- θalladʒ	?iθ- θalladʒ	was frozen
ɖʒ	?it- ɖʒallax	?iɖʒ- ɖʒallax	was scratched
d	?it- dibaxɣ	?id- dibaxɣ	was hit
ð	?it- ðawwab	?ið- ðawwab	was melt
z	?it- zinaq	?iz- zinaq	was surrounded with
s	?it- sadd	?is- sadd	was stopped
ʃ	?it- ʃam	?iʃ- ʃam	was smelled
S	?it- Sab	?iS- Sab	was poured
Z	?it- Zab	?iZ- Zab	was hidden
T	?it- Tallaq	?iT- Tallaq	was divorced
D	?it- Dahhar	?iD- Dahhar	was demonstrated

Table 6: No Assimilation of the "t-" in the Pro-clitic Used in Passivizing Verbs to Sonorant and Non-coronal Sounds.

The sound	Input	Output	The meaning
?	?it- ?assis	?it- ?assis	was established
b	?it- ballal	?it- ballal	was wet with water
h	?it- ʰaffaz	?it- ʰaffaz	was given incentives
x	?it- xarram	?it- xarram	was punched
r	?it- raDaʕ	?it- raDaʕ	was nursed
ʕ	?it- ʕammar	?it- ʕammar	was built
χ	?it- χaffaS	?it- χaffaS	was crashed
f	?it- fassar	?it- fassar	was explained
q	?it- qattal	?it- qattal	was killed
k	?it- kammam	?it- kammam	was masked
l	?it- laʕan	?it- laʕan	was cursed
m	?it- maħaT	?it- maħaT	was whipped
n	?it- namma	?it- namma	was raised
h	?it- hanna	?it- hanna	was congratulated
w	?it- wallaʕ	?it- wallaʕ	was lighted
j	?it- jassar	?it- jassar	was made easy

Table 7: Assimilation of the "t-" in the Pro-clitic "mit" Used in Deriving Past Participial Adjectives to Coronal Non-sonorous Sounds.

The sound	Input	Output	The meaning
t	mit- tarrix	mit- tarrix	is recorded
θ	mit- θawwir	miθ- θawwir	is fired
ɖʒ	mit- ɖʒarriħ	miɖʒ- ɖʒarriħ	is wounded
d	mit- darriʕ	mid- darriʕ	is shielded
ð	mit- ðammin	mið- ðammin	is priced
z	mit- zahhil	miz- zahhil	is gotten ready
s	mit- sabbik	mis- sabbik	is fixed
ʃ	mit- ʃammis	miʃ- ʃammis	is sun shined
S	mit- SaTar	miS- SaTar	is slapped
Z	mit- Zabbir	miZ- Zabbir	is piled up
T	mit- Tawwi	miT- Tawwi	is twisted
D	mit- Dahhir	miD- Dahhir	is demonstrated

Table 8: No Assimilation of the "t-" in the Pro-clitic "mit" Used in Deriving Past Participial Adjectives to Sonorant and Non-coronal Sounds.

The sound	Input	Output	The meaning
ʔ	mit- ʔamil	mit- ʔamil	is hoped
b	mit- ballil	mit- ballil	is wet
h	mit- ʔamil	mit- ʔamil	is tolerated
x	mit- xarrim	mit- xarrim	is punched
r	mit- raDiʕ	mit- raDiʕ	is nursed
ʕ	mit- ʕammir	mit- ʕammir	is built
χ	mit- χayyir	mit- χayyir	is changed
f	mit- fasir	mit- fasir	is uncovered
q	mit- qaatil	mit- qaatil	is fought
k	mit- kammil	mit- kammil	is finished
l	mit- laʕan	mit- laʕan	is cursed
m	mit- mahiT	mit- mahiT	is whipped
n	mit- nammi	mit- nammi	is raised
h	mit- handdim	mit- handdim	is tidied up
w	mit- wayyil	mit- wayyil	Yelled
j	mit- jassir	mit- jassir	is available

Moreover, total assimilation of the "t" to the following coronal non-sonorant sounds also applies acrossword boundaries. See the following table.

