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An OT Account of Negation in Jordanian Arabic

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***Abstract*—Jordanian Arabic exhibits three forms of negation: preverbal, discontinuous and post-verbal. In this paper, we show how these three forms of negation could be accounted for from an OT perspective. Concisely, our main goal is to find out form-specific ranking(s) of the set of universal constraints that condition negation in this dialect. We argue that negation is tense-dependent in this dialect (viz. different tense forms opt for different constraint rankings). We propose a set of universal constraints that constrain the native speaker's choice of the negation pattern(s) with the verb form. Additionally, we demonstrate how these constraints militate against each other to let only the optimal forms surface with each tense. The paper found that one major difference between negated present and past tense is that NEGFIRST is ranked very low in present verbs but very high in past verbs. Second, *Neg2 and MAX 3μ interact to block future circumflex negation forms in future verbs. Third, the morph-syntactic expression of negation was found to be subject to weight in that the negators are maximally tri-moraic, a condition which explains why long *ma:* cannot be a viable alternative when circumflexing negation either with present or past verbs.**

***Index Terms*—Circumflex negation, OT, constraints, Jordanian Arabic, tense**

I. INTRODUCTION

Although scholars are still in disagreement on how to define negation, they would all contend that it is a phenomenon of semantic opposition, whose expression is subtle and complex. Therefore, to negate certain parts of the sentence or negate the entire sentence or clause, you have to mark the structure morphosyntactically, a state of affairs that surely causes the hearer(s) extra mental effort to process. For long, it has been reckoned that negative statements are psychologically more complex and harder to process than affirmative statements. Probably for this, languages adopt different strategies to code negation. Two basic differences are attested crosslinguistically. Whereas one relates to the position of the negative marker, the other relates to the number of the negators in one sentence/clause. When only one negator is used, languages choose to have the negator glued either before the main verb (pre-verbal negation) or after the verb (post-verbal). Languages that use two negators circumfix them (often called discontinuous negation). French is a very good example of the last type:

(1) Je **ne** sais **pas**
I **NEG** know **NEG**
'I don't know.'

Jespersen (1933) argues that these three types of sentential negation often represent three evolutional stages in the history of many European languages. He points out that pre-verbal sentential negation is often replaced by discontinuous negation which, in turn, develops into post-verbal sentential negation. Accordingly, De Swart (2009) and Lopopolo and Biro (2011) put languages into three categories: Languages such as Italian, Chinese, Russian and Hungarian mark sentential negation pre-verbally. Lombard, Dutch, Turkish, and Japanese, on the other hand, mark sentential negation post-verbally. French employ discontinuous sentential negation[1]. However, De Swart (2009, p. 102) points out, 'We do not find discontinuous negation in many languages, and when we find it … Reasons of economy might explain the rarity of discontinuous negation'. Ouali (2004) points out that certain Berber dialects have discontinuous negation where the preverbal marker *ur* is obligatory, while the post-verbal marker *sha* is optional.

[1] Old English had mainly preverbal negation. There was some time in the Middle English period when discontinuous negation was the most frequent strategy (See Wallage, 2005). As for Welsh, present-day Welsh has primarily post-verbal negation (Willis, 1998).

Like some other languages, Jordanian Arabic (henceforth JA) uses the three forms: preverbal (2a), post-verbal (2b) and discontinuous 'circumfixes' (2c) negation[2]:

(2) a. sam:I m**a:** b-ji-ʕraf ji-ħki faransi
Sami **NEG** ASP-IMPRF-know IMPRF-speak French
b. sam:I b-ji-ʕraf-**iʃ** ji-ħki faransi
Sami ASP-IMPRF-know-**NEG** IMPRF-speak French
c. sam:I **ma** b-ji-ʕraf-**iʃ** ji-ħki faransi
Sami **NEG** ASP-IMPRF-know-**NEG** IMPRF-speak French
'Sami does not know how to speak French.'

Interestingly, whereas preverbal negation is attested with present, past, and future tenses, discontinuous negation is attested with present and past tenses, and post-verbal negation is only attested with present tense verbs.[3] While imperfective (present tense) verbs sanction the three variants of negation, perfective verbs (past tense verbs) allow for preverbal and discontinuous variants (but not the post-verbal form).[4] Compare (2b) above with (3a) below:

(3) a. sam:I **ma** ʕirf-**iʃ**/ **ma**: ʕirf / *ʕirf-**iʃ** ji-ħki faransi
Sami NEG PRF:know-**NEG** IMPRF-speak faransi
'Sami did not know how to speak French.'

Future tense verbs, on the other hand, accept only preverbal negation:

(3) b. sam:I **ma** reħ ji-ʕrif/*__ma__ reħ-ji-ʕrif**iʃ**/ * reħ ji-ʕrif-**iʃ** ji-ħki faransi
Sami NEG FUT-IMPRF:know-**NEG** IMPRF-speak faransi
'Sami will not know how to speak French.'

