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BROKEN PLURAL IN JORDANIAN ARABIC: CONSTRAINT-BASED EVIDENCE FROM LOANWORDS ADAPTATION

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Abstract

Based on a critical review of previous work, this paper shows that prosodic phonology models do not account for all broken plurals in Arabic especially in the case of singular forms comprising two or more different plurals, and in the dialectal variations of selecting the optimal plural pattern. As evidenced in loanword adaptation in Bedouin Jordanian Arabic, this paper proposes a well-defined set of prosodically-based constraints that account for cases of a single template generating two optimal outputs with different meanings creating lexical ambiguity, and cases of a single template generating multiple optimal outputs creating cases of free variation (multiple grammar/free ranking) in the same dialect and within different regional varieties.

Keywords: broken plural, free ranking, Jordanian Arabic, loanwords adaptation, prosodic phonology

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PLURAL INTERN EN ÀRAB JORDÀ:

EVIDÈNCIA BASADA EN RESTRICCIONS DE L'ADAPTACIÓ DE MANLLEUS

Resum

Basat en una revisió crítica de treballs anteriors, aquest article mostra que els models de fonologia prosòdica no tenen en compte tots els plurals interns en àrab, especialment en el cas de formes singulars que comprenen dos o més plurals diferents, i en les variacions dialectals en la selecció del patró plural òptim. Com s'evidencia en l'adaptació de manlleus en àrab jordà beduí, aquest article proposa un conjunt ben definit de restriccions prosòdiques que donen compte dels casos en què una sola plantilla genera dues sortides òptimes amb diferents significats que creen ambigüitat lèxica, i els casos d'una sola plantilla que genera múltiples resultats òptims i crea casos de variació lliure (gramàtica múltiple/classificació lliure) en el mateix dialecte i en diferents varietats regionals.

Paraules clau: plural intern, classificació lliure, àrab jordà, adaptació de manlleus, fonologia prosòdica

PLURAL INTERNO EN ÁRABE JORDANIANO:

EVIDENCIA BASADA EN RESTRICCIONES DE LA ADAPTACIÓN DE PRÉSTAMOS

Resumen

Basado en una revisión crítica de trabajos anteriores, este artículo muestra que los modelos de fonología prosódica no tienen en cuenta todos los plurales internos en árabe, especialmente en el caso de formas singulares que comprenden dos o más plurales diferentes, y en las variaciones dialectales en la selección del patrón plural óptimo. Como se evidencia en la adaptación de préstamos en árabe jordano beduino, este artículo propone un conjunto bien definido de restricciones prosódicas que dan cuenta de los casos en que una sola plantilla genera dos salidas óptimas con diferentes significados que crean ambigüedad léxica, y los casos de una sola plantilla que genera múltiples resultados óptimos creando casos de variación libre (gramática múltiple/clasificación libre) en el mismo dialecto y en diferentes variedades regionales.

Palabras clave: plural interno, clasificación libre, árabe jordano, adaptación de préstamos, fonología prosódica

1. Introduction

In the nominal system of Classical and Modern Standard Arabic, plurality can mainly be manifested via two processes: sound plural (SP) and broken plural (BP). The

former involves the affixation of a plural suffix (masculine $+-\bar{u}n(a) \sim \bar{in}(a)$ or feminine $+-\bar{a}t$) to a fixed stem, as in (1) (cf. Ratcliffe 2008: 440, Mashaqba et al. 2020a):^{1, 2}

| (1) | singular | plural |
|-----------|--------------------------------------|-----------------------|
| nom. | <i>mudarris(un)</i> ‘teacher (m.)’ | <i>mudarrisūn(a)</i> |
| gen./acc. | <i>mudarris(in/an)</i> | <i>mudarrisīn(a)</i> |
| nom. | <i>mudarrisa(tun)</i> ‘teacher (f.)’ | <i>mudarrisāt(un)</i> |
| gen./acc. | <i>mudarrisa(tin/tan)</i> | <i>mudarrisāt(in)</i> |

The second type, the target of this study, involves the formation of a non-concatenative inflected form and is primarily based on internal vocalic melody modification of the singular nominal stem producing new forms/patterns ‘broken plural’, as will be seen in (3) and (4).³ Based on the notion that Arabic exhibits non-concatenative morphology, a typical hallmark of Arabic is impressed by apophony – a feature that can be exemplified in ‘broken plurals’ in nouns. The terms ‘sound’ versus ‘broken’ could be inaccurate based on the proposition that the SP is the default/unmarked/conventional pattern, whereas BP involves the marked one. Considering the lexicon as a whole, as reported by McCarthy & Prince (1990b: 213), BP is non-exceptional (cf. Mashaqba 2015: 196, Mashaqba & Huneety 2017, Al-Shboul et al. 2020). Holes (2004: 162-163) claims in support of such premise that SP is concatenated to a limited set of nominal stems. By way of contrast, BP is more common than SP, as will be seen in data in (3) and (4) in sections 3.1 and 3.2.⁴

Theoretically, the BP is an intriguing topic that imposes a critical challenge on the literature related to Arabic phonology and morphology. The challenge stems from the problem of how morphology relates singular stems to plural patterns in their surface structures (Mashaqba et al. 2020b), and how they (the optimal forms) exemplify interaction and conflict between the demands of violable constraints (cf. Kager 1999: xi). Second, one might impressionistically think that plural patterns are arbitrarily associated with their corresponding singulars. Although Arabic dialects have retained

¹ Case inflection has been marked in parentheses. For the rest of the work, case inflections will not be marked unless they are relevant to the analysis.

² Modern Arabic dialects have generally lost their declensional marking system: $-\bar{in}$ for masculine sound plural and $-\bar{a}t$ for the feminine sound plural.

³ Or, in very few cases, by suppletion, as in *ʔimraʔah* ‘woman’ > *nisāʔ*.

⁴ See also the twenty-nine common patterns of BP in Wright (1974: 199-224).

many broken plural patterns from Classical Arabic (CA) and Modern Standard Arabic (MSA), they also succeed to expand new patterns. For example, Yemeni Arabic has developed the pattern aCCūC (as in, *ʕamm* ‘uncle’ > *aʕmūm*) (cf. Fischer & Jastrow 1980 eds: 91), and the pattern CuCwaC (as in, *tarīg* ‘road’ > *turwag*) (cf. Diem 1979: 64-75).

2. Methodology and material

The paper addresses Bedouin Jordanian Arabic (BJA), a less studied variety of Arabic on which more research is needed. Data were collected from participants covering Bani Hassan (distributed mainly in Mafrāq, Zarqa, and Jerash), ʔAhl al-Jabal, Bani Xalid (North-west Badia), ʕAjarma, ʕAbbādi, Bani ʕaxar (southern Amman). The number of the speakers of BJA is around 1,250,000. The dialect under investigation exhibits a multitude of shared phonological, morphological, grammatical, and many lexical aspects. However, to obtain homogeneous sampling, Zawaidih and Zalabiah Bedouin subtribes (Wādi Ramm) were excluded as their dialect exhibits a significant number of linguistic aspects that distinguish this variety from other BJA dialects. Although Wadi Ramm Arabic belongs to Jordan in terms of geography, it is typologically classified under the greater Northwest Arabian type of Bedouin dialects including Negev Bedouin and the Ḥwēṭāt dialect (cf. Sakarna 2002; Palva 1986, 1991; Mashaqba 2015).