Table 9: Assimilation of the Coronal Sound "t" to Coronal Non-sonorous Sounds across Word Boundaries

The sound	Input	Output	The meaning
t	lait- taxara ḏ ʒ	lait- taxara ḏ ʒ	I hope you graduate.
θ	ʃarait- θyaab	ʃaraiθ-θyaab	I bought clothes.
ḏʒ	ʃift- ḏʒaditi	ʃifḏʒ- ḏʒaditi	I saw my grandma.
d	mut- duunaha	mud- duunaha	Die because of it.
ō	baχait- ōminih	baχaiō- ōminih	I want its price.
z	riħt- zahran	riħz- zahran	I went to Zahran.
s	bait- sabbaak	bais- sabbaak	A plumber's house
ʃ	bait- ʃams	baiʃ- ʃams	A sun house
S	faat- SaTar	faaS- SaTar	He entered slapping.
Z	walʕaadiat- Zabha	walʕaadiaZZabha	By the steeds that run.
T	maat- Taahir	maaT- Taahir	Taahir died.
D	kaanat- Dalimah	kaanaD- Dalimah	It was unjust.

We could see from table (9) that total regressive assimilation of the "t" applies across word boundaries. However, total regressive assimilation of the "t" is not attested word internally. See the two examples in table 10 below.

Table 10: NoAssimilation of the "t-" Word-Internally.

The sound	Input	Output	The meaning
ʃ	fatʃuu	fatʃuu	Do search.
ḏʒ	matḏʒar	matḏʒar	Shop.

We could see from table (10) that the coronal sound "t" does not assimilate to the following non-sonorant coronal sounds word internally. From the tables, one can conclude that the coronal sound "t" always fully assimilates to the following coronal non-sonorous sounds in all positions except word-internally. Before providing an OT account of the data here, next, I review the literature on the regressive "t" assimilation in other dialects of Arabic.

4. Assimilation of the Coronal Non-sonorous Sound "t" in Other Dialects of Arabic

The imperfective prefix "t-" has been investigated by a number of ancient Arab grammarians; the two well know Arabic linguists, Sibawayh (1975) and Ibn Jinni (1954), state that when this imperfective prefix is attached to a consonant-initial verb a vowel is inserted; this is because in classical Arabic the complex onset is not tolerated.

Table 11: The Imperfective Prefix "t" and Vowel Insertion

Input	Output	The meaning
t-drus-u	tadrusu	"You (mas. sing.) learn."
t-darris-u	tudarrisu	"You (mas. sing.) teach."
t-drus-e	enatadruseena	"You (fem.sing.) learn."
t-darris-e	enatudarriseena	"You (fem.sing.) teach."
t-drus-a	anitadrusaani	"You (two persons) learn"
t-darris-a	anitudarrisaani	"You (two persons) teach"
t-drus-u	unatadrusuuna	"You (mas.pl.) learn"
t-darris-u	unatudarrisuuna	"You (mas.pl.) teach"
t-drus-n	atadrusna	"You (fem.pl.) learn"
t-darris-n	atudarrisna	"You (fem.pl.) teach"
t-drus-u	tadrusu	"She teaches."
t-darris-u	tudarrisu	"She teaches."

We could see from table (11) that in the vowel "a" or "u" is epenthesized between the imperfective prefix "t-" and the first consonant in the following verb. The vowel "a" or the vowel "u" is used depending on the verb used. Anees (1975) shows that the consonant "t" in Arabic verbs changes into one of the velarized consonants /S, Z, T, and D/ depending on the neighboring influencing sound; (See al-Saygh (1998) for the same phonological change).

Barry and Teifour (1999) and Teifour (1997) studying obstruent clusters voicing assimilation in informal Syrian Arabic give the following example for regressive voicing assimilation of the "t" to the following sound; (see also Cowell (2005) who argued for the same regressive assimilation in Syrian Arabic):

7. /ʃare:tda:r/ → [ʃare:dda:r] (Barry and Teifour, 1999)

(7) shows that regressive voicing assimilation takes place across word boundaries in Syrian Arabic.

Watson (2002) investigating Cairene and San'ani dialects of Arabic states that "plain coronal stop assimilates the feature of a following marked coronal obstruent" a process that is attested in both dialects of Arabic; for example, in Cairene, an underlying voiceless obstruent assimilates voice from a following voiced obstruent with the phonological words.voicing assimilation may also occur across phonological words. However, assimilation does not take place before sonorants.

8. a. yitsabbanyissabban "he soaps h.s." (Watson, 2002)
 b. k+d > gd /yikdib/ yigdib "he lies."
 c. s+z > χz /maxzan/ maxχzan "store"

We could see from (8a,b and c) that there is regressive voicing assimilation of the voiceless obstruent sounds including the sound "t" to the following voiced sounds. (I will not say anything about this regressive voicing assimilation of other voiceless sounds since it is not attested in the dialect under investigation).

