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Theoretical Models Testing for Examining Permissible Onset Sequences in Jordanian Urban Arabic

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ABSTRACT

Languages differ as to which sounds are permissible to combine to form onset sequences. The aim of this article is to test two versions of the theory of sonority hierarchy to examine to what extent that they can make correct predictions about permissible onset sequences in Jordanian urban Arabic. It also aims at testing articulator-based feature theory to examine its capability to account for permissible onset sequences in the language in question. Findings of the study have shown that the sonority theory seems to fail to predict some occurring onset sequences in Jordanian urban Arabic and to make wrong predictions about some other missing sequences. Some sequences violate the minimal sonority distance, but they are found in Jordanian urban Arabic while some other sequences satisfy the minimal sonority distance, but they are not found in this language. The results have also shown that the articulator-based feature theory fails to account for permissible onset sequences in Jordanian urban Arabic.

Key words: Onset Sequences, Sonority Hierarchy, Articulator-Based Feature Theory (The Complex-Sound Approach), Jordanian Urban Arabic

INTRODUCTION

Languages differ as to which word-initial sounds can be adjacent or not. Every language imposes restrictions on which sounds are permissible to combine to make up a well-formed sequence. Some examples of onset sequences from Jordanian urban Arabic (JUA, henceforth) are shown in (1). For the IPA symbols of JUA, see (appendix 1).

(1) Onset Sequences in JUA

Onset Sequence	Example	Gloss
[kt]	[ktaːb]	'book'
[kl]	[klaːb]	'dogs'
[fṭ]	[fṭuːr]	'breakfast'
[dm]	[dmuːʕ]	'tears'

The list in (1) shows onset sequences which are permitted in JUA. However, there are onset sequences which are not possible in JUA; some examples are shown in list (2).

(2) Not possible Onset Sequences in JUA

*[dx], *[lʃ], *[rn], *[ṭz], *[kd], *[hṣ], *[xh], *[ɣʒ]

The aim of this article is to test Kenstowicz's (1994) and Gouskova's (2004) two versions of the theory of sonority hierarchy to examine to what extent that the two versions can make correct predictions about permissible onset sequences in JUA. It also aims at testing Duanmu's (2002, 2008) articulator-based feature theory (or complex-sound approach) to investigate its capability to account for permissible onset sequences in JUA. I opted for the theory of sonority hierarchy as it has been commonly used in the analysis of sequences in languages and I chose Duanmu's articulator-based feature theory as it is one of the most recent theories that have been introduced in the field of consonantal sequences in the recent decades. In section 2, I test Kenstowicz's (1994) and Gouskova's (2004) two versions of the theory of sonority hierarchy. In section 3, I test Duanmu's (2002, 2008) articulator-based feature theory. I conclude in section 4.

SONORITY HIERARCHY-BASED ANALYSIS OF JUA ONSET SEQUENCES

The theory of sonority hierarchy, which was introduced by Jespersen (1897-1899, 1904), was meant to predict in which order sounds can appear in complex syllables. The view of this theory is that increasing sonority occurs within consonants in syllable onsets, but sonority decreases towards the end of the syllable. This is illustrated by the JUA word [smiːd] 'semolina' and the Standard Arabic word [ʃams] 'sun' in which the relatively sonorous bilabial [m] is adjacent to the syllable nucleus and the less sonorous voiceless alveolar [s] appears in the word's periphery. Two proposals of sonority analysis will be tested in this section: Kenstowicz (1994) and Gouskova (2004).

Testing Kenstowicz's Version of the Theory of Sonority Hierarchy

In this sub-section, I analyze onset sequences in JUA from the perspective of Kenstowicz's (1994) model of the theory

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of sonority hierarchy. The purpose of this analysis is to test Kenstowicz's (1994) model and examine the extent to which it can make correct predictions about permissible onset sequences in JUA. According to Kenstowicz (1994), four degrees of sonority are proposed for consonants and glides as it is shown in (3).

(3) Sonority Scale for JUA

Sound Class	Example	Sonority Scale
Glides	[j, w]	4
Liquids	[l, r]	3
Nasals	[m, n]	2
Obstruents	[k, d, f, s, ʃ]	1

The Minimal Sonority Distance (MSD) in a JUA onset sequence must be set at one to include onset sequences such as [dm, kn, fn, ʃm] which are found in JUA. The MSD requires that the sonority of the second sounds must be one degree higher than that of the first. Some examples are shown in (4).