This casts doubt on the role of the post-verbal variant *-iʃ,* whether it is a real negator or not. What matters most here is that if the three forms, or at least two of them, can be used interchangeably, then we end up having different negation forms with one semantic function. This means that the phenomenon cannot be accounted for syntactically. The case becomes more complicated when we learn that some other factors (linguistic or otherwise) are at play. For instance, the preverbal negator *ma:* undergoes vowel lengthening when it stands alone but has a short vowel variant when it appears in a circumflex structure (cf. 2a & 2c). Moreover, the post-verbal negator *-ʃ* undergoes vowel lengthening when preceded by a short vowel.

(4) sam:i **ma** b-ji-ʃtar-**i:ʃ** xubiz kul youm
Sami **NEG** ASP-IMPRF-buy-**NEG** bread every day
'Sami does not buy bread daily.'

What adds insult to injury to the phonologist is that in the case of a super-heavy syllable in final position, a vowel may be inserted before the final consonant when using a preverbal negation, but it must be inserted before the final consonant when using post-verbal negation, hence avoiding a super-heavy syllable.

(5) a. ma: ʃuf-**i**t/ ʃuf-t el-ħa:deθ
NEG see:PRF-1S the-accident
b. ma *ʃuf-**i**t-ʃ/ ʃuf-t-**i**ʃel-ħa:deθ[5]
'I did not see the accident.'

All in all, given the conflicting constraints that condition negation in JA, we adopt an OT approach to account for how the three forms (pre-verbal, post-verbal and discontinuous negation) are sanctioned with the imperfective case, and how only preverbal and discontinuous negations are sanctioned with perfective verbs. We will also show that negation with future-marked verbs is governed by high ranking constraints that are different in terms of ranking from those governing negation with the present and past tenses.

II. Review of Previous Work on Negation in OT Framework

Although negation in different languages has been investigated extensively from different perspectives, it has not as yet been widely studied from a phonological perspective. In this paper, we adopt an optimality-theoretic account of negation (McCarthy & Prince, 1993, 1995, 1999; Prince & Smolensky, 1993) to demonstrate how the phenomenon is tense-dependent in Jordanian Arabic. Concisely, we argue that negation is constrained by counter constraints (though not countervailing) because the guiding thesis in this framework is that information is minimally stored in the native speaker's mental lexicon. In OT terms, this means that although negation is universal, the realizations are language-particular choices. In this section, we will do two things. Firstly, we will provide a quick review of the basic tenets and machinery of OT. Secondly, we will review, along the same lines, the seminal works that have tackled negation in the world languages from this perspective.

[2] Jordanian Arabic here refers to Ammani JA, the dialect spoken in the capital. Unlike the dialects spoken in the north or in the south, Ammani JA is a mix of almost all Jordanian and Palestinian dialects as many Jordanians from a Palestinian origin live in the capital.

[3] Sallakh (2021) has shown that preverbal negation is the most dominant (87%) type in Jordanian Arabic

[4] Imperfective and perfective will be used as equivalent to present and past tenses respectively.

[5] Epenthesis to break up a final CC cluster is totally regular (though optional before a following vowel-initial word. Also totally regular is that CCC sequences can never surface as such, without epenthesis (unless C1 is s or ʃ). In the example in (5) we have CCC#, which is just a special case of CC#, explaining why we have CCiC.

To begin, the guiding basic premise for all previous studies is that OT can capture the relation between form and meaning by positing violable universal constraints whose ranking is language/dialect-specific. De Swart (2004, p. 1) puts it this way: 'a bi-directional version of OT that calculates the optimal form for a given meaning, and the optimal meaning for a given form on the basis of a ranking of violable constraints'. Accordingly, each occurring (and non-occurring) linguistic structure is evaluated by a set of well-formedness constraints that frequently impose conflicting requirements, so that no structure can satisfy all of these constraints simultaneously. What this means is that the expression of negation in OT terms is, like any other structure, obtained through the interaction of two types of constraints that play both ends against the middle: (i) faithfulness constraints that militate against the loss of the negative marker, and (ii) markedness constraints banning the expression of negation altogether (De Swart, 2004, 2009).

At the practical plane, we argue that since negatives are morphosyntactically more marked, psychologically harder to process and semantically less informative, they are definitely more marked than affirmatives. As such, the following markedness constraint bans the emergence of a negative form:

***Neg:** *Avoid negation in the output*. (De swart, 2004, 2009)

Should this constraint be undominated, no negative structure would ever surface as an optimal form. Therefore, for a negative sentence (or any part of it) to emerge, a faithfulness constraint that preserves elements of the input in the output needs to be called for. Such constraint is formulated along the following lines:

FaithNeg: *Be faithful to negation, i.e. reflect the non-affirmative nature of the input in the output.*

As negation is marked in form and meaning**, FaithNeg** is highly ranked.[6] In other words, in order for negation to be morphologically (and/or syntactically) visible, **FaithNeg** should outrank ***Neg**; hence affirmative forms are not morphologically marked. Quite expectedly, the conflict between ***Neg** and **FaithNeg** is resolved by ranking in terms of juxtaposed strength. In negative statements, we need **FaithNeg** to be higher than ***Neg**, but in affirmative statements we need the ranking to be reversed.

