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The Phonological Adaptation of English Loanwords in Jizani Arabic: An OT Analysis

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***Abstract*—This paper presents a phonological analysis of English loanwords within Jizani Arabic (JA). JA is a Saudi dialect spoken in the southwestern region of Saudi Arabia, specifically in Jizan City, the capital of Jazan province. This study investigates the phonological adaptation of loanwords at both the segmental and suprasegmental levels using optimality theory (OT) constraints (Prince & Smolensky, 1993, 2004). A corpus consisting of 114 English loanwords that have been integrated into JA was analysed using the data elicitation technique. The study's 15 participants are monolingual native speakers of JA. The results of the segmental adaptation show that JA speakers tend to use a process of nativisation to replace the sounds of both consonants and vowels in English loanwords that do not exist in JA with phonemes that are available in JA's phonemic inventory. At the suprasegmental level, the stress of the loanwords falls on the heaviest syllable, following the stress pattern that governs words that are original to JA.**

***Index Terms*—English loanwords, phonological adaptation, phonological processes, OT constraints, JA**

I. Introduction

Previous studies have analysed the phonological adaptation of English loanwords in different languages, including many Arabic dialects: Modern Standard Arabic (MSA), Hadrami Yemeni Arabic, Egyptian Arabic, Ammani Arabic, Jordanian Arabic, Urban Hijazi Arabic, Madinah Hijazi Arabic, Taifi Arabic, and Qassimi Arabic (Abu Guba, 2016, 2021; Al-Athwary, 2017; Alhoody, 2019; Almathkuri, 2022; Alomoush & Alfaqara, 2010; Aloufi, 2016; Al-Qudah & Mahadin, 2024; Al-Saqqaf, 2006; Jarrah, 2013). However, to the best of the researcher's knowledge and based on an extensive review of the existing literature, the phonological analysis of English loanwords in Jizani Arabic (JA) had never been previously investigated using OT constraints. In Jizan City, the capital of Jazan province, native speakers use JA for everyday communication. Thus, this research is significant, as it contributes to knowledge about English loanwords by explaining how they are adapted into this dialect and identifying the phonemes that are replaced to achieve integration into this dialect using optimality theory (OT) constraints (Prince & Smolensky, 1993, 2004). This study is also important because it uses OT constraints and moraic theory to discuss the suprasegmental adaptation of these loanwords in terms of the stress and syllable weight (Hyman, 1985; Hayes, 1989; McCarthy & Prince, 1990).

The remainder of this paper is structured as follows. In Section 2, previous studies of English loanwords in different languages, including Arabic, are summarised to identify the research gap and clarify this study's significance. Further, the variation between the phonemic inventories of JA and English are briefly discussed to justify changes to these borrowed words when they are integrated into the dialect under investigation (JA). Section 3 outlines the methodology used to collect data for this study. Section 4 discusses the segmental and suprasegmental changes to English loanwords that facilitated their integration into JA based on the phonotactic constraints that govern this dialect. Section 5 presents the OT analysis, and finally, section 6 offers concluding remarks.

II. Background and Literature Review

According to Campbell (1999), words that are transferred from one language (sometimes called the *donor* language) into another (sometimes called the *recipient* language) are called 'loanwords', and this process is called 'linguistic borrowing'.[1] In other words, loanwords are words that are taken from one language and used in another. These borrowed words typically undergo a process involving some degree of phonological or morphological 'adaptation' to fit into the phonological system and rules of the recipient language (Kang, 2011). This paper considers the phonological changes that these loanwords undergo at the segmental level (phonemic) and the suprasegmental level (weight and stress adaptation only), as some previous research has already discussed the syllabic adaptation of English loanwords in JA.