(4) JUA Onset Sequences (Minimal Sonority Distance = 1)

Example	Sonority Distance	Prediction
[sd]	0 <1 MSD	bad
[lm]	1 = 1 MSD	good
[sl]	2 > 1 MSD	good
[sw]	3 > 1 MSD	good

As the list in (3) shows, the sonority of [s] is 1 and that of [d] is 1, as well. So, the sonority distance of the onset sequence [sd] is 1 – 1 = 0, which is lower than the MSD. Accordingly, the onset sequence [sd] is considered bad; no JUA word can begin with [sd]. However, this is not true. Examples of JUA words with [sd] onset sequence are [sdːd] 'dams' and [sduːr] 'platters'. In the sequence [lm], the sonority of [l] is 3 and that of [m] is 2. Accordingly, the sonority distance of [lm] is 3 – 2 = 1, which meets the MSD, and accordingly, it is considered good. However, the sequence [lm] does not exist in JUA. In [sl], the sonority distance is 3 – 1 = 2, which is higher than the MSD, so the sequence is good. The sonority distance of [sw] is 4 – 1 = 3, which exceeds the MSD constituting a good sequence.

The examples in list (4) show issues with the sonority analysis. Firstly, some sequences violate the MSD, but they are found in JUA, such as [sd, sb, sf, kt, kf, kb]. Secondly, some other sequences satisfy the MSD, but they are not found in JUA, such as [lm, ln, rn, rs, wf, wn, ws, wb]. List (5) shows to what extent the sonority-based analysis makes correct predictions in JUA, where the relevant sonority distance (SD) for each sequence is indicated.

(5) Onset Sequences [CC-]

Predicted to be good and found (125 cases)

SD = 1: bm, bn, mt, mṭ, mk, mʔ, mb, md, mḍ, mf, ms, mṣ, mʃ, mx, mḥ, mh, mz, mẓ, mʒ, mɣ, mʕ, ml, mr, nt, nṭ, nk, nʔ, nb, nd, nḍ, nf, ns, nṣ, nʃ, nx, nḥ, nh, nz, nẓ, nʒ, nɣ, nʕ, nl, nr, wl, wr, tm, tn, dm, sm, ʃm, zn, ʒm, lw, rm, rj, rw, km, jl, jr, kn, ḥm

SD = 2: bl, br, mj, mw, nj, nw, fl, fr, dl, dr, tl, tr, sl, sr, ʃl, ʃr, zl, zr, ʒl, ʒr, ls, lḥ, rṭ, rf, rṣ, rx, kl, kr, jm, jn, ʕl, ʕj, hl, ṭl, ṭr, ḍl, ḍr, ṣr, ḥl, ḥr

SD = 3: bj, bw, wʒ, tj, tw, dj, dw, sj, sw, ʃj, ʃw, zj, ʒw, kj, kw, xj, xw, ɣj, ṭj, ṭw, ḍj, ṣj, ḥw

Predicted to be good but not found (81 cases)

SD = 1: ṭn, ʃn, xn, ḥn, hm, hn, zm, ẓm, ẓn, ɣm, ɣn, ʕm, lm, ln, lj, rn

SD = 2: ṣl, xl, xr, ẓl, ẓr, ɣl, ɣr, ʕr, lt, lṭ, lk, lʔ, lb, ld, lḍ, lf, lṣ, lʃ, lx, lh, lz, lẓ, lʒ, lɣ, rt, rk, rʔ, rd, rḍ, rʃ, rh, rẓ, rɣ, wm, wn

SD =3: ḍw, fj, fw, ṣw, ḥj, hj, hw, zw, ẓj, ẓw, ɣw, ʕw, wt, wṭ, wk, wʔ, wb, wd, wḍ, wf, ws, wṣ, wʃ, wx, wḥ, wh, wz, wẓ, wɣ, wʕ

Predicted to be bad but found (85 cases)