However, since languages may have preverbal and/or post-verbal negation, some additional constraint(s) is/are needed. For example, **NegFirst** is a markedness constraint proposed to condition the position of the negation marker cross linguistically**.**

NegFirst: *Negation is preverbal* (Horn, 1989).[7]

Bensoukas (2012) found that the Northern dialects of Amazigh, called Tarifit, reinforce negation by a post-verbal particle, hence the use of the discontinuous negator [wa ... ʃa]. To account for the Amazigh data, Bensoukas adopted the often-used constraints which militate against deletion, insertion and/or alternation of material that matches input with output forms. He posited such faithfulness constraints along the following lines:

- **M-REAL(NEG)/ MAX-NEG**: *An input negative morpheme has a correspondent in the output (no deletion)*.
- **DEP-V**: *An output vowel must have an input correspondent* (No epenthesis).
- **IDENT-V (ID-V)**: *An input vowel has the same features in the output*. (No vowel change).

In his analysis, Bensoukas showed that **MAX-NEG** should outrank both **IDENT-V** and **DEP-V.**

However, for post-verbal and discontinuous negation, both De Swart (2009) and Bensoukas (2012) argued that two other markedness constraints were also high ranking. These were:

***Neg2:** *Two expressions of negation are banned.*

FocusLast: *New information comes last in the sentence.*

For two negation markers to surface, it becomes, the argument goes, imperative that **MAX-Neg** dominate ***Neg2**, and that both **NegFirst** and **FocusLast** outrank the markedness constraint ***Neg**. Besides, the interaction of **NegFirst** and **FocusLast** with the other constraints at play surely guarantees that the negators appear at the edges of the negation domain.

Since ***Neg**: bans any occurrence of SN, **NegFirst** militates against candidates without an SN in pre-verbal position, and **FocusLast** militates against candidates without an SN in post-verbal position, the three types of negation surface when these three markedness constraints interact as follows:

[6] (See https://plato.stanford.edu/entries/negation/).

[7] NegFirst is functionally motivated by communicative efficiency, i.e. 'by the desire 'to put the negative word or element as early as possible, so as to leave no doubt in the mind of the hearer as to the purport of what is said' (Jespersen, 1933, p. 297). It is worth mentioning here that the sentential negation marker can be a word or an affix which cliticizes onto the verb (as French *ne*), and can even be incorporated in the verb or adverb as in *never* which is built out of the incorporation of *ne* into *ever*

TABLE 1
RANKING OF NEGATION CONSTRAINTS

Meaning ¬p	Form	NegFirst	FocusLast	*Neg
	(S) SN V (O)		*	*
	(S) V SN (O)	*		*
☞	(S) SN V SN (O)			**

Thus, in languages with preverbal negation, **NegFirst** is highest, and in languages that do not have preverbal negation **NegFirst** is lowest. By the same token, a language with a highest-ranking **FocusLast** pushes the SN marker towards the end of the sentence. Discontinuous negation, by contrast, satisfies both constraints, but would incur two violations of ***Neg**, which would then be low ranking. In OT terms, discontinuous negation causes both **NegFirst** and **FocusLast** to be higher than ***Neg**. Preverbal or post-verbal negation causes ***Neg** to be 'sandwiched' between **NegFirst** and **FocusLast**. The Typology of the position of the negator is, thus, as follows:

- preverbal negation: {NegFirst, *Neg} >> FocusLast
- discontinuous negation: {NegFirst, FocusLast} >> *Neg
- post-verbal negation: {FocusLast, *Neg} >> NegFirst

(De Swart, 2009, p. 104)

As for the ranking of the constraints mentioned above, De Swart (2009) maintains that *Neg sanctions candidates with fewer sentence negators (henceforth SN), while **NegFirst** and **FocusLast** sanction candidates with SN before and after the verb, respectively. De Swart proposes the following table to demonstrate the ranking of these constraints, and thus obtain each of the three types of negation:

TABLE 2
STAGES OF NEGATION DEVELOPMENT AND THEIR CONSTRAINTS RANKING

Stage 1: pre-verbal	1.1	*Neg ≫ NegFirst ≫ FocusLast
	1.2	NegFirst ≫ *Neg ≫ FocusLast
Stage 2: discontinuous	2.1	NegFirst ≫ FocusLast ≫ *Neg
	2.2	FocusLast ≫ NegFirst ≫ *Neg
Stage 3: post-verbal	3.1	FocusLast ≫ *Neg ≫ NegFirst
	3.2	*Neg ≫ FocusLast ≫ NegFirst

III. METHODOLOGY

Although negation in Jordanian Arabic has been the focus of a number of previous works, it has not been approached from an OT theoretic perspective. The researchers therefore used the data already available in the literature on negation in JA for current research purposes, mainly to be reinterpreted from this theoretical framework. These included:

- Al-Momani's (2011) syntactic study on sentential negation in JA,
- Al-Qassas's (2012) morpho-syntax and pragmatics of negation forms in Levantine Arabic (LA),
- Murphy's (2014) sociolinguistic study on negation in MSA and four Arabic dialects,
- Mrayat's (2015) sociolinguistic study on negation in Urban, Rural and Bedouin areas of Jordan;
- Sallakh's (2021) sociolinguistic study on children's negation in JA.