To examine BP patterns in BJA, 50 participants (25 males and 25 females) plus a language consultant from each subtribe were recruited. According to a metadata sheet, ages ranged between 40-75 years old (M= 55). None of the participants had travelled outside Jordan. They speak the original Bedouin dialect, i.e. unaffected by aspects of modern life which changed some of the linguistic features of young generation’s speech (cf. Mashaqba 2015). Their level of education ranged from primary education (28 participants) to secondary education (22 participants). None of the participants suffered speech disorders. Consent form showing how data will be processed, explaining the participants’ conditionality, and confirming that the

participants were willing to answer all questions that serve this study had been signed in advance.

The empirical data to be introduced in this work are of interest since the topic of loan forms adaptation is a timely question (for details on the linguistic importance of investigating loanwords, read Davis 1994, LaCharite & Paradis 2005, Huneety & Mashaqba 2016). Hence, a wide range of loanwords of different syllable types had been orally elicited and registered using different strategies: where possible, the target words (singular and plural) were presented in pictures to be identified and produced by the participants. For very few cases, the participants were given explanations to produce the target words. Where pictures did not assign the exact target words, the researchers and the language consultants ran natural speech concerning a relevant topic. Where the latter strategy did not work, language consultants were asked to give their correct plural pattern. The collected loanwords and their plural patterns were then double-checked with the participants themselves and with the language consultants. The phonetic transcription adopted in this study follows that of the *Journal of Semitic Studies*.⁵

To investigate the percentage of the probability of the occurrence/frequency of loanwords among the JA dialects, a survey of selected loanwords and their plural forms in both dialects (BJA and UJA) was carried out. To achieve this task, twenty participants (ten males and ten females) who are native speakers of Ammani Arabic (Urban dialect) were recruited in the study. Their ages range between 40 and 70 (M=53). The same strategies described above were followed.

Like many other dialects, BJA does not share the same phonetic, phonological and morphological profile with CA or MSA. Data in (2a) below exemplifies some phonological, morphological and free variation differences between BJA and MSA, and data in (2b) introduces singular loanwords and their plural correspondents in BJA.

⁵ For details, see: <http://jss.oxfordjournals.org/>

| 2a. Singular | BJA | MSA | Gloss |
|----------------|--------------------------|----------------------|-----------|
| <i>ḥajar</i> | <i>ḥjār</i> | <i>ḥajjār</i> | stone |
| <i>xarūf</i> | <i>xirfān</i> | <i>xirāf</i> | lamb |
| <i>sijīn</i> | <i>misajīn</i> | <i>sujanāʔ</i> | jailed |
| <i>riġġif</i> | <i>ruġġfān</i> | <i>ḥarġifa</i> | loaf |
| <i>šanta</i> | <i>šanāti ~ šant-āt</i> | <i>šant-āt šunaṭ</i> | bag |
| <i>ʔajnabi</i> | <i>ʔajanīb ~ ʔajānib</i> | <i>ʔajānib</i> | foreigner |

| Singular pattern | Loanword | Plural pattern | Plural (BJA) | Gloss |
|------------------|-----------------|-----------------------|-------------------------------|-------------|
| CūC | <i>būt</i> | CCāC | <i>bwāt</i> | boot |
| CaCC | <i>šanş</i> | CCūC | <i>šnūş</i> | chance |
| CiG | <i>dişş</i> | CCūC | <i>dşūş</i> | dish |
| CiCC | <i>film</i> | (Ca)CCāC | <i>(ʔa)flām</i> | film |
| Ca.CaC | <i>galan</i> | CCāC | <i>glān</i> | gallon |
| CiC.CaC | <i>filtar</i> | CaCāCiC | <i>falātir</i> | filter |
| CāCīC | <i>kāşīr</i> | CaCaCīC~ CāCīCiCCa | <i>kawaşīr~ kaşīriyya</i> | cashier |
| CaC.CīC | <i>ʔarşīf</i> | Cv.Cv.CvvC | <i>ʔaraşīf</i> | archive |
| CaC.Cō.Ca | <i>kartōna</i> | CaCaCīC | <i>karatīn</i> | carton |
| CaC.CēC | <i>kaskēt</i> | CaCaCīC | <i>kasakīt</i> | casket |
| CaC.CaC | <i>santar</i> | CaCāCiC | <i>sanātir</i> | centre |
| Ci.Ci.CaC | <i>dijital</i> | CaCāCiC | <i>dajātil</i> | digital |
| CaC.CuCēC | <i>balyunēr</i> | CaCCuCēCiCCa | <i>balyunēriyya</i> | billionaire |

3. Critical review of previous frameworks on Arabic broken plural

Two major frameworks have been mapped for a general comprehension of Arabic BP, namely Ratcliffe's (1998) and McCarthy & Prince's (1990b), in addition to Sakarna's (2013) model for JA. This section gives a concise critical review of these frameworks. Then we argue for BP of adapted loanwords with special consideration of the consequences of OT framework on JA varieties.

3.1 Ratcliffe's (1998) broken plural proposal

Within the framework of morphological correlates of BP patterns and their non-concatenative idiosyncrasies, Ratcliffe has successfully grouped seven classes for singular-plural patterns depending on a well-defined classification of these patterns by medieval grammarians (e.g., ʔAbū s-Suṣūd 1971; ʔAbd al-ʔĀl 1977). Based on modern

statistical studies (cf. Murtonen 1964, Levy 1971), he has confirmed that the collected plural patterns and their allomorphs generally account for more than 90 % of all plurals. Data in (3) summarizes the Arabic broken plural system and indicates all broken (and mixed) plurals representing 10 percent or more of the plurals of each singular.