SD = 0: bt, bṭ, bk, bʔ, bd, bḍ, bf, bs, bṣ, bʃ, bx, bḥ, bh, bz, bẓ, bʒ, bɣ, bʕ, mn, fṭ, fḍ, fṣ, fx, tṭ, tk, tʔ, tf, ts, tṣ, tʃ, tx, tḥ, th, tz, tẓ, tʒ, tɣ, tʕ, dh, st, sṭ, sk, sb, sd, sf, sx, sḥ, sh, sʒ, zb, zɣ, zh, ʒb, ʒd, ʒf, nm, kt, kb, kf, ks, kh, kʕ, xṭ, xd, xz, ɣṣ, jw, ʕt, ʕʒ, hd, ṭʔ, ṭb, ṭf, ṭḥ, ṭh, ḍb, ṣf, ṣx, ḥk, ḥb, ḥd, ḥṣ, ḥz, ḥʒ

Predicted to be bad and not found (255 cases)

SD = 0: ṭk, ṭs, ṭṣ, ṭʃ, ṭx, ṭz, ṭẓ, ṭʒ, ṭɣ, ṭʕ, kṭ, kʔ, kd, kḍ, kṣ, kʃ, kḥ, kz, kẓ, kʒ, dk, dʔ, db, df, ds, dṣ, dʃ, dx, dḥ, dz, dẓ, dʒ, dɣ, dʕ, ḍk, ḍʔ, ḍf, ḍs, ḍṣ, ḍʃ, ḍx, ḍḥ, ḍz, ḍẓ, ḍʒ, ḍɣ, ḍʕ, ft, fʔ, fb, fd, ff, fs, fʃ, fḥ, fh, fz, fẓ, fʒ, fɣ, fʕ, sʔ, sb, sḍ, sɣ, ṣt, sʃ, ṣk, ṣʔ, ṣb, ṣd, ṣḍ, ṣf, ṣʃ, ṣḥ, ṣh, ṣʒ, ṣɣ, ṣʕ, ʃt, ʃṭ, ʃk, ʃd, ʃḍ, ʃf, ʃs, ʃṣ, ʃx, ʃz, ʃẓ, ʃʒ, ʃɣ, ʃʕ, xt, xʔ, xb, xd, xf, xs, xṣ, xʃ, xḥ, xh, xẓ, xʒ, xʕ, ḥt, ḥṭ, ḥd, ḥḍ, ḥf, ḥh, ḥʔ, ḥʃ, ḥx, ḥẓ, ḥɣ, ht, hṭ, hk, hb, hḍ, hf, hḥ, hs, hṣ, hʃ, hx, hz, hẓ, hʒ, hɣ, hʕ, zt, zṭ, zʃ, zk, zʔ, zḍ, zf, zx, zḥ, zh, zz, zẓ, zʒ, zʕ, ẓt, ẓṭ, ẓk, ẓʔ, ẓb, ẓd, ẓf, ẓx, ẓḥ, ẓh, ẓʃ, ẓʒ, ẓɣ, ẓʕ, ʒt, ʒṭ, ʒk, ʒʔ, ʒḍ, ʒf, ʒx, ʒḥ, ʒh, ʒs, ʒṣ, ʒz, ʒẓ, ʒʃ, ʒɣ, ʒʕ, ɣt, ɣṭ, ɣk, ɣʔ, ɣb, ɣd, ɣḍ, ɣf, ɣs, ɣṣ, ɣʃ, ɣḥ, ɣh, ɣz, ɣẓ, ɣʒ, ɣʕ, ʕṭ, ʕk, ʕb, ʕd, ʕḍ, ʕf, ʕʔ, ʕh, ʕs, ʕṣ, ʕʃ, ʕx, ʕz, ʕẓ, ʕɣ

The list in (5) shows that the sonority theory makes 166 wrong predictions, where 81 onset sequences such as [ṭn, ʃn, xn] are predicted to be good, but they do not exist in JUA. Another 85 sequences such as [bt, bṭ, bk] are predicted to be bad, but they occur in JUA. A different version of sonority-based analysis was introduced by Gouskova in 2004. This version will be tested in the following sub-section.