Previous studies have described the incorporation of English loanwords into other languages through either adaptation or adoption. In adaptation, loanwords from the donor language are modified so that they conform to the phonotactic constraints of the recipient language. In contrast, adoption involves incorporating loanwords from the donor

[1] It should be mentioned that "Loanwords" typically occur due to different factors, such as cultural exchange, trade, technology transfer, colonization, need and prestige, or other forms of contact between speakers of different languages. However, an in-depth exploration of these factors is beyond the scope of this paper.

language into the recipient language without changing them. The English loanwords that have been analysed in the Arabic dialects mentioned above undergo adaptation at both the segmental and suprasegmental levels (Abu Guba, 2016, 2021; Al-Athwary, 2017; Alhoody, 2019; Almathkuri, 2022; Alomoush & Alfaqara, 2010; Aloufi, 2016; Al-Qudah & Mahadin, 2024). At the segmental level, speakers of various Arabic dialects tend to replace English phonemes that are unavailable in their phonemic inventory with the closest sounds in their dialect; for instance, the /p/ sound in English loanwords is replaced by /b/ because the former is unavailable in Arabic. Thus, Arabic speakers would pronounce the word 'panda' /ˈpæn.də/ as [ˈbaːn.da], while the word 'villa' /ˈvɪl.ə/ becomes [ˈfil.la]. However, at the suprasegmental level, Arabic speakers use different phonological processes, such as vowel shortening, deletion, and insertion, to adapt English words. The English word 'jeans' /dʒiːnz/ is adapted into many Arabic dialects as [dʒinz]; vowel shortening is used to maintain the legitimate weight of the syllable as trimoraic syllable is strongly prohibited. Meanwhile, the word 'scooter' /ˈskuː.tər/ becomes [ʔis.ˈkuː.tar]; a glottal stop and a vowel are inserted to avoid having a syllable with complex onset, which is not allowed in MSA and many Arabic dialects.

These changes to English loanwords are not restricted to Arabic. Various languages exhibit similar changes at both the segmental and suprasegmental levels. For instance, in Ewe (a language spoken in Ghana and Togo), native speakers tend to replace English loanword phonemes that do not exist in Ewe with acoustically similar Ewe phonemes. Thus, the English words 'thick' /θɪk/ and 'thin' /θɪn/ are adapted in Ewe as [tik] and [tin] because the phoneme /θ/ does not exist in this language's phonemic inventory (Wornyo, 2016). At the suprasegmental (prosodic) level, the Ewe language adopts the stress patterns of English loanwords, despite being a tonal language. In adapting monosyllabic English loanwords, vowel epenthesis is employed to satisfy Ewe's syllable structure constraints, as codas are not permitted. For instance, the English word 'ball' is adapted as [bɔ.lu], with a high tone (H) applied to the first syllable. For disyllabic English loanwords, if stress is placed on the first syllable, a high tone (H) is assigned to this syllable in Ewe, as well. An example is the English word 'tractor' /ˈtræk.tə/; the stress falls on the first syllable, making it the stronger one. In Ewe, this word is adapted as [tra(H).ta(L)], with the high tone (H) on the stressed first syllable and a low tone (L) on the unstressed final syllable. In summary, the stressed syllable in English corresponds to the syllable that receives a high tone in Ewe.

Alenazi (2023) has explained that adapting unfamiliar English sounds is common in some languages. For example, in Quebec French dialects, the English postalveolar fricative /ʃ/ in borrowed words is replaced with /h/, turning 'shop' /ʃɔp/ into [hɔp]. Similarly, in Korean, the English /z/ sound is adapted as /ts/, so 'zoom' becomes [tsum].

To clarify the phonological changes that English loanwords undergo in JA, the following section provides an overview of English and JA phonology.

Phonology of English and JA: An Overview

This section discusses the phonological systems of both English and JA to identify the adaptation patterns, including those related to consonants, vowels, and stress. JA contains 25 consonantal phonemes in different places of articulation and eight vowels (Abbas, 2018; Bosli & Cahill, 2022; Ruthan, 2020). Standard British English, meanwhile, contains 24 consonants and 12 vowels (monophthongs), not including diphthongs and triphthongs (Cahill, 2019). Compared to the phonemic inventory of English consonants, JA lacks the sounds /p/, /v/, /tʃ/, /ʒ/, and /ŋ/. In terms of vowels, it is important to note that, similar to MSA and many other Arabic dialects, JA has fewer vowels than English. All modern Arabic dialects contain at least three long vowels (Watson, 2002). JA has a vowel inventory of eight vowels: three long vowels (/aː, iː, uː/), three short vowels (/a, i, u/), and two long mid-vowels (/eː/ and /oː/) (Bosli & Cahill, 2022). Consequently, this paper focuses on the adaptation of loanwords containing specific consonantal and vowel sounds that do not occur in JA's phonemic inventory. It examines how native speakers adapt these sounds in segmental phonology, and it analyses the stress adaptation of English loanwords in JA, focusing on syllable weight at the suprasegmental phonology.