| | Singular | Arabic broken plural | BJA reflex |
|------|--------------------|---|--|
| i. | CaCC | CuCūC, ʔaCCāC, CiCāC, [ʔaCCuC], (CīCān) | CCūC <i>njūm</i> 'stars', CCāC <i>klāb</i> 'dogs' |
| | CvCC | ʔaCCāC, CuCūC, (CiGaCat) | CCāC <i>ḥzāb</i> 'parties'; <i>ḥkāṁ</i> 'rules' |
| | CvCvC | ʔaCCāC | CCāC <i>qlām</i> 'pens'; <i>jbāl</i> 'mountains' |
| ii. | CvCCa(t) | CvCaC, CvC(a)Cāt | C(v)CaC <i>ġ(u)raf</i> 'rooms', CvCCāt x(i)rag ~ <i>xirgāt</i> 'rags' |
| | CaCCat | CaC(a)Cāt, CiCāC | CaCCāt <i>faraxat</i> 'chicks' |
| iii. | CvCCvC(at) | CaCāCiC | CaCāCiC <i>makātib</i> 'offices' |
| | CvCCvC(at) | CaCāCīC, CaCāCiCat | CaCāCīC <i>salātīn</i> 'sultans', CaCāCiCa <i>ʔasātīda</i> 'teachers' |
| iv. | CvCvCat | CawāCiC | CawāCiC <i>ḥawāmil</i> 'pregnant' |
| | CvCvCat | CaCāʔiC | CaCāʔiC <i>rasāyil</i> 'letters' |
| | CvCvC | CawāCīC | CawāCīC <i>qawāmīs</i> 'dictionaries' |
| v. | CāCiC (n.) (-rat.) | CawāCiC | CawāCiC <i>qawālib</i> 'molds' |
| | CāCiC (n.) (+rat.) | CuCCāC, CaCaCat, (CuCāt) | CuCCāC <i>ṭullāb</i> ~ <i>ṭalaba</i> 'students', (CuCāt) <i>q(u)ḏāh</i> 'judges' |
| | CāCiC (adj.) | CuCCaC | CuCCaC <i>sujjad</i> 'prostraters' |
| vi. | CvCāC | ʔaCCiCat, CuCuC | CiCCān <i>jinḥān</i> 'wings' ʔaCCiCa <i>ʔasliḥa</i> 'weapons' [CuCuC] <i>kutub</i> 'books' [CaCīC] <i>ḥamīr</i> 'donkeys' |
| | CaCūC | CuCuC, ʔaCCiCat | [CuCuC] <i>rusul</i> 'messengers' |
| | CaCīC (n.) (-rat.) | ʔaCCiCat, CuCuC | CuCCān <i>gumšān</i> 'shirts' |
| | CaCīC (n.) (+rat.) | CuCaCāʔ, ʔaCCiCāʔ | CuCaCa <i>ʔumara</i> 'princes' ʔaCiCCa <i>ʔaṭibba</i> 'doctors' ʔaCCiCa <i>ʔaġniya</i> 'riches' |
| | CaCīC (adj.) | CiCāC, [CaCCā] | CCāC <i>kbār</i> 'elderly' CuCaCa <i>buxala</i> 'misers' |
| vii. | ʔaCCaC | CuCC, CuCCān | CuCC ~ CuCCān <i>ṭurš</i> ~ <i>ṭuršān</i> 'deaf' |

Table 1. The Arabic broken plural system and its BJA reflex⁶

⁶ The patterns in parentheses () account for less than 10 % of the class as a whole but more than 10 % of words containing glide or geminate. The patterns in brackets [] are statistically rare (less than 10 %)

Data in Table 1 confirms that the morphological allomorphy exemplified by the broken plural is different from that of the sound plural: the former is distinguished from its corresponding singular by a variety of syllabic/vocalic patterns associated with the plural form - the latter is distinguished by a specific suffix attached to the singular stem (cf. Ratcliffe 1998, 2008; Mashaqba et al. 2020a). The patterns were investigated in terms of syllable structure, gender marking, and vocalism.

3.2 McCarthy & Prince's (1990b) broken plural⁷

Within McCarthy & Prince's (1990b) approach (prosodic morphology) of BP, the patterns are categorized according to the foot type and classified into three essential patterns: 'iambic, trochaic, and monosyllabic', together with an 'additional 'other' set' (see also Watson 2002: 164-165 for Cairene Arabic and Sanʿani Arabic; McCarthy & Prince 1990b: 213 for the 31 types in MSA). BJA features a rich number of BP patterns that are in common use. A number of stems have forms in free variation between sound and BPs, and some stems have two or more alternative BP templates. In the nominal system, plurality can be expressed by the formation of a different template rather than affixation of a plural suffix. In this regard, the most common patterns of BP in BJA are listed together with examples in (4); (G = geminate consonant):

plural patterns strongly associated with a particular class. The underlined CC indicates a geminate. For details on geminate representation in Jordanian Arabic (Mashaqba et al. 2021).

⁷ It is expected that some readers might think that prosodic morphology model is presented as an alternative to OT; this analysis is intentionally introduced here to benefit from later on - as OT analyses are compatible with the prosodic representations of this model.

| Iambic | Trochaic | Monosyllabic | Other |
|---|---|--------------------------------------|---|
| CvCāCiC <i>ʔašāyil</i> 'genuine' | CaCaC <i>ħaras</i> 'guards' ⁸ | CCūC <i>dmūs</i> 'stones' | ʔaCCiCa <i>ʔajwiba</i> 'answers' |
| CaCāCa <i>šarāga</i> 'eastern people' | CiCaC <i>birak</i> 'pools' | CCāC <i>ħjār</i> 'stones' | CuCCaC <i>burrad</i> 'impolite people' |
| CaCāCiC <i>ġarābīl</i> 'sieves' | CvCaC <i>ġuraf</i> 'rooms' | CCaC <i>jwarr</i> 'holes' | CuCCāC <i>juhhāl</i> 'ignorant/children' |
| CaCāCi <i>gahāwi</i> 'coffee shops' | CuCuC <i>luħuf</i> 'quilts' | CiCC+ān <i>biṭbān</i> 'mountains' | |
| CaCaCiC <i>manadīl</i> 'handkerchiefs' | ʔaCCuC <i>ʔashum</i> 'shares' | CaCC <i>ward</i> 'flowers' | |
| ʔaCāCiC <i>ʔajānib</i> ~ʔaCaCiC <i>ʔajanīb</i> 'foreigners' | CuCaCa <i>šuraka</i> 'partners' | | |
| (ʔa)CCāC <i>ʔajwād</i> ~ʔajawād 'hospitable householders' | CāCāC <i>ʔālāf</i> 'thousands' | | |
| CaCīC <i>ħamīr</i> 'donkeys' | | | |
| CaCāCCa <i>dakātra</i> 'doctors' | | | |

Table 2. Common BP patterns in BJA

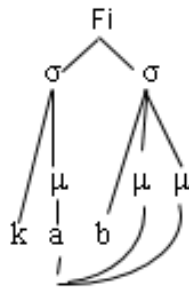
In his first attempt, McCarthy (1979) does not provide a plausible account that covers all BP forms in Arabic especially in the case of a singular form that has two different plurals or the dialectal variations of selecting the optimal plural pattern. McCarthy & Prince (1990a) have developed a theory of prosodic morphology which depends on templates of segmental slots (strings of consonants and vowels). The major premise of this framework is that templates are framed in terms of purely prosodic principles and by morphological units, including mora, foot, syllable, prosodic word, etc. (cf. Watson 2002: 129). This framework has come out with novel results of many challenging nonconcatenative phenomena, one of which is Arabic BP. McCarthy & Prince (1990b) have successfully accounted for BP derivation in terms of metrical (moraic) model. Deriving the broken plural patterns from singular forms comprising three or more moras would be predictable in this model. To do so, (i) the first two moras of the singular (the minimal word, Fqu) are mapped on to an iambic (prosodic) template (Fi). (ii) The plural vocalic melody is 'mapped on to the moraic slots of the plural template', overwriting the singular vocalic melody of the base (McCarthy &

⁸ CvCvC pattern has an iambic foot in Negev Bedouin (Blanc 1970) and Wadi Ramm Arabic (Mashaqba 2015; Mashaqba & Huneety 2018).