However, two points are in order here. First, as these studies addressed negation from a syntactic, pragmatic, and/ or sociolinguistic perspective, none of them touched on the phonological differences that are pulled along by the three forms of negation. Second, the data in these studies were found to be insufficient to underpin the phonological changes that negation in general pulls along with it. Therefore, we set ourselves that task to collect supplementary spontaneous data. By focusing mainly on subtle phonological differences, we were able to detect special phonological features triggered by the different negators including, but not limited to, lengthening and shortening of the negative markers, and epenthesis and deletion of material before and after the negators. Consider the following illustrative examples:

(6) a. **ma**-bi-ʃtar-**i:ʃ** (shortening of NEG '**ma'** and lengthening of NEG '**i:ʃ**)
NEG-ASP-buy-NEG
'(He) does not buy.'

b. bi-ʕraf-**ʃ** >>> biʕraf-**iʃ** (epenthesis)
ASP-know-NEG
'(He) does not know.'

c. liʕ**i**b >>> ma liʕb-iʃ (deletion of short front vowel 'i' from the root)

play:PRF NEG-play:PRF-NEG
'(He) does not play.'

IV. An OT Analysis of JA Data

Given the main types of negation and the subsidiary features associated with them, we try in the main body of this paper to propose an OT analysis of the data gathered either from previous research or from the field. However, before embarking on this task, two points are in order here. First, we believe that the constraints already put forward by some researchers (e.g. by Bensoukas, 2012; De Swart, 2004, 2009; Lopopolo & Biro, 2011) cannot account for JA data under current scrutiny. Therefore, some other constraints are suggested, a significant contribution to the literature on the phenomenon. Second, we think that negation pulls along with it other phonological changes (e.g. vowel lengthening and shortening, etc.) that should be accounted for simultaneously, a statement underlying the thesis that language is a coherent whole. The analysis will show how all constraints (whether phonological, lexical, morphological, syntactic, pragmatic, social, etc.) interact to yield the optimal forms(s). In the main body of the paper below, we try to show that negation in JA is tense-constrained because each tense has certain negation forms (though overlapping).

A. Negation in Past Tense

We start our discussion with the past tense because it is, we believe, the closest to the tri-consonantal root, and thus does not incorporate aspectual proclitics.[8] With the past form verbs, negation can take the four following forms:

(7) a. *preverbal negation with long vowel* **ma:** daras
NEG study:3SM:PRF

b. preverbal negation with short vowel **ma** daras
NEG study:3SM:PRF

c. *circumflex negation with epenthesis* **ma:** daras- **iʃ**
NEG study:3SM:PRF-NEG

d. *circumflex negation without epenthesis* **ma** daras-**ʃ**
NEG study:3SM:PRF-NEG

Given the four main negation constraints introduced in section (3) above, we could quite easily suggest that **FaithNeg** and **NegFirst** must dominate ***Neg**; otherwise no negative form is likely to emerge.

- Preverbal negation: {faithNeg, NegFirst} >> *Neg.

What this means is that any candidate form that is not marked for negation is ruled out because it violates **FaithNeg:**[9]

TABLE 3
VIOLATING *FAITHNEG* IN PAST TENSE NEGATION IN JA

Meaning	Candidate	Faith Neg
¬ p **ma:** daras-**ʃ**	daras	*

Second, verbal negation is manifested pre-verbally with the negator *ma(:)* and optionally post-verbally with the negator *-ʃ*. Nominal negation, in contrast, surfaces only pre–nominally with the negator *miʃ*.[10] Therefore, a highly ranked constraint that militates against *miʃ* in verbal constructions is needed:

- * *miʃ/V*: *miʃ* cannot be used as a verbal negator in JA.

Thus, the candidate *miʃ daras* violates **miʃ/V* because *miʃ* is a nominal negator.

TABLE 4
VIOLATING **MIΣ/V* IN PAST TENSE NEGATION IN JA

Meaning ¬ p ma: daras-ʃ	Candidates	Faith Neg	*miʃ/V
	miʃ daras[11]		*
	daras	*	

Third, recall that our main thesis is that negation in JA is tense dependent. While present tense verbs accept three main negation forms (pre–, post- and circumflex), past tense verbs accept pre- and circumflex, and future-marked verbs only accept preverbal negation. So, we need to account for not having a post-verbal negation, without a preverbal one, in the past tense. To capture this, all we need is to rank **NegFirst** low in the past tense, and hence candidates which have

[8] Arabic is mainly derivational, so Arabic verbs are derived mainly from tri-consonantal roots. Vowels and non-root consonants are infixed in the consonantal roots to form words which follow specific patterns.