Testing Gouskova's Version of the Theory of Sonority Hierarchy

In this sub-section, I test Gouskova's (2004) model of the theory of sonority hierarchy to examine its capability to make correct prediction about permissible onset sequences in JUA. A finer-grained sonority scale, which is adapted from Jespersen's (1904) scale, is used in this model. The view of this model is that sequences have a universal sonority scale, shown in (6), in which sequences in the same column have the same sonority rise, which appears on the first top row. W in the sonority scale indicates a glide, R an [r]-like sound, L a lateral, N a nasal, Z a voiced fricative, S a voiceless fricative, D a voiced stop, and T a voiceless stop.

(6) Universal Scale of Sonority Rise (Gouskova, 2004)

0	+1	+2	+3	+4	+5	+6	+7
WW	RW	LW	NW	ZW	DW	SW	TW
RR	LR	NR	ZR	DR	SR	TR	
LL	NL	ZL	DL	SL	TL		
NN	ZN	DN	SN	TN			
ZZ	DZ	SZ	TZ				
DD	SD	TD					
SS	TS						
TT							

List (7) shows the extent to which Gouskova's version makes correct predictions in JUA. The MSD of JUA sequences is assumed to be set at 1 to exclude the lack of onset sequences such as [ww, jj, rr, ll, nn, mm, nm, mn] although sequences whose sonority rise is 0, [bd, bḍ, fṣ, fx, sf, sx, sḥ, sh, tṭ, tk, kt], are found in JUA.

(7) Onset Sequences (MSD >_1)
Predicted to be good and found (103 cases)
SD = 1 (RW, NL, ZN, DZ, SD, TS)
rj, rw, nl, ml, ʒm, bz, bẓ, bʒ, bɣ, bʕ, fḍ, sd, xd, ḥd, hd, ts, tṣ, tʃ, tx, tḥ, th, ks
SD = 2 (LW, NR, ZL, DN, SZ, TD)
lw, nr, mr, zl, ʒl, ʕl, bn, bm, dm, sʒ, xz, ḥz, ḥʒ, tb, td, tḍ, ṭb
SD = 3 (NW, ZR, DL, SN, TZ)
nw, mw, nj, mj, zr, ʒr, ʕr, bl, dl, ḍl, sm, ʃm, ḥm, tz, tẓ, tʒ, tɣ, tʕ
SD = 4 (ZW, DR, SL, TN)
zj, ʒw, ɣj, ʕj, br, dr, ḍr, fl, sl, ʃl, ḥl, hl, tn, tm, km, kn
SD = 5 (DW, SR, TL)
bj, bw, dj, dw, ḍj, fr, sr, ṣr, ʃr, ḥr, tl, ṭl, kl
SD = 6 (SW, TR)
sj, sw, ṣj, ʃj, ʃw, xj, xw, ḥw, tr, ṭr, kr
SD = 7 (TW)
tj, tw, ṭj, ṭw, kj, kw
Predicted to be good but not found (145 cases)
SD = 1 (ZN, DZ, SD, TS)
zm, ẓn, ẓm, ʒn, ɣm, ɣn, ʕm, ʕn, dz, dẓ, dʒ, dɣ, dʕ, ḍz, ḍẓ, ḍʒ, ḍɣ, ḍʕ, fb, fd, sḍ, ṣb, ṣd, ṣḍ, ʃb, ʃd, ʃḍ, xb, xḍ, ḥḍ, hb, hḍ, ṭs, ṭṣ, ṭʃ, ṭx, kṣ, kʒ, kʃ, kx, kḥ, ʔf, ʔs, ʔṣ, ʔʃ, ʔx, ʔḥ, ʔh
SD = 2 (LW, ZL, DN, SZ, TD)
lj, ẓl, ɣl, dn, ḍm, ḍn, fz, fẓ, fʒ, fɣ, fʕ, sz, sẓ, sɣ, sʕ, ṣz, ṣẓ, ṣʒ, ṣɣ, ṣʕ, ʃz, ʃẓ, ʃʒ, ʃɣ, ʃʕ, xẓ, xʒ, xɣ, xʕ, ḥẓ, ḥɣ, ḥʕ, hz, hẓ, hʒ, hɣ, hʕ, ṭd, ṭḍ, kd, kḍ, ʔb, ʔd, ʔḍ
SD = 3 (ZR, SN, TZ)
ẓr, ɣr, fm, fn, sn, ṣm, ṣn, ʃn, xm, xn, hn, hm, ḥn, ṭz, ṭẓ, ṭʒ, ṭɣ, ṭʕ, kz, kz, kẓ, kʒ, kɣ, kʕ, ʔz, ʔẓ, ʔʒ, ʔɣ, ʔʕ
SD = 4 (ZW, SL, TN)
zw, ẓj, ẓw, ʒj, ɣw, ʕw, ṣl, xl, ṭm, ṭn, ʔm, ʔn
SD = 5 (DW, SR, TL)
ḍw, xr, hr, ʔl
SD = 6 (SW, TR)
fj, fw, ṣw, ḥj, hj, hw, ʔr
SD = 7 (TW)
ʔw
Predicted to be bad but found (10 cases)
SD = 0 (DD, SS, TT)
bd, bḍ, fṣ, fx, sf, sx, sḥ, sh, tk, kt
Predicted to be bad and not found (18 cases)
SD = 0 (WW, RR, LL, NN, ZZ, DD, SS, TT)
wj, zʒ, zʕ, ẓʒ, ẓɣ, ẓʕ, ʒz, ʒẓ, ʒɣ, ʒʕ, ɣz, ɣẓ, ɣʒ, ɣʕ, ʕz, ʕẓ, ʕʒ, ʕɣ