Prince 1990b: 245-247 cited in Watson 2002: 167). (iii) The remainder of the singular is suffixed back to the iambic foot in the plural template. This model for BP specification in CA and MSA applies to the dialect under investigation. Consider the derivation of examples from loanwords that conform to the BP patterns in BJA:

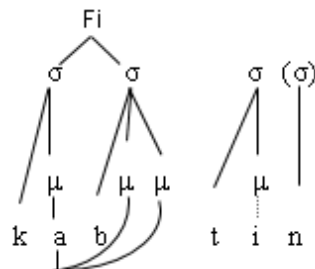
To derive the broken plural *kabātin* ‘captains’ from the bimoraic non-minimal singulars *kabtin* ‘captain’, the first two moras of the singular [kab] are mapped to an iambic template [kabā] ($\mu \mu \mu$) to give ($k\mu b\mu \mu$), as in (3):

(3)



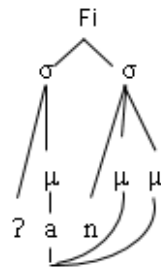
Then, the vocalic melody -a- associates to the moraic slots of the iambic template to give (*kabā*). The residue of the singular (-tin) is suffixed to the iamb, and where this contains a vocalic slot, as here, -i- of the plural vowel melody overrides the vowel of the remainder, to give *kabātin*, as in (4):

(4)



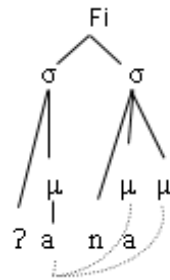
In the derivation of plural forms like *ʔanātīl* ‘nails’ from the nominal singular form *ʔintīl* ‘nail’, the first two moras [ʔin] of the singular are mapped to an iambic template [ʔanā] to give ($ʔ\mu n\mu \mu$), as in (5):

(5)



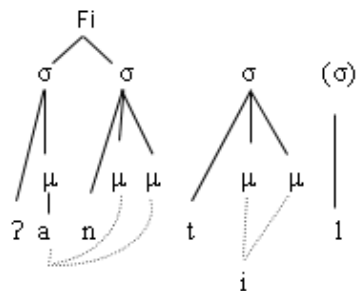
Then, the vocalic melody -a- overwrites the original melody -i- and associates to 'the moraic slots of the iambic template' to give (*ʔanā*), as in (6):

(6)



The remainder of the singular (-*tīl*) is suffixed to the iamb, and where this contains a vocalic slot -a- of the singular vocalic melody, it is overridden by -i- of the BP melody, to give *ʔanātīl*, as in (7):

(7)



Relying on the binary relationship between elements in the grid, this model encounters several problems in application.

First, in the case of words comprising two moras (minimal words) and a number of non-minimal words, the plural cannot be predicted as easily as from the singular form.⁹ Examples include *sēf* ‘sword’ pl. *syūf*, *ʔax* ‘brother’ pl. *xwān*, *ʔaxt* ‘sister’ pl. *xawāt*, *ḥajar* ‘stone’ pl. *ḥjār*, *bēt* ‘house/ poetry line’ pl. *byūt* ~ *byāt*, etc. Among the loanwords, we have *kūb* ‘cup’ pl. *kwāb*, *gīr* ‘gear’ pl. *gyār*, *būt* ‘boot’ pl. *bwāt*, *bank* ‘bank’ pl. *bnūk*.

Second, for the last example from BJA (*bēt* ‘house/poetry line’ pl. *byūt* ~ *byāt*), another problem is attested as this model does not explain why the same singular nominal base derives two different plural forms that exhibit two different meanings. The best example for this aspect could be exemplified within the different plural forms of the noun *šāhid* ‘witness’ in BJA: *šhūd* ‘witnesses’, *šuwāhid* ‘signs’, *šāhdīn* ‘people who attend (adj)’, *šuhhād* ‘witnesses (intensive active participle)’, *ʔašhād* ‘attendance’, and *šahada(h)* ‘angles’ (cf. Mashaqba 2015: 196-197 for Wadi Ramm Arabic). Among the loanwords in BJA we have, for example, *numra(h)* ‘number-plate’ pl. *numar* ~ *numrāt* ~ *nmarr*; *kabīna* ‘cabin’ pl. *kibāyin* ~ *kbinna* ~ *kibin* ~ *kabīnāt*.

Third, this model does not give a plausible answer of why/how dialects produce different plural forms (though refer to the same meaning) of the same nominal base, as in: *xarūf* ‘lamb’ pl. *xirfān* ~ *xrāf* in BJA and Rural Jordanian Arabic (RJA), but *xawarīf* in Urban Jordanian Arabic (UJA); *nāga* ‘camel f.’ pl. *nūg* in BJA, but *nyāg* in RJA, and *nāgāt* in UJA. This problem is also encountered in BJA loanwords, as in *tank* ‘tank’ pl. *tnūk(ah)* ~ *tankāh* in BJA, but *tankat* in RJA and UJA.

Fourth, the model stipulates, in its early stages (cf. McCarthy 1979), specific templates for the plural patterns that are associated with certain singular counterparts. However, it leaves the answer open for a number of exceptional cases where the plural pattern does not conform to the stipulated templatic pattern. For example, the BP template for nouns comprising the template CVCVVC, as in: *ḍamīr*

⁹ The singular CVCC, though has an iamb plural, the plural forms are realized with different vowel melody, e.g., *nafs* ‘soul’ p. *nufūs*, *qīdh* ‘arrow’ pl. *qīdāh*, *ḥukm* ‘judgement’ pl. *ḥakām* [ʔaḥkām] (McCarthy & Prince 1990b: 217).

‘conscience; pronoun’ is CVCVVCVC, as in: *ḍamāʔir* ~ *ḍamāyir* ‘consciences; pronouns’. But, there are expectations where the plural form does not conform to the previous templatic pattern, as in: *safīr* ‘ambassador’ > *sufarāʔ* ‘ambassadors’ (for other cases, see McCarthy 1979, Sakarna 2013). The same problem occurs when it comes to singular loanwords of the template CVCVVC, as in: *kabīn(a)* ‘cabin’ pl. *kabāyin* CVCVVCVC, *matōr* ‘motor’ pl. *muwatīr* (CVCVVCVC), but *šufēr* ‘driver’ pl. *šufēriyya* (CVCVVCVCCV).