[9] For our argument in this section and the following ones, we assume *ma:- -iʃ* as the underlying verbal negation form in JA.

[10] The interesting point here is that, unlike JA, some Egyptian varieties sanction *miʃ* verbally (e.g *miʃ daras* 'has not studied' and *miʃ bijidris* 'is not studying'.

[11] For speakers of Jordanian Arabic, *miʃ daras…* is in fact a grammatical form, especially in questions, where it has a wide-scope sense along the lines of "is it not the case that he studied…?".

only post-verbal negation violate **NegFirst**.

TABLE 5
VIOLATING *NEGFIRST* IN PAST TENSE NEGATION IN JA

Meaning ¬ p **ma:** daras-**ʃ**	Candidates	Faith Neg	*miʃ/V	NegFirst
	daras-ʃ			*
	miʃ daras		*	
	daras	*		

As for circumflex negation in past tense verbs, **NegFirst** and **FocusLast**, can both be satisfied at the expense of violating ***Neg**. However, what is interesting to notice is that postverbal *ʃ* cannot co-occur with long preverbal *ma:*. Rather, it could only be attached post-verbally should the preverbal negation be short (*ma)*. Yasin et al. (under review) found the vowel length of the negator *ma:* to be around 270 msc while *ma* is only 150 msc. The length of the reinforcer post negator *-iʃ* was found to be around 190 msc.[12] What this means is that the length of *ma* and *-iʃ* together equates to the length of *ma:* per se. We could therefore argue that in circumflex negation, *ma:* was shortened for quantity purposes. Put differently, the long variant *ma:* and the post negator *-iʃ* together cause the speaker extra unnecessary effort to execute negation. In terms of mora count, they both weigh two moras each: 2 for *ma: and 2 for* (*-iʃ*), counting last which could be extrametrical. However, with *ma- -iʃ* concurrences, we have only three moras (1 for *ma-* and 2 for *-iʃ).* In OT, we can put forward a constraint that militates against extra heavy negation. We dub this constraint as MAX 3μ

- **MAX 3μ: verbal negation cannot weigh more than 3 moras.**

What this constraint does is rule out all *ma:- -ʃ* configurations**.** Consider Table 4 below for demonstration**.**

TABLE 6
VIOLATING *MAX M* IN PAST TENSE NEGATION IN JA

Meaning ¬ p ma: daras-ʃ	Candidates	Faith Neg	*miʃ/V	NegFirst	MAX 3μ
	ma: daras-iʃ				*
	daras-iʃ			*	
	miʃ daras		*		
	daras	*			

In addition to the candidates in the previous tables, three more candidates, namely *la daras*, *ma: danras*, and *ma: dras*, violate the faithfulness constraints of IDENT (no feature alteration), DEP (no epenthesis) and MAX (no deletion), respectively. Adding these three candidates to Table 6 above, we get (7) below.

TABLE 7
VIOLATING *FAITHFULNESS CONSTRAINTS* IN PAST TENSE NEGATION IN JA

Meaning ¬ p **ma:** daras-**ʃ**	Candidates	Faith Neg	*miʃ/V	NegFirst	MAX 3μ	IDENT	DEP	MAX
	ma: dras							*
	ma: danras						*	
	la daras					*		
	ma: daras-iʃ				*			
	daras-iʃ			*				
	miʃ daras		*					
	daras	*						

As negation pulls along with it vowel lengthening/shortening (*ma* or *ma:* alternation), we need to decide in advance upon the input form. The question that arises immediately is this: which is the input form for preverbal negation *ma* or *ma:*? Although this requires extensive investigation on its own right, we are tempted to believe for brevity reasons that *ma:* (the long form) is present in the input representation. Following Aljarrah (2002), we argue that Arabic is one of the languages which respect word weight represented by mora count. As the negator is a prosodic word that is orthographically independent,[13] it should weigh at least two moras. This means that *ma* cannot be prosodically independent since it weighs only one mora, but *ma:* can as it weighs two moras. In terms of constraint satisfaction/violation, the preverbal Neg *ma:* satisfies IDENT, while *ma* violates the minimality requirement on word size imposed by LEX=PROS constraint.

- LEX=PROS: a lexical word must be a prosodic word that cannot weigh less than two moras.

LEX=pros is satisfied in *ma: daras* because *ma:* is bimoraic. LEX=PROS is also satisfied in *madaras*, *madaras-iʃ,* and

[12] Al-Qassas (2012) considers the post-verbal negator *-ʃ* as a reinforcer as it cannot stand on its own with past and future tenses.

[13] Had the word been represented in the orthography as part of the word by being prefixed to it, the minimality requirement would then have been totally irrelevant.

madaras-ʃ because *ma* is not a lexical word as it becomes a prefix attached to the verb. LEX=PROS is only violated by *ma daras* because *ma* is orthographically represented as a lexical word that does not make a prosodic word on its own right. All *ma*-prefixed verbs violate MAX because part of the input is missing. This means that MAX is then low-ranking, and hence its violation does not yield suboptimal forms. Another point worthy of mention here is that the negator *ma* is prefixed to the verb once the verb is suffixed with *ʃ*, thus obviating the need for superheavy negations. Otherwise, high ranking MAX 3μ would be violated.