Elramli (2012) studying the prefix “*t-*” in Misrata Libyan Arabic, shows that the prefix acquires its voicing from an initial voiced consonant of the verb stem to which it is prefixed to.

- | | | |
|--------------------|--------------------------|-----------------|
| 9. a. t-zuurdzuur | “You/she visit(s).” | (Elramli, 2012) |
| b. t-zakkidzakki | “You/she give(s) sakat.” | |
| c. t-gaabildgaabil | “You/she meet(s).” | |

To support his point, Elramli cites a number of works done in different dialects of Arabic where the same regressive voicing assimilation process takes place, Elgadi (1986), Harrama (1993) and Abdunnabi (2000). Harrama (1993) investigating the al-Jabal al-Garbi dialect of Libyan Arabic, assumes that there is a process of syncopization. For him, underlyingly, there is a vowel right after the imperfective prefix “*ti-*”; when this vowel is syncopated, the voicing assimilation between the prefix and the first consonant takes place.

- | | | | | |
|----------------|-------------|-------|--------------------|----------------------|
| 10. a. ti-diff | t-diff | ddiff | “You (m.s.) push.” | (Elramli 2012 p. 39) |
| b. ti-ziid | t-ziiddziid | | “She adds.” | |

In (10a and b), we could see that the vowel is present in the underlying representation; and when it is syncopated, voicing assimilation between the prefix “*t-*” and the following sound takes place. However, when the prefix is followed by a verb with a consonant cluster, the vowel is not deleted just to prevent CCC clusters.

- | | |
|----------------------|-----------------------|
| 11. a. ti-dristidris | “You study.” |
| b. ti-gdirtigdir | “You are capable of.” |

We could see that in (11a and b) the vowel “*i*” is not syncopated. The same process is attested in Jabal “mountain” Libyan Arabic, Abdunnabi (2000); in this dialect, the prefix “*t-*” assimilates to the first consonant of the following verb; the same process is also attested in Tripolitanian Arabic, Elgadi (1986) and in Moroccan Arabic, Almahmakh (1997).

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|--------------------|------------|----------------------|
| 12. a. t-guuldguul | “You say.” | (Elramli 2012 p. 40) |
| b. t-ziididziid | “You add.” | |

In (12a and b), the prefix “*t-*” assimilates to the following voiced sound. Both Elgadi (1986) and Abdunnabi (2000) agree that the prefix “*t-*” does not assimilate to sonorous sounds, *n*, *l*, *r*, *w*, or *j*.

- | | |
|--------------------|-----------------------------------|
| 13. a. t-nuggtnugg | “You nag.” |
| b. t-laagitlaagi | “You meet.” |
| c. t-rattibrattib | “You moisture.” |
| d. t-wazzaṭwazzaṭ | “You/she distribute(s).” |
| e. t-jassirtjassir | “You/she make(s) something easy.” |

In (13a, b, c, d, and e), the “*t-*” does not assimilate to sonorous sounds.

Accounting for the *t*-assimilation in the above dialects and the Misrata Libyan Arabic, Elramli (2012), using Optimality framework of Prince and Smolensky (1993, 2004), and proposes the following marked-ness and faithful constraints:

To account for voicing assimilation of the prefix “*t-*” to the following sound, Elramli uses the following two constraints.

Share (F) > IDENT-IO

Since the dialects he presents do not insert a vowel as a repair strategy to break the prefix "t-" and the following sound and to prevent voicing assimilation, he uses the following two constraints:

DEP-IO > IDENT-IO

To preserve the prefix "t-" and the following sound to which the prefix assimilates from being deleted, he uses the constraints:

MAX-IO > IDENT-IO

To prevent progressive voicing where the first consonant of the stem assimilates to the prefix "t-", he uses the constraints:

IDENT-IO (stem-initial) > IDENT-IO (prefix)

Since the prefix "t-" does not assimilate to the following sonorous sounds, he uses the constraint:

ID PRESONORANT VOICE (IDPRESON VOI)

Therefore, to yield the optimal candidate in Misrata and other dialects he discusses, Elramli comes up with the following ranking.