By a careful examination of data in (4) (as well as in (3) above), linking particular singular and plural patterns (via a clear derivational structured process) is difficult to determine except for the deverbal derivatives. In congruence with this vision, Ratcliffe (2008: 445) points out that the large number of plural patterns would be ‘paradoxical’, given that this process (pluralization) comprises only one function. So, words comprising the singular pattern CaCaC have different plural templates, as in: *ḥajar* ‘stone’ > *ḥjār* (CCāC) ‘stones, but *ḍahab* ‘gold’ > *ḍhūb* ‘golds’; *ḥakam* ‘referee’ > *ḥukkām* (CuGāC) ‘referees’. Additionally, a given nominal stem sometimes has both SP and BP realizations, or multiple BPs, sometimes (but not always) with a contrastive meaning, e.g., *šāhid* ‘witness’ in BJA: *šhūd* ‘witnesses’, *šuwāhid* ‘signs’, *šāhdīn* ‘people who attend (adj)’, *šuhhād* ‘witnesses (intensive active participle)’, *ʔašhād* ‘attendance’, and *šahada(h)* ‘angles’.

A final point before we move to the next section is that a number of studies have been carried out to investigate the phonetics and phonology of loanwords over the past few decades (e.g., Peperkamp & Dupoux 2003, Kang 2010, Tu 2013), but a little attention has been devoted to examining the morphological aspects of loanwords in Arabic until very recently. In the literature, a borrowed word adapts the segmental and suprasegmental (prosodic) features to be found in the source language in order to fit into the target language (e.g., Huneety et al. 2020). The present study tries to investigate the morphological property of pluralization applied to borrowed words in BJA. Examining a wide range of loanwords in Jordanian Arabic varieties, the present study seeks for a piece of evidence for a unified theoretical analysis that is able to stipulate the most basic parameters controlling Arabic broken system. The importance

of investigating this aspect of loanwords is drawn from the fact that their adapted structure can be employed as evidence for the existence of certain linguistic features in BJA.

3.3 Sakarna's (2013) broken plural model

The *Broken Plural Model*, as referred to by Sakarna (2013), proposes that generator is three-fold: Templates Generator (which maps the set of any possible template), Subtemplates Generator (which generates the set of any possible subtemplates), and Candidates Generator (which locates all possible candidates). In this respect, five constraints have been produced to fit this model (Sakarna 2013: 51-52):

Constraint (A): Candidate-Template Constraint (only optimal candidate corresponds to optimal templates). The choice of one candidate is affected by a number of criteria (including also extragrammatical factors) namely: the context, innate knowledge, morphological competence, sociolinguistic variables, and the speaker's intention.

Constraint (B): Fixed Template Constraint (for x noun there is a major template called y).

Constraint (C): Sub-Template Constraint (for a major template y, there are subtemplates y_1 , y_2 , etc.).

Constraint (D): Template Dominance Constraint (a major template dominates its subtemplates).

Constraint (E): Ranking Component (possible candidates are ranked hierarchically; the most optimal one is highly ranked, then the lower-ranked ones follow).

Giving these premises, Template Generator involves the assignment of a number of competing major templates (e.g., Y_1 , Y_2 , ... Y_n) that a given noun X may have. Subtemplate Generator also assigns the possible competing subtemplates of all major templates (e.g., Y_{1a} , Y_{1b} , Y_{2a} , Y_{2b} , ... Y_{xn}) and then Candidate Generator maps every competing candidate for the generated templates and subtemplates, (e.g., X_1 , X_2 , ...

Xn). Candidate-Template Constraint is said to match the least marked (optimal) candidate (e.g., X1) with the optimal template (e.g., Y1), and then corresponds with the optimal candidate X1 with the optimal subtemplate (e.g., Y1a). Finally, the optimal output would result (e.g., X1) as it satisfies the underlying template as well as the underlying subtemplate. Tableau (1) summarizes what has been claimed before (cf. Sakarna 2013: 52).

| Input | TG | STG | CG | CTC | RC | Output |
|-------|-----------|-------------------|-----------|----------|-----------|-----------|
| | Y1 | Y1a, Y1b..., Y1n | X1 | X1 = Y1a | X1 | X1 |
| | Y2 | Y2a, Y2b..., Y2n | X2 | X2 = Y2c | X2 | |
| | Y3 | Y3a, Y3b..., Y3n | X3 | X3 = Y3b | X3 | |
| | Yn | Yna, Ynb ..., Ynn | Xn | Xn = Ynn | Xn | |

Tableau 1. Deriving BP patterns

This model is mainly manifested to be a means of demonstrating the existence of a variety of outputs and their use, but the optimal form is the only one that surfaces as the outcome. Suppose that we apply Broken Plural Model of OT (Sakarna 2013) on examples from our data. For instance, the singular noun *kabīna* ‘cabin’ has four different plural forms in BJA: *kibāyin* ‘cabins’ ~ *kbinna* ~ *kibin* ~ *kabīnāt*. To account for why the noun *kabīna* is realized in BJA as *kibāyin* in a specific situation and not the other forms, consider the following tableau:

| Input | TG | STG | CG | CTC | RC | Output |
|--------|----------|----------|---------|--------------------|---------------------------------------|---------|
| kabīna | CiCiC | CiCiC | kibin | kibin = CiCiC | kibāyin kbinna kibin kabīnāt | kibāyin |
| | | CiCC | kibn | | | |
| | CCiCCa | CCiCCa | kbinna | kbinna = CCiCCa | | |
| | | CCaCCi | kbanni | | | |
| | CiCāCiC | CiCāCiC | kibāyin | kibāyin = CiCāCiC | | |
| | | CāCiCiC | mābiyin | | | |
| | | CiCiCāC | kibiyān | | | |
| | CaCīC-āt | CaCīC-āt | kabīnāt | kabīnāt = CaCīC-āt | | |
| | | CīCaC-āt | kībanāt | | | |

Tableau 2. Deriving the plural pattern *kibāyin* from *kabīna* in BJA Arabic

According to tableau (2), TG generates the possible competing templates, and STG assigns the possible forms for every basic template taking into account the

insertion of prefixes (if there any), suffixes (e.g., *-āt*),¹⁰ and infixes. After that, CG provides several candidates, each of which matches a subtemplate to which they are assigned. CTC, then, selects four possible candidates and eliminates all other candidates that violate syllabification patterns as well as the canonical structures of BP in BJA; the resulting four acceptable candidates, namely: *kibāyin*, *kbinna*, *kibin*, and *kabīnāt*, match the following templates: CiCiC, CCiCCa, CiCāCiC, and CaCīC-āt, respectively.