TABLE 8
OPTIMAL CANDIDATES VIOLATING *LOW-RANKED CONSTRAINTS* IN PAST NEGATION IN JA

Meaning ¬ p **ma:** daras-**ʃ**	LEX=PROS	FocusLast	*Neg
☛ ma: daras		*	*
☛ madaras		*	*
☛ madaras-iʃ			**
☛ madaras-ʃ			**
ma daras	*		

Having all possible candidate forms assessed against the set of constraints suggested so far in a number of tables, we can now generate one last table that shows how all candidates compete for optimality.

TABLE 9
CONSTRAINTS FOR PAST TENSE NEGATION IN JA

Meaning ¬ p ma: daras-ʃ	Candidates	Faith Neg	*miʃ/V	Neg First	MAX 3μ	IDENT	DEP	MAX	LEX=PROS	Focus Last	*Neg
	☛ ma: daras									*	*
	☛ ma daras								*	*	*
	☛ ma daras-iʃ								*		**
	☛ ma daras-ʃ								*		**
	ma: dras							*		*	*
	ma: danras						*			*	*
	la daras					*				*	*
	ma: daras-iʃ				*						**
	daras-iʃ			*							*
	miʃ daras		*							*	*
	daras	*									

B. Negating Present Tense Verbs

In the present tense, negation surfaces in four preverbal variants differing in the presence (or absence) of vowel length (ma vs. ma:) and gliding (u vs. ju) (9a-b), in four post-verbal variants that differ in gliding and/or deletion before the postverbal -*ʃ* (10a-b), and in four circumflex forms that vary according to gliding and deletion as well (11a-b). The following examples show these variations:

(8) a. **ma:** b-**ju**-drus/ bu-drus *(long preverbal negation with/without gliding)*
NEG ASP-**IMPRF:3SM**-study / ASP-study
'(He) does not study.'
b. **ma** b-**ju**-drus/ bu-drus *(short preverbal negation with/without gliding)*
NEG ASP-**IMPRF:3SM**-study/ ASP-study

(9) a. b-**ju**-drus-ʃ / bu-drus-ʃ
ASP-**IMPRF:3SM**-study-NEG / ASP-study--NEG
(postverbal negation with/ without gliding with deletion)
b. b-**ju**-drus-iʃ /bu-drus-iʃ
ASP-**IMPRF:3SM**-study-NEG/ ASP-study-NEG
(postverbal negation with/ without gliding without deletion)

(10) a. **ma** b-**ju**-drus-ʃ / bu-drus-ʃ
NEG ASP-**IMPRF:3SM**-study-NEG / ASP-study-NEG
(circumflex negation with/ without gliding with deletion)
b. **ma** b-**ju**-drus-iʃ / bu-drus-iʃ
NEG ASP-**IMPRF:3SM**-study-NEG / ASP-study-NEG
(circumflex negation with/ without gliding & without deletion)

This means that we have 12 output forms. The interplay between negation and tense is evident here in that it is the only tense where post-verbal negation occurs in its own right. To account for all surface forms, we need to consider three more issues: *vowel deletion/insertion before -ʃ, gliding,* and *post-verbal* negation.

As for vowel deletion/insertion before *-ʃ,* the need arises as to see whether the input form of the post verbal negator is *-ʃ* or *-iʃ* because both are optimal variants in the language under current scrutiny (see 10a-b above). To decide on this, two observations about Arabic in general are called for: (1) Arabic does not allow words to start with a vowel. We therefore assume that the underlying post-verbal negator be *-ʃ.* Note that this assumption is in line with the economy principle, i.e. as long as both *-ʃ* and *-iʃ* serve as post-verbal negators, then the less-costly negator is assumed to be the underlying one. In addition, as long as /i/ does not change, then it is unlikely that this vowel is part of the input. (2) Arabic generally disfavors consonant clustering in the same syllable. Thus, when *-ʃ* is attached to a verb that originally ends with a consonant, the result would be consonant clustering in the same syllable (e.g. *bilʕa**bʃ*** 'does not play'). The constraint that rules out clustering of consonants is *CC$^{\sigma}$:

*CC$^{\sigma}$: avoid having a two-consonant cluster in the same syllable.

Jordanian Arabic, unlike Classical Arabic, sometimes sanctions the clustering of consonants (e.g. CC), so *CC$^{\sigma}$ is low-ranked in this dialect. What is worth noting her is that we do not need to put forward further constraints here simply because this can be captured by demoting the constraint which militates against epenthetic material.