IDPRESON VOI > Share (F), MAX-IO, DEP (IO), IDENT-(S-I) > IDENT (prefix)

Recall the Saudi data under investigation; although Elramli's (2012) constraints work best to account for voicing assimilation of the imperfective tense "t-" he discusses, the constraints he uses do not work for the data investigated in this paper; for a simple reason; the Saudi data shows total assimilation of the "t" to the following consonant in voicing, place and manner, and it is not only the "t-" used in the imperfective prefix "t-" that assimilates to the following consonant; but it is actually the "t" found in all positions even in word boundaries; this total assimilation of the "t" is only not attested word-internally. To recap, we can say that the sound "t" assimilates either partially or totally to the following sound; partially, it assimilates in voicing; whereas, totally, it assimilates in voicing, place and manner.

Now, in the following section, I provide an OT account for the total regressive assimilation of the "t" in SNBDA; and see if the same ranking could be used to account for the voicing assimilation of the "t" manifested in other dialects of Arabic.

5. OT Constraints and the "t" assimilation

Since the adjacent obstruent in this dialect agree in voice, place, and manner, I assume, following Prince and Smolensky (1993, 2004), that we need the markedness constraint AGREE; however, I will depart from Prince and Smolensky in assuming that this markedness constraint is divided into three AGREE markedness constraints.

AGREE (voi.)

Adjacent Obstruent must agree in voicing.

(Lombardi, (1999) and Flemming, (2008))

AGREE (pl.) (Flemming (2008))

Adjacent Obstruent must agree in place.

AGREE (man.)

Adjacent Obstruent must agree in manner.

Full agreement of the two obstruents form geminates which are universally disfavored; thus, we need the constraint NoGem:

NoGem (Hall (2003) and Rose (2000))
 Geminates are not allowed.

In addition, the following faithful constraints are needed:

IDENT (voi.)

The specification for the feature voice of the input must be preserved in the output.

IDENT (pl.)

The specification for the feature place of the input must be preserved in the output.

IDENT (man.)

The specification for the feature manner of the input must be preserved in the output.

Tableau 1

ʔit- 0uur	Agree voi.	Agree pl.	Agree man.	IDENT voi.	IDENT pl.	IDENT man.	NoGem
ʔiθ- 0uur				*	*	*	*
ʔit- 0uur	*	*	*				

In tableau (1), the faithful candidate *ʔit-0uur* loses out to the assimilated form *ʔiθ-0uur* because the former candidate does not satisfy the highly ranked constraints Agree (voic), Agree (pl.) and Agree (man.).

Since epenthesis is not allowed in this dialect, we need the DEP (V) constraint: DEP (V)

Output segments must have input correspondents. (Kager (1999))

Tableau 2

ʔit- 0uur	DEP V	Agree voi.	Agree pl.	Agree man.	IDENT voi.	IDENT pl.	IDENT man.	NoGem
ʔiθ- 0uur					*	*	*	*
ʔiti0uur	*							

In tableau (2), the candidate *ʔiθ-0uur* wins because it does not violate any of the highly ranked constraints DEP V, Agree (voic), Agree (pl.) and Agree (man.). The candidate *ʔiti0uur* loses out because it violates the constraint DEP V.

To prevent deleting any of the obstruents, we need the constraint MAX (C): MAX (C)

Input segments must have output correspondents. (Kager (1999))

Tableau 3

ʔit- 0uur	MAX C	DEP V	Agree voi.	Agree pl.	Agree man.	IDENT voi.	IDENT pl.	IDENT man.	NoGem
ʔiθ- 0uur						*	*	*	*
ʔi- suur	*					*	*	*	

In tableau (3), the winner *ʔiθ- 0uur* is selected over *ʔi- 0uur* because the latter form does not satisfy the constraint MAX C. Since the assimilation in this dialect is regressive in which the "t" assimilates to the following sound, we need a constraint to prevent the following coronal sound to assimilate to the "t"; the constraint needed is IDENTstem initial (voice, place, and manner):

IDENT stem initial (voice, place, manner) (see Grijzenhout's (2000) with some modification) Voicing, place, and manner specification of segments of the stem must not change.

Tableau 4

ʔit- 0uuur	IDENT stem initial voi.pl.man.	MAX C	DEP V	Agree voi.	Agree pl.	Agree man.	IDENT voi.	IDENT pl.	IDENT man.	NoGem
ʔi0- 0uuur							*	*	*	*
ʔit- tuur	*						*	*	*	

The candidate *ʔit- tuur* loses out to the assimilated form *ʔi0- 0uuur* in tableau (4) because the former violates the highly ranked constraint IDENT stem initial voic.pl.man. Recall that I have given some examples where the coronal non-sonorous consonant "t" does not assimilate to the following consonant word internally; thus, we need the constraint IDENT word-inter.:

IDENT word-inter.

Voicing, place, and manner specification of segments word internally must not change.