III. Methodology

To analyse the phonological adaptation of English loanwords in JA, a data elicitation technique was employed in which the orthography was excluded from the list to minimise any protentional influence of written language. A list of approximately 114 pictures of English nouns that have been adopted in JA was designed and arranged alphabetically (see appendix). Fifteen participants from Jizan City were recruited for the study; they were female, monolingual, native speakers of JA between 20 and 40 years old and were selected to eliminate the influence of a second language on their pronunciation of the target words. The task involved asking each participant to name the pictures on the list. Some abstract nouns, such as 'protocol' and 'April', were included without pictures, because they do not refer to a specific object; therefore, the researcher posed additional questions to help participants produce the target word. The participants did so correctly, indicating that these words are indeed loanwords in JA, except in one case: 'parachute'. Most participants replaced this word with a completely different one, which may indicate that this word is not actually borrowed in this dialect; 'parachute' was thus excluded from the analysis. After recording their pronunciation of the words, the recordings were manually transcribed using International Phonetic Alphabet (IPA) symbols for the analysis. To investigate the adaptation of loanwords, the JA speakers' pronunciations were compared to those found in the *Online Cambridge Dictionary* (UK English, https://dictionary.cambridge.org).

IV. Discussion

This section has two primary subsections. The first addresses segmental adaptation and analyses the consonants and vowels of English loanwords in JA, and the second examines suprasegmental adaptation, specifically the stress patterns of English loanwords in JA.

A. Segmental Adaptation

(a). Consonant Adaptation

The participants faithfully produced all the consonants that already exist in their native language. However, they replaced all the sounds that are not present in JA's phonemic inventory; for instance, all words containing the consonant sounds (/p/, /tʃ/, /v/, /ʒ/, and /ŋ/) underwent some changes. According to Kang (2011, p. 8), 'when the foreign input contains a non-native segment, the segment is replaced with the "closest" sound in the native language'. This is true in the case of JA, as these sounds were replaced with the nearest phonetic equivalent sounds in the recipient dialect. This process is called 'segmental adaptation' or 'phoneme substitution', wherein the native speakers of a language or dialect replace unfamiliar sounds from one language with similar, more familiar sounds from their native language. The following table illustrates how JA speakers adapt English phonemes.

Table 1
Consonantal Adaptation of English Loanwords in JA

English loanwords	UK English pronunciation	JA pronunciation	Sound change
Panda	[pæn.də]	[baːn.da]	p>b
Petrol	[pet.rəl]	[bit.roːl]	
Chips	[tʃɪps]	[ʃibs]	tʃ>ʃ
Inch	[ɪntʃ]	[ʔinʃ]	
Van	[væn]	[faːn]	v>f
Visa	[viː.zə]	[fiː.za]	
Massage	[mæs.ɑːʒ]	[ma.saːdʒ]	ʒ>dʒ
Garage	[gær.ɑːʒ]	[ga.raːdʒ]	
Bank	[bæŋk]	[bank]	ŋ>n
Hanger	[hæŋ.ər]	[han.gar]	

The data in Table 1 shows that the JA speakers replaced sounds that were absent from the JA phonemic inventory (for instance, the voiceless bilabial stop /p/, the voiceless post-alveolar affricate /tʃ/, the voiced labiodental fricative /v/, the voiced post-alveolar fricative /ʒ/, and the voiced velar nasal /ŋ/) with the most closely articulated sounds within the recipient dialect's phonemic inventory (/b/,/ʃ/, /f/, /dʒ/, and /n/, respectively). The JA speakers therefore participated in phonological processes such as voicing, deaffrication, devoicing, and affrication to adapt English loanwords containing consonants that are absent from the JA phonemic inventory.