Similarly, Gouskova's version seems to fail to predict some occurring sequences in JUA and seems to make wrong predictions about some other missing sequences. For example, it predicts that the sequence [kt] is bad but it is found in JUA and it predicts the sequence [fb] to be good but it does not exist in JUA.

ARTICULATOR-BASED FEATURE ANALYSIS OF JUA ONSET SEQUENCES

In this section, I present the main aspects of articulator-based feature theory and I examine the capability of the theory to account for permissible onset sequences in JUA.

Aspects of Articulator-based Feature Theory

The view of articulator-based feature theory is that words are comprised of consonants and vowels which in turn are made of distinctive features. The present theory is different from Chomsky and Halle's (1968) feature theory in the sense that it distinguishes between articulators and features: 'articulators are movable parts in the vocal tract that participate in speech production. A feature is a gesture made by an articulator' (Duanmu, 2002: 6). Duanmu's feature geometry in (8) is based on the works of Clements (1985), Sagey (1986), Ladefoged and Halle (1988), McCarthy (1988), Steriade (1989), Kenstowicz (1994), and Halle (1995).

(8) Articulator-based Feature Structure (Duanmu, 2002: 7)

Stricture features	Articulators	Their features
[sonorant][continuant]	Vocal-cords	[aspirated] [voice]
	Velum	[nasal]
	Dorsal	[high][low][back]
	Coronal	[anterior][lateral]
	Labial	[round]

Duanmu (2002: 8) lists some traditional terms and their counterparts in the current feature geometry, as shown in (9).

(9)

Traditional Terms	Feature Geometry
Stop	[-cont]
Obstruent	[-son]
Fricative	[-son, +cont]
Retroflex	Coronal-[+ant]
Palatal	Coronal and Dorsal-[-back]

Duanmu (2002: 8) clarifies the reason behind the combination of coronal and dorsal-[-back] for palatals. The first part accounts for alternation between palatals and coronals and 'the feature [-back] accounts for close interaction between front vowels and palatals.' A sound that has one place articulator is called a simple sound whereas a sound which has two or three place articulators is called a complex sound. For Duanmu (2002), when a sound has only one place articulator, this articulator is considered the primary articulator whereas when it has two or more articulators, the degree of closure is considered: the articulator that has greater constriction is considered the primary articulator and the one that has less constriction is considered the non-primary articulator[1]. If articulators have the same degree of closure, all of them are considered primary articulators.

For Duanmu, the two consonants that an onset sequence is comprised of occupy one slot – the onset. The two consonants comprise what is called a complex sound in the current theory. A complex sound can be thought of as a merger of two or more sounds (Duanmu, 2008). Consider the three cases in (10) (Duanmu, 2008: 25).