As for gliding, we need to decide whether it is a process of epenthesis or deletion. In fact, there is evidence that gliding is part of the underlying representation in the present tense form. First, gliding conveys imperfective aspectuality, so if we change the verb form from a third person to the second person or first plural person, an imperfective allomorph surfaces along with the progressive aspectual *–b*. What this means is that the aspectual *–b* is different from the imperfective prefix. Consider:

(11) inta b-**tu**-drus / iħna b-**nu**-drus
you:2SMASP-**IMPRF**:2SM-study/ we:1PL ASP-**IMPRF**:1PL-study

Second, in some varieties of Arabic, the present imperfective glide always surfaces while the aspectual prefix *b-* does not.

(12) sa:mi **ji**-drus (Gulf varieties)
Sami **IMPERF**:3SM-study

Third, in embedded clauses in JA the imperfective glide is used without the aspectual prefix *b-*:

(13) ʔumm-uh ħaka-t-l-uh ʔinno **ji**-drus kweijjis
Mother-his tell:PRF-F-to-him that **IMPERF**:3SM-study well
'His mother told him to study well.'

Accordingly, the absence of the glide violates a whole set of constraints which militate against deletion, insertion or alternation of the input material. For brevity and convenience, we use GLIDE as an encompassing term.[14] Having this said, we find that a few of the optimal candidates violate GLIDE, indicating that this is a low-ranking constraint.

The other thing to note is that only negation with present tense verbs can surface post-verbally without a co-occurring preverbal negator. This kind of negation is blocked with past and future tenses, thus supporting our thesis that negation is tense-dependent. Recall that Al-Qassas (2012, 2015) considers *-ʃ* as a reinforcer. We argue that the deletion of the preverbal *ma* is phonologically triggered. Since the present tense often surfaces with the aspectual *b-* (which is bilabial and the preverbal negator *ma* is also bilabial), *ma* gets deleted as part of a progressive assimilation process. If this argument were right, we would expect *ma* to surface if the aspectual *b-* were not present. This prediction is borne out:

(14) a. ʔumm-uh ħaka-t-l-uh ʔinno ma **ji**-lʕab-iʃ
Mother-his tell:PRF-F-to-him that NEG IMPERF:3SM-play-NEG
'His mother told him not to play.'

b. * ʔumm-uh ħaka-t-l-uh ʔinno **ji**- lʕab-iʃ
Mother-his tell:PRF-F-to-him that IMPERF:3SM-play-NEG

Since (15b) is unacceptable, the preverbal negator *ma-* cannot be deleted unless it is assimilated to the aspectual prefix *b-*. Table 8 shows the optimal candidates for the proposition ¬ *b-judrus-iʃ*" 'does not study'. As mentioned in the literature, when some language permits preverbal and post-verbal negation, **NegFirst** and **FocusLast** are low-ranking:

[14] Accounting for this falls outside the scope of the paper. Those interested in the phenomenon could consult, for example, Daniel A. Dinnsen (2001) New insights from optimality theory for acquisition, *Clinical Linguistics & Phonetics*, 15:1-2, 15-18, DOI: 10.3109/02699200109167623

TABLE 10
OPTIMAL CANDIDATES VIOLATING *LOW-RANKED CONSTRAINTS* IN PRESENT NEGATION IN JA

¬ bi-ju-drus-iʃ	*CC$^{\Sigma}$	GLIDE	LEX=PROS	Focus Last	Neg First	*Neg
☛ ma: bjudrus				*		*
☛ ma: budrus		*		*		*
☛ ma bjudrus			*	*		*
☛ ma budrus		*	*	*		*
☛ bjudrus-ʃ	*				*	*
☛ budrus-ʃ	*	*			*	*
☛ bjudrus-iʃ					*	*
☛ budrus-iʃ		*			*	*
☛ ma bjudrus-ʃ	*		*			**
☛ ma budrus-ʃ	*	*	*			**
☛ ma bjudrus-iʃ			*			**
☛ ma budrus-iʃ		*	*			**

Now, it is high time we generated one last table that shows how all possible candidate forms compete for optimality.

TABLE 11
CONSTRAINTS FOR PRESENT TENSE NEGATION IN JA

¬ bi-ju-drus-iʃ	Faith Neg	*miʃ/ V	MAX 3μ	IDENT	DEP	MAX	*CC$^{\sigma}$	GLIDE	LEX=PROS	Focus Last	Neg First	*Neg
☛ ma: bjudrus										*		*
☛ ma: budrus								*		*		*
☛ ma bjudrus									*	*		*
☛ ma budrus								*	*	*		*
☛ bjudrus-ʃ							*				*	*
☛ budrus-ʃ							*	*			*	*
☛ bjudrus-iʃ											*	*
☛ budrus-iʃ								*			*	*
☛ ma bjudrus-ʃ							*		*			**
☛ ma budrus-ʃ							*	*	*			**
☛ ma bjudrus-iʃ									*			**
☛ ma budrus-iʃ												
ma budrs						*		*	*	*		*
ma bundrus					*			*	*	*		*
la bjudrus				*						*		*
ma: bjudrus-iʃ			*									*
miʃ bjudrus		*								*		*
bjudrus	*											

All in all, this table shows that the major difference between negation with present and past tense is that **NEGFIRST** is ranked very low in the present but very high in the past. This allows all optimal present forms with post-verbal negation to become optimal.