This proposed IDENT word-inter. constraint is to insure that obstruents sequence inside the word not at the edges is kept intact.

Tableau 5

matdʒar	IDENT word- inter.	IDENT stem initial voi.pl.man.	MAX C	DEP V	Agree voi.	Agree pl.	Agree man.	IDENT pl.	IDENT voi.	IDENT man.	NoGem
matdʒar					*	*	*	*			
madʒdʒar	*							*	*	*	*

In tableau (5), although the candidate *matdʒar* does not satisfy any of three Agree constraints, it still wins; that is because it does satisfy the highly ranked constraint IDENT word-inter, a constraint which the second candidate *madʒdʒar* does not satisfy.

Now, recall that I have shown that the "t" before the coronal sonorous sounds is persevered; in other words, no assimilation takes place; thus, we need the following constraint.

IDENT (obs-son.)

An obstruent sonorous sound sequence in the input must be persevered in the output.

Tableau 6

ʔit- rafis	IDENT obs.son	IDENT wor.-inter.	IDENT stem initial voi.pl.man.	MAX C	DEP V	Agree voi.	Agree pl.	Agree man.	IDENT voi.	IDENT pl.	IDENT man.	NoGem
ʔit- rafis						*	*	*				
ʔir- rafis	*								*	*	*	*

Although the candidate *ʔir-rafisin* tableau (6) satisfies the three Agree constraints, it still loses out over the faithful candidate *ʔit-rafis*, that is because the former violates the highly ranked constraint IDENT obs.son. which the latter candidate satisfies.

Let us see if the same raking could take care of the “*t*” assimilation across the word boundaries.

Tableau 7

maat- θuuri	IDENT obs.son	IDENT wor.-inter.	IDENT stem initial voi.pl.man.	MAX C	DEP V	Agree voi.	Agree pl.	Agree man.	IDENT voi.	IDENT pl.	IDENT man.	NoGem
maaθ- θuuri									*	*	*	*
maati- θuuri					*							
maa- θuuri				*					*	*	*	
maat- tuuri			*						*	*	*	*

Tableau (7) shows that even across word boundaries and compared to other rival candidates only the candidate *maaθ-θuuri* wins; that is because it satisfies all the highly ranked constraints.

To recap, the following constraints ranking accounts for the total regressive assimilation of the “*t*” to the following coronal non-sonorous sounds in SNBDA:

IDENT obs.son, IDENT wor.-inter, IDENT stem initial, MAX C, DEP V > Agree voi., Agree pl., Agree man. > IDENT voi., IDENT pl, IDENT man., NoGem

The same constraints could be re-ranked to account for dialects where voicing assimilation of the obstruent “*t*” is attested.

Ranking for voicing of the obstruent “*t*”:

IDENT obs.son, IDENT wor.-inter, IDENT stem initial, MAX C, DEP V, NoGem > Agree voi. > Agree pl., Agree man., IDENT voi., IDENT pl, IDENT man.,

6. Conclusion

Using Prince and Smolensky (1993) optimality theory, in this paper, I have provided an optimality theoretical (OT) account for the regressive assimilation process manifested in Saudi Northern Region Dialect of Arabic (SNBDA); in this dialect, the coronal consonant “*t*” assimilates to the following coronal non-sonorous consonant. The data interesting for two reasons, first, it shows that it is not only the coronal consonant of the second person or the third person feminine (singular or plural) in the imperfective tense “*t*” assimilates to the following coronal non-sonorous consonant in voicing, Elgadi (1986), Harrama (1993), Abdunnabi (2000), and Elramli (2012) but also the consonant “*t*” surfacing in all positions including word boundaries assimilates totally to the following coronal non-sonorous consonant in voicing, place and manner.

More interestingly, the data presented here is counterevidence against Bakovic’s (2005) claim in which bokovic proposes that adjacent consonants with a small subset of specific features could result in assimilation and that assimilation between the two adjacent consonants is blocked and epenthesis applies when assimilation leads to the formation of geminates.

In this data, although assimilation of the adjacent consonants leads to the formation of geminates, it is not blocked. In this paper, using the constraints: *Agree (feature)* Beckman (1998) and Lombardi (1999) and *NoGem* Bakovic (2005), Hall (2003 and 2006) and Rose (2000) among other interacting markedness and faithfulness constraints, I have come up with a constraints ranking that accounts for this total regressive assimilation and used the same ranking to account for the voicing assimilation of the same sound manifested in other dialects of Arabic.

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