However, there are some major issues that prompt the need to review Sakarna's model. Recall that the OT account is highly stipulative. GEN is decomposed into three functions (i) Template Generator TG, (ii) Subtemplate Generator STG, and (iii) Candidate Generator CG. However, according to the Broken Plural Pattern (Sakarna 2013), TG generates ONLY the templates that are optimal (cf. Tableaux 1 and 2). Each optimal template is responsible for choosing one of the optimal candidates that are in free variation based on various linguistic and extralinguistic factors involved. This assumption defies the basic rationale in OT where GEN is responsible for generating ALL possible candidates (freedom of analysis) and choice among them is the function of H-Eval. *Freedom of analysis* further indicates that 'GEN applies all linguistic operations freely, optionally, and sometimes repeatedly' (McCarthy 2007b: 264, see also McCarthy 2007a). The assumption does not accord with the tenets of OT: Gen generates all types of Candidates and Con evaluates the candidates and the optimal one emerges as a result. Still, some legitimate questions were not answered in this model, e.g., how does the template generator know which template is optimal? And how is optimality defined here?

Additionally, if the available templates generated are all potentially optimal (each in its own context), then nothing can go wrong and there would be NO real competition among candidates. Although GEN must be constrained, Sakarna's model takes this concept to an extreme where GEN is allowed to generate only the potentially optimal templates. To resolve this problem, we need to allow TG to generate ALL broken plural templates in the language and provide a sufficient set of

¹⁰ Such data are considered problematic in McCarthy (1979: 191-192).

ranked constraints to choose the optimal candidate(s). These templates may be seen as BASES to which faithfulness constraints may refer to.

4. Discussion

Broken plurality is accounted for in terms of Autosegmental Phonology (McCarthy 1979), templatic morphology (Hammond 1988; Ratcliffe 1990, 1998, 2008), metrical theory (McCarthy & Prince 1990a, 1990b, Hayes 1995, Watson 2002), and Optimality Theory (Sakarna 2013), to mention but a few. The previous section shows that Sakarna's (2013) model hinges on different forms of GEN-which actually does not inform the current model. The model in the current paper is, however, a more traditional OT model with a single GEN component and a series of markedness and faithfulness constraints.

4.1 Adaptation of Arabic broken plural within OT

To account for the multiple aspects of the Arabic BP, I adopt the constraint-based OT model (presuming that the reader is enough knowledgeable about the principles and the mechanisms of OT). Four constraints are proposed to account for BJA broken plural system as represented by adapted loanwords. The constraints are proposed in (10) as follows:

(8)

(i) F-iamb: the minimal word (a quantitative trochee, Fqu) is parsed out from the left-hand of the singular stem and mapped onto an iambic template (cf. Watson 2002: 166).

(ii) MAX-S-residue: the residue of the singular stem is triggered to the plural pattern, and continues to be prosodically the same.¹¹

(iii) u-a Melody: for any singular noun having the template CvCCa assign CuCaC to form the plural form.

(iv) PL-SOUND: for each singular stem add a suffix (masculine $-īn$, or feminine $+ -āṭ$) to a fixed stem to form a sound plural without any differences between the stem input and the stem output.

First, we propose an alignment markedness constraint (F-iamb) which aligns the feature iambicity to the plural template of the singular. We also propose a faithful constraint (MAX-S-residue) which prohibits changing the portion which remains prosodically unchanged after Fqu (quantitative trochaic foot) is parsed from the leftward of the singular stem. The two constraints interact in some examples but show extreme conflict in other cases. Some observations about syllabification patterns of broken plural in BJA would promote that the prosodic constraint F-iamb is ranked higher than constraint MAX-S-residue. MAX-S-residue must be dominated because patterns occur in surface forms with changing the residue of the produced word (cf. tableau 4). These constraints are also ranked with respect to the faithfulness PL-SOUND. The alignment constraint outranks the faithfulness constraints given that broken plural patterns are more harmonic than sound plural. The markedness constraint u-a-Melody outranks all the constraints and is ONLY mapped in the constraint hierarchy when generating underlying forms comprising the template CvCCa (cf. tableau 5).

Tableau (3) shows the process of finding the most harmonic candidate *kuwābil* ‘cables’ by applying a language-particular constraint hierarchy (F-iamb, MAX-S-residue >> PL-SOUND) to the set of proposed candidates.

¹¹ The residue accounts for what has been left over after Fqu has been parsed out (cf. Watson 2002: 166).


| kēbil | F-iamb | MAX-S-residue | PL-SOUND |
|--|--------|---------------|----------|
| a.  kuwābil | | | * |
| b. kēbil | * | | * |
| c. kēb(i)l-āt ¹² | * | | |
| d. kēb(i)l-īn | * | | |

Tableau 3. F-iamb >> MAX-S-residue >> PL-SOUND

Candidate (3a) is more harmonic than candidates (3b), (3c), and (3d) where the highest ranking constraints that distinguish between the competing candidates are F-iamb followed by MAX-S-residue, but candidates (3b), (3c), and (3d) lose by violating F-iamb. Tableau (3) is in congruence with the OT principles as EVAL never looks for candidates that obey a constraint. It only selects candidates that are most harmonic/favoured by a constraint. That is, no candidate is preferred or neglected in itself, but in relation to other candidates of the same input.

In the above example, the faithfulness constraint MAX-S-residue is active though it was dominated. But what about examples like *filtar* ‘filter’ > *falātir* ‘filters’? Consider tableau (4):


| filtar | F-iamb | MAX-S-residue | PL-SOUND |
|--|--------|---------------|----------|
| a.  falātir | | * | * |
| b. falātar | | | * |
| c. filtār-āt | * | | |
| d. filtār-īn | * | | |

Tableau 4. F-iamb >> MAX-S-residue >> PL-SOUND

The data in tableau (4) confirms that F-iamb dominates MAX-S-residue. Even though the winner violates MAX-S-residue, the constraint F-iamb still actively eliminates candidate (4b). This conforms to the OT principle *the emergence of the unmarked* (TETU), a situation when a markedness constraint is active but also violated by some winners (cf. McCarthy & Prince 1994).

¹² [i] deletion is a result of syncope in many modern Arabic dialects when the stem is attached to a vowel initial suffix (cf. Irshied 1984: 25; Mashaqba 2015: 120-124). So, we suppose that syncope operates after the plural suffix is attached.

In examples like *numra* ‘plate’, to optimise candidates like [numar] ‘plates’ over other candidates, we need to formulate a constraint like u-a-Melody, which requires that the singular form CvCCa be pluralized in the output as CuCaC as in tableau (5). This constraint forces CuCaC by the well-defined classification of BP patterns by medieval grammarians and Ratcliff 1998) and based on modern statistical studies which confirm that the collected plural patterns and their allomorphs generally account for more than 90 percent of all plurals (cf. Murtonen 1964, Levy 1971). For details, see Ratcliff (1998).

| | numra | u-a-Melody | F-iamb | MAX-S-residue | PL-SOUND |
|----|---------|------------|--------|---------------|----------|
| a. | numar | | * | * | * |
| b. | numr-āt | * | * | * | |
| c. | namāyir | * | | * | * |
| d. | namāra | * | | | * |

Tableau 5. u-a-Melody >> F-iamb >> MAX-S-residue >> PL-SOUND

Violating F-iamb cannot be tolerated unless the underlying representation of the singular stem is CuCCa. Accordingly, (5b) and (5c) are ruled out. Candidate (5d) satisfies F-iamb and MAX-S-residue but is ruled out by violating the higher markedness constraint u-a-Melody.