C. Negating Future- Marked Verbs

With future-marked verbs, the preverbal negation is followed by a future auxiliary. In addition to vowel length, a preverbal nominal negator *miʃ* may be used here.

(15) a. **ma:** reħ ju-drus
NEG will IMPRF-study:3SM
'(He) will not study.'
b. **ma** reħ ju-drus
NEG will IMPRF-study:3SM
c. **miʃ** reħ ju-drus
NEG will IMPRF-study:3SM

All variants are followed by the imperfective present form without deleting the glide or alternating the root. This indicates that the faithfulness constraints (**DEP**, **MAX**, **IDENT)** are highly ranked.

Post-verbal and circumflex (discontinuous) negations are not permitted. We can account for the former by ranking **NEGFIRST** high. As for the circumflex, the constraint which militates against two negators is now high ranking. We cannot rank **FocusLast** high because that will also exclude the optimal (preverbal) candidates which also violate

FocusLast. Therefore, ***Neg2** and **MAX 3μ** block future circumflex negation forms.

There remains one issue: Why does future negation in (12c) surface as *miʃ*? As mentioned above, *ma:* (and its variant *ma*) are used as verbal negation, while *miʃ* is used as a nominal negator as in *miʃ usta:z* 'not a teacher', and *miʃ mari:D* 'not sick'. Therefore, having *miʃ* before the future auxiliary *reħ* casts doubts on its nature:

(16) a. sa:mi *miʃ* **reħ** jidrus il-leileh
Sami *NEG* **FUT** study tonight
'Sami will not study tonight.'

b. *miʃ* **aki:d/ muħtamal/ mumkin** ʔinno sa:mi jidrus il-leileh
NEG **sure/ possible/ probable** that Sami study tonight
'It is **not sure/ not possible/ improbable** that Sami study tonight.'

When comparing (17a) with (17b), it seems that *reħ* here is used as an epistemological adjective. As we are concerned with negation from an OT perspective, we will not pursue this point. In light of the constraints mentioned above, ***miʃ/V*** captures it. However, since future tense permits ****miʃ,*** this constraint is ranked very low unlike its ranking in present and past tenses.

In light of the above, the constraints used for future negation of the proposition ¬ *reħ judrus* 'will not study' and their rankings are as follows:

TABLE 12
CONSTRAINTS FOR FUTURE TENSE NEGATION IN JA

¬ reħ judrus	Faith Neg	Neg First	MAX	DEP	IDENT	***Neg2**	*miʃ/V	LEX=PROS	Focus Last	*Neg
☛ ma: reħ judrus									*	*
☛ ma reħ judrus								*	*	*
☛ miʃ reħ judrus							*		*	*
ma: reħ judrus-iʃ						*				**
la reħ judrus -ʃ					*	*				**
ma: reħ jundrus				*					*	*
ma: reħ judrs			*						*	*
reħ judrus-ʃ		*								*
reħ-iʃ judrus		*								*
reħ judrus	*								!	

All candidates, but the last, violate the lowest constraint ***Neg**, but satisfy **FaithNeg**. **NegFirst** excludes *reħ judrus-ʃ* and *reħ-iʃ judrus* because they do not have a preverbal negator.[15] The faithfulness constraints **MAX**, **DEP** and **IDENT** exclude candidates *la reħ judrus-ʃ, ma: reħ jundrus* and *ma: reħ judrs*. The optimal candidate *ma: reħ judrus* violates FOCUSLAST. The second optimal candidate *ma reħ judrus* violates the low-ranking constraints LEX=PROS and Focuslast. The third optimal candidate *miʃ reħ judrus* violates ****miʃ/V***.

V. CONCLUSION

The foregoing discussion has shown that negation, like any other phenomenon of semantic opposition whose expression is subtle and complex, is constrained by a universal set of violable constraints whose simultaneous satisfaction is impossible. In Jordanian Arabic, where the three forms of negation (preverbal, discontinuous and post-verbal negation) are attested, it is shown that variation is conditioned by the tense of the verb in the negation domain: Past tense verbs allow for preverbal and discontinuous negation but never allow for post verbal negation; present tense verbs allow for the three variants unconditionally; and future tense verbs allow for preverbal negation only. In OT terms, the constraints that govern the distribution of these negation forms allow for variation; hence more than one possible form is sometimes sanctioned. In this research paper, we tried to do two things to account for this variation. First, we proposed the high ranking constraints whose violations yield suboptimal forms. Second, we showed how those high ranking constraints conspire to yield the optimal output forms for each tense of the verb which was locus of the negation domain.

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[15] It is worth noting that double negation at the edges of the word can be accounted for by the satisfaction/violation of negation material not falling at the edges, right or left, of the word. The distance is relevant and gradient (the further away from the edge of the word, the more violations).

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