(10) (a) Different articulators ([F] can be any feature, same or different)

Time-1	Time-2	Time-1
Art_a-[F]	Art_b-[F] →	Art_a-[F]
		Art_b-[F]

(b) Same articulator, different features

Time-1	Time-2	Time-1
Art_a-[F_i]	Art_a-[F_j] →	Art_a-[F_i, F_j]

(c) Same articulator, different values of the same feature

Time-1	Time-2	
Art_a-[$+F_i$]	Art_a-[$-F_i$] →	?

For Duanmu, the two cases in (10a) and (10b) are accepted where two different articulators that make same or different gestures can do so simultaneously. The same is true for the articulator which makes two different gestures. However, the case in (10c) is unaccepted as a complex sound in Duanmu's current theory, as shown in (11).

(11) No Contour Principle (Duanmu, 2008: 174)
An articulator cannot make the same feature (F) twice within one sound.

A complex sound can have more than one articulator at the same time. However, the No Contour Principle governs possible and impossible complex sounds in a language.

Testing Duanmu's Articulator-based Feature Theory (Complex-Sound Approach)

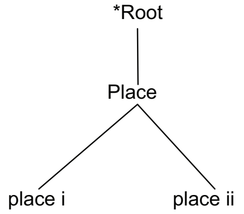
In this section, I test the articulator-based feature theory to investigate its capability to account for permissible onset sequences in JUA. Consider the sequences in (12), the asterisk * indicates a primary articulator.

(12) Labial-initial onset sequences in JUA

Sound	Example	Gloss	Articulator
[fṣ]	[fṣuːl]	'seasons'	*Labial, *Tongue-root
[fx]	[fxaːd]	'thighs'	*Labial, *Dorsal-[+back]
[bz]	[bzuːr]	'he visits'	*Labial, Coronal
[ms]	[msaːfir]	'active participle of travel'	*Velum-[+nasal], [-nasal]

A quick look at the sequences [fṣ] and [fx] reveals that the consonants involved in each of the two sequences have two primary articulators. According to Duanmu, this is because the two consonants involved in each sequence have the same degree of closure. However, the literature (e.g. Berry, 1955; Anderson, 1976; Selkirk, 1993; cited in Watson, 2002) shows that it is necessary for segments with multiple articulations to distinguish between primary and non-primary place even in the case when the degree of constriction is the same for the two articulations and hence the constraint of No Dual Place was introduced in Selkirk (1993: 32; cited in Watson, 2002: 30), see (13).

(13) No Dual Place



Let's have a look at the sequence [bz] where the consonant [b] has a greater degree of closure and thus *labial* is a primary articulator. The consonant [z] in the same sequence has a less degree of closure but *coronal* cannot be a non-primary articulator, either. This is because the stricture of [z] is [-son, +cont], and for an articulator to be non-primary its stricture should be [+son, +cont]. In this case, *coronal* is neither primary nor non-primary. A further issue with stop plus fricative sequences such as [bz] is that there is no difference between [bz] and [zb]. The two consonants involved in the [bz] have two different articulators and thus they can be made simultaneously; however, this means that [bz] is identical to [zb]. Thus, JUA cannot have [bz] and [zb] as two different sequences, but this cannot be true. The two consonants involved in [ns] have conflicting features; the [n] is [+nasal] while the [s] is [-nasal]. Nevertheless, the sequence [ns] exists in JUA. Moreover, JUA has both [ns] and [sn] as two different sequences, as in [nsaː-fir] 'we travel' and [snaːn] 'teeth', respectively.

Apart from the sequences in the list above, JUA has a set of consonants [b, m, n, t, j] which can be adjacent to all other consonants forming permissible onset sequences: [bt, bṭ, bk, bʔ, bd, bḍ, bf, bs, bṣ, bʃ, bx, bḥ, bh, bz, bẓ, bʒ, bɣ, bʕ, bm, bn, bl, br, bj, bw, mt, mṭ, mk, mʔ, mb, md, mḍ, mf, ms, mṣ, mʃ, mx, mḥ, mh, mz, mẓ, mʒ, mɣ, mʕ, mn, ml, mr, mj, mw, nt, nṭ, nk, nʔ, nb, nd, nḍ, nf, ns, nṣ, nʃ, nx, nḥ, nh, nz, nẓ, nʒ, nɣ, nʕ, nm, nl, nr, nj, nw, tṭ, tk, tʔ, tb, td, tḍ, tf, ts, tṣ, tʃ, tx, tḥ, th, tz, tẓ, tʒ, tɣ, tʕ, tm, tn, tl, tr, tj, tw, jt, jṭ, jk, jʔ, jb, jd, jḍ, jf, js, jṣ, jʃ, jx, jḥ, jh, jz, jẓ, jʒ, jɣ, jʕ, jm, jn, jl, jr, jw]. A quick look at these sequences reveals that JUA has, for example, the sequences [bt] and [tb] which are two different sequences. However, for Duanmu, these sequences are identical.