4.2 Cases of free variation

More attention should be devoted to the factors affecting speaker’s choices of free variants. Kager (1999: 404) notes that ‘a wide range of extragrammatical factors may affect the choice of one variant over the other, including sociolinguistic variables (such as gender, age, and class), and performance variables (such as speech style and tempo)’. With the emergence of a constraint-based approach like OT, aspects of language variation would be convincingly accounted for within violable constraint interactions (e.g. Reynolds 1994, Anttila 1995, Cardoso 2001). *Free variation* can be accounted for without referring to an independent *deterministic* grammar for each variant, and in processes comprising multiple variants, without resorting to a separate rule for each case (Kager 1999). In OT, variation is allowed to be encoded in one

constraint hierarchy. Where variation involves different grammars (e.g. different dialects), OT licenses the construction of distinctive grammars for such cases.

Variation and change receive a serious attention in OT. Several approaches have been proposed in an attempt to give a plausible answer to this phenomenon: (i) Kiparsky's (1993) grammars in competition, (ii) Prince and Smolensky's (1993) and Kager's (1999) free ranking of constraints, (iii) Reynolds' (1994) floating constraints, (iv) Smolensky's (1996) and Itô & Mester's (1997) tied ranking, (v) Anttila's (1995) partial grammars, (vi) Kager's (1999) co-phonologies,¹³ (vii) Boersma's (1998) and Boersma & Hayes' (2001) stochastic OT,¹⁴ and, (viii) Coetzee's (2006) rank-ordering model of EVAL. Each approach competently accounts for a specific aspect of the phenomenon (cf. Cardoso 2001). The target of this work is not to assess the way that each approach has accounted for phenomena of multiple varieties within the framework of OT. Instead, I adopt Prince and Smolensky's (1993) and Kager's (1999) free ranking approach (later we will explain why it is preferred over other approaches).

The unresolved problem in this work includes examples of an input being mapped onto two (or more) well-formed outputs. Such variation, also known as 'optionality', does not inevitably imply that the optimal output is completely unpredictable (cf. Kager 1999). Rather, it would suggest that no grammatical principles govern the candidates' distribution, which actually imposes a challenge to OT. This challenge is also exaggerated if two optimal candidates (say X and Y) are different in grammatical terms which entails that they do not share the same violation marks. Impressionistically, this indicates that X is more harmonic/optimal than Y within the hierarchy and vice versa. But, in comparison with rules (in grammar), constraints and the general principles are not language-specific devices, but elements of universal grammar which explain how grammars are structured, while the constraints hierarchy is constructed in a language-specific way (Kager 1999: 18). Grammars are the result of constraints interaction and ranking to show the relationship between 'the universal

¹³ *Co-phonologies* would be suggested as a way of generating *free variation* that is manifested throughout *competing grammars*. This requires assigning separate constraint hierarchies, so that each one selects its most harmonic candidate by its own ranking. However, this would wrongly predict that we have two independent (different) subgrammars.

¹⁴ McCarthy (2008: 261) refers to these approaches (1-7) as 'multiple grammars'.

and the language-particular grammars'. So, constraints 'differ in their activity from language to language' to find specific constraints rankings that reproduce language data (cf. McCarthy 2007b: 264-265). Hence, 'free variation problem' can be resolved via constraint ranking (Kager 1999: 405). At this stage, we demonstrate that the selection of the most harmonic candidate for a constraint hierarchy resides in output Ranking Constraint (Kager 1999: 405), i.e., RC orders the candidates according to what BJA Arabic speaker chooses as more-less harmonic with respect to the hierarchy of given candidates for one underlying singular nominal stem (to satisfy constraint ranking).

Free ranking within a single constraint hierarchy looks very promising in such a way that applies the most harmonic candidate(s) (cf. Prince & Smolensky 1993: 51; Kiparsky 1993, Kager 1994, 1997, 1999, Reynolds 1994; Anttila 1995). This approach is preferred over two co-phonologies in terms of prediction of the correlation of the *degree of dissimilarity* between variable output forms and the *number* of variable outputs (Kager 1999: 407). Free ranking has also the privilege of estimating the frequency of occurrence for every output (cf. Anttila 1995). In this study, we adopt Kager's (1999) *free ranking* constraint presented in (9):

(9) Interpretation of *free ranking* of constraints C1, C2 (Kager 1999: 406)

Evaluation of the candidate set is split into two subhierarchies, each of which selects an optimal output. One subhierarchy has $C1 \gg C2$, and the other $C2 \gg C1$.

The evaluation process branches at that point via splitting into two subhierarchies, each of which selects an optimal output (cf. Kager 1999: 406, data 60). Tableau (6) is a slightly simplified example on free ranking for the broken plural and sound plural of the singular *mātōr* 'motor' in BJA:

| mātōr | F-iamb | MAX-S-residue | PL-SOUND |
|----------------|----------|---------------|----------|
| a. i mawātīr | | * | * |
| a. ii mātōr-āt | * | | |
| | PL-SOUND | MAX-S-residue | F-iamb |
| b. i mawātīr | * | * | |
| b. ii mātōr-āt | | | * |

Tableau 6. Free ranking with different plural patterns in BJA

Under the free ranking (multiple-grammar) theory of variation, speakers of BJA know more than one ranking of these constraints. Or to put it differently, in their linguistic competence, the speakers of BJA have access to different constraint rankings. Each time EVAL operates, it randomly chooses one of the rankings. The conflict between F-iamb, MAX-S-residue, and PL-SOUND is resolved in favour of either the former (6a.i) or the latter (6b.ii). It can be observed that each subhierarchy retains its strict domination structure achieved via free ranking proposal. The difference in the reordering of subhierarchy domination proves that different rankings yields disparate outputs. So the change would be in what the speaker understands to be the output of the grammar. Simply, if the input is /mātōr/ and EVAL selects the ranking in (6a), then the more harmonic output will be [mawātīr]. The other ranking in (6b) will give [mātōr-āt] as the more harmonic candidate.

With this in mind, further account for the variation of BP patterns within regional dialects is proposed. Consider data in (10) below which illustrates the difference between BJA and UJA in the formation of BPs from the same loan noun stems:

| (10) | Singular | BJA | UJA | Gloss |
|------|-----------------|--------------------------|--------------------------|-------|
| | <i>kubb~kūb</i> | <i>kwāb</i> | <i>kabb-āt</i> | cup |
| | <i>tank</i> | <i>tnūk(ah)~ tank-āh</i> | <i>tank-āt</i> | tank |
| | <i>kabīna</i> | <i>kibāyin ~kbinna</i> | <i>kabīn-āt</i> | cabin |
| | <i>kēbil</i> | <i>kuwābil</i> | <i>kēbl-āt</i> | cable |
| | <i>kōraba</i> | <i>kuwārib</i> | <i>kawārib~ kōrab-āt</i> | kerb |

Assuming that the use of both plural variants is most often acceptable in both dialects, then tableaux (6) above will adequately explain the way different variants are optimally selected via free ranking constraint hierarchy. According to this model, the

singular noun may have more than one acceptable broken plural pattern as its output. Therefore, the only difference is attested when it comes to constraints ranking.