CONCLUSION

In this article I tested Kenstowicz's (1994) and Gouskova's (2004) two versions of sonority theory and Duanmu's (2002, 2008) articulator-based feature theory. The aim of the study was to examine to what extent the two versions of sonority theory in question can make correct predictions about permissible onset sequences in JUA. The study also aimed at investigating if the articulator-based feature theory could account for permissible onset sequences in JUA. Findings have shown that the two versions of the sonority theory seemed to fail to predict some occurring sequences in JUA and to make wrong predictions about some other missing sequences. Some sequences violate the MSD, but they are found in JUA such as [sd] while some other sequences satisfy the MSD, but they are not found in JUA such as [lm]. Kenstowicz's version of the sonority theory makes 166 wrong predictions, where 81 onset sequences such as [ṭn] are predicted to be good, but they do not exist in JUA. The other 85 sequences such as [bt] are predicted to be bad, but they are found in JUA. Gouskova's version of the theory makes 155 wrong predictions, in which 145 sequences are predicted to be good, but they are not found in JUA. Other 10 sequences are predicted to be bad, but they exist in JUA.

Findings of the study have also shown that the articulator-based feature theory failed to prove the capability to account for permissible onset sequences in JUA. It has been found that complex sounds which have two primary articulators violate the No Dual Place constraint. The two consonants involved in a complex sound such as [bz] have two different articulators, and thus they can be made simultaneously. This means that the sequences [bz] and [zb] are identical. However, [bz] and [zb] are two different sequences in JUA and thus cannot be the same. The consonants which are involved in onset sequences such as [ns], [ms], [nz], [mz], [nd] and [nr] have conflicting features. However, they do exist in JUA.

ENDNOTE

1. Following Selkirk (1993), I opted for using the terms *primary* and *non-primary* in replacement for Duanmu's terms of *major* and *minor*, respectively.

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APPENDIX 1

The IPA symbols for Jordanian Urban Arabic consonantal and vocalic phonemes (adapted from Sa'aida, 2015: xiv-xv; cf. Sa'aida, 2016, 2017)

1. /t/: voiceless plain dental plosive.
2. /ṭ/: voiceless emphatic dental plosive.
3. /k/: voiceless velar plosive.
4. /q/: voiceless uvular plosive.
5. /ʔ/: voiceless glottal plosive.
6. /b/: voiced bilabial plosive.
7. /d/: voiced plain dental plosive.
8. /ḍ/: voiced emphatic dental plosive.
9. /f/: voiceless labiodental fricative.
10. /s/: voiceless plain alveolar fricative.
11. /ṣ/: voiceless emphatic alveolar fricative.
12. /ʃ/: voiceless post-alveolar fricative.
13. /x/: voiceless velar fricative.
14. /ḥ/: voiceless pharyngeal fricative.
15. /h/: voiceless glottal fricative.
16. /z/: voiced plain alveolar fricative.
17. /ẓ/: voiced emphatic alveolar fricative.
18. /ʒ/: voiced post-alveolar fricative.
19. /ɣ/: voiced velar fricative.
20. /ʕ/: voiced pharyngeal varies between fricative and approximant.
21. /m/: voiced bilabial nasal.
22. /n/: voiced alveolar nasal.
23. /l/: voiced alveolar lateral.
24. /r/: voiced alveolar trill.
25. /w/: voiced labial-velar glide.
26. /j/: voiced palatal glide.
27. /i/: high front short vowel.
28. /u/: high back rounded short vowel.
29. /a/: low central short vowel.
30. /iː/: high front long vowel.
31. /uː/: high back rounded long vowel.
32. /aː/: low front long vowel.
33. /eː/: mid front long vowel.
34. /oː/: mid back rounded long vowel.