However, as has been demonstrated for distinct dialectal varieties (e.g. Selkirk 1995, Boersma & Hayes 2001), we propose that the different regions in Jordan exhibit different dialects which exhibit truly different grammars (different syllable structures, stress rules, foot-directionality, consonant and vowel inventory, phonological processes, etc. (cf. Mashaqba 2015 for Wadi Ramm Arabic, Rakhieh 2009 for Maṣani Arabic, Sakarna 1999 for Ṣabbadi Arabic, Yasin & Owens 1984 for Bdūl, among others). One grammar for the BJA, in which the broken plural variant is favoured (98% of our data) as opposed to the other UJA variant, in which the sound plural variant is favoured (63 % of our data). The proposal of maintaining two distinctive grammars would help us to account for and validate the variable *plurality* within different constraint hierarchies (cf. Cardoso 2001). To account for the different outputs attested in the two different grammars (BJA versus UJA), two domain-specific constraints are demonstrated: one for BJA, and the other for UJA, as in (11):

- (11) BJA plural Grammar: F-iamb >> MAX-S-residue >> PL-SOUND
 UJA plural Grammar: PL-SOUND, MAX-S-residue >> F-iamb

The application of these two grammars definitely results in different tableaux comprising different constraint hierarchies, as in Tableaux (7) and (8):


| kubb | F-iamb | MAX-S-residue | PL-SOUND |
|---|--------|---------------|----------|
| a.  kwāb | | * | * |
| b. kabb-āt | * | | |

Tableau 7. BJA: F-iamb >> MAX-S-residue >> PL-SOUND

The case is the other way round in UJA. Simply RC ranks *kabbāt* over *kwāb* as the former is the optimal output in the relevant dialect.

| kubb | PL-SOUND | MAX-S-residue | F-iamb |
|------------|----------|---------------|--------|
| a. kwāb | * | * | |
| b. kabb-āt | | | * |

Tableau 8. UJA: >> PL-SOUND, MAX-S-residue >> F-iamb

The more harmonic candidate in both dialects satisfies the stipulated dominance hierarchy where the constraint F-iamb dominates all other constraints in BJA, whereas the constraints PL-SOUND does in UJA.

Under the assumption that EVAL applies in random likelihood of selecting the possible rankings, some outputs are going to be more likely to win than others in a different way for each dialect. This approach further bears significant predictions about the frequency corresponding to each variant in both dialects. The probability would be that: the observed frequency of each variant approximates the friction of the totally ordered rankings (tableaux) that produce such variant (cf. McCarthy 2008, Anttila 1995). The variant probability prediction is formulated in (12):

(12) If a candidate wins in n tableaux and t is the total number of tableaux, then the candidate's probability of occurrence is n/t . (Anttila 1997 in Cardoso 2001: 184)

This assumption is supported by a survey of selected loanwords and their plural forms in both dialects (BJA and UJA). A slightly simplified example is the word *kubb* 'cup' and its different acceptable plural realizations: *kwāb* and *kabb-āt*. According to the survey, BJA, though uses both plurals, prefers *kwāb* (87%) over *kabb-āt*. In UJA, on the other hand, *kabb-āt* is more likely frequent (73%) in use than its counterpart. Tableau (9) explains the observation of the relative frequency of the plural variants of the word *kūb* 'cup' in BJA and UJA:

| Variety | Total of tableaux | <i>kwāb</i> | | <i>kabb-āt</i> | |
|---------|-------------------|-------------|-------------|----------------|-------------|
| | | Obs. | Pred. (n/t) | Obs. | Pred. (n/t) |
| BJA | 30 | 26 | .87 | 4 | .13 |
| UJA | 30 | 8 | .27 | 22 | .73 |

Tableau 9. Probability of the occurrence of *kwāb* and *kabb-āt*

Applying variant probability prediction, tableau (9) produces probabilistic outcomes that match the ones observed in JA varieties. It summarizes the predicted and observed probability of the occurrence of *kwāb* and *kabb-āt* according to the regional variety. The tableau highlights nonranking of the constraints F-iamb, MAX-S-residue, and PL-sound in BJA. It produces a pattern where the broken plural variant *kwāb* is preferred (probability = .87) over the sound plural variant *kabb-āt* (probability = .13). In the grammar of UJA, the decisive non ranking of the constraints PL-SOUND, MAX-S-residue, and F-iamb patterns in a way where *kabb-āt* is more likely expected to surface (probability = .73) as compared to the other variant *kwāb* (probability = .27). This argumentation of unranked (free ranked) constraints determines the notion of variable grammars, where different rankings produce different grammars.

5. Concluding remarks

This study investigates the reason why certain forms are pluralized with non-concatenative morphology while others follow the plural suffixation. In brief, metrical model can be criticised for constructing very elaborate hypotheses but with little empirical evidence that covers all/most of Arabic BP patterns. On the other hand, and contrary to what Sakarna (2013) claims, OT entirely gives plausible answers to all questions highlighted in this study. This work proves that OT is adequately capable of accounting for sociolinguistically-grounded variation and explains the way such a dialect chooses a pattern while other dialects choose other patterns? This does make sense once one understands the central thesis of OT as compared to rules: ‘constraints are not language-specific devices, but elements of universal grammar that are potentially active in every grammar’ (Kager 1999: 405). It does not go beyond distinguishing between faithfulness and markedness and how these constraints interact with each other.

A final point of interest is whether free ranking is *learnable* or not. If the answer is yes, this may require learning special algorithm associating the constraints with numerical values indicating their frequent occurrence in relation to other constraints.

Under the assumption that quantitative information is essential to grammars, and that frequency index (predictability/probability) is indicative of a speaker's linguistic competence (cf. Labov 1969, Cedergren & Sankoff 1974, Guy 1997, Kager 1999), further future research on Stochastic OT (with special focus on MAX-ENT constraint) seems to be very promising in support of the selection of the most harmonic components (cf. Boersma 1998, Boersma & Hayes 2001). With Stochastic OT, constraints, as being supported by a numerical index, reside in certain ranking positions in the dominance hierarchy (Cardoso 2001: 197). This approach accurately accounts for the variation and is able to predict the likelihood of frequency for each candidate (variant) effects within the same constraint hierarchy.

There is also a need to conduct a corpus study examining the frequency of the preferred syllable(s) in each dialect, a first impression as to improve that BJA prefers heavy/superheavy syllables (e.g., *widyān* 'valleys', *šibyān* 'boys' *ruġfān* 'loafs of bread', *jidyān* 'kids') whereas other dialects may prefer light syllables (e.g., *widiyih*, *šibiyih*, *riġfih*, *jdāyih*).

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