Voicing is a phonological process that involves changing a voiceless sound into a voiced one to follow the phonological system of the native language. Thus, JA speakers replaced the voiceless sound /p/ with /b/, which is considered the closest native equivalent. It should be noted that voicing is not contrastive in Arabic. The second phonological process that the JA speakers applied to adapt the English loanwords is called 'deaffrication', wherein an affricate sound, which is a combination of a stop and a fricative (such as /tʃ/ or /dʒ/), is replaced by a fricative sound (such as /ʃ/ or /ʒ/). This means that the stop component of the affricate is deleted, leaving only the fricative sound. According to the data in table 1, in cases of deaffrication, JA speakers pronounced the English word /tʃɪps/ as [ʃibs] 'chips', with the fricative /ʃ/ rather than the affricate /tʃ/. The third phonological process that the JA speakers employed to adapt the English loanwords was devoicing; they replaced the voiced sound /v/ with a voiceless /f/. For instance, they articulated /viː.zə/ as [fiː.za] 'visa'. Another phonological process to adapt English loanwords to JA's phonological system is 'affrication', in which a fricative sound /ʒ/ changes to an affricate /dʒ/; for instance, /ga.raːʒ/ would be adapted in JA as [ga.raːdʒ] 'garage'. These examples demonstrate that JA speakers adapted English loanwords into their dialect by replacing sounds that are absent in this dialect with the closest equivalent sounds through nativisation.

(b). Vowel or Vocalic Adaptation

This section addresses the patterns within the adaptation of English vowels to suit JA's phonemic inventory. The result of the analysis indicates that English vowels that are unmarked (available) in JA, such as /iː, uː, and aː/, were faithfully adapted. In contrast, English vowels that are marked (not present) in JA, including /ɪ, ʊ, ɛ, æ, ɑ, ɒ, o, ɔ, ʌ, and ə/, were replaced by the closest corresponding vowels available in JA's phonemic inventory. It is important to note that there is no consistent pattern regarding the adaptation of each vowel in this dialect, and the same vowel in different English words could be adapted differently in JA. For instance, /tʃɪps/ was adapted into JA as [ʃibs] 'chips', while the same vowel in the second syllable of the word /tæk.tɪk/ was adapted as [tak.tiːk] 'tactic'. Therefore, the results indicate that English vowels that do not occur in the phonemic inventory of JA are substituted with vowels that are available within JA's phonological system. In other words, JA speakers modified English vowels in loanwords through a process of nativisation, substituting English vowels with those present in the JA's phonological system. The following table provides several examples of vowel adaptation in JA.

TABLE 2
THE VOWEL ADAPTATION OF ENGLISH LOANWORDS IN JA

English loanwords	UK English pronunciation	JA pronunciation	Sound change
Cup	[kʌp]	[koːp]	ʌ > oː
Cake	[keɪk]	[keːk]	eɪ > eː
Cocktail	[kɒk.teɪl]	[kuk.teːl]	ɒ>u & eɪ > eː
Tattoo	[tətuː]	[taːtoː]	ə > aː & uː>oː
Facebook	[feɪs.bʊk]	[feːs.buk]	eɪ > eː & ʊ >u
Snapchat	[snæp.tʃæt]	[snaːpʃaːt]	æ>aː
Chips	[tʃɪps]	[ʃibs]	ɪ>i
Cartoon	[kɑːtuːn]	[kaɾtuːn]	ɑː>a
Coat	[kəʊt]	[koːt]	əʊ>oː
Term	[tɜːm]	[tirm]	ɜː>i

The data in Table 2 indicate that JA speakers tended to replace all vowels in an English loanword that are absent in their native dialect with the closest available JA sounds. Generally, English diphthongs in loanwords are adapted to long mid vowels in JA; for instance, /eɪ/ and /əʊ/ become [eː] and [oː], respectively.

B. Suprasegmental Adaptation

Stress Adaptation

The stress on loanwords can be assigned in one of two main ways: by maintaining the stress of the source language without making any changes (stress adoption) or by changing the placement of the stress to follow the stress patterns within the recipient language (stress adaptation; Buczek-Zawiła, 2015). JA is a quantity-sensitive dialect, and the stress placement within a word is determined by the syllable's weight and position. Following Hellmuth (2013), the quantity of the syllables is crucial in determining the stress patterns across all Arabic dialects. In many Arabic dialects, including JA, word stress typically falls on the heaviest syllable. When all syllables are of equal weight, the stress generally falls on the penultimate syllable. To clarify how the weight of a syllable is measured in Arabic, moraic theory is briefly explained. A mora is identified as a phonological weight unit and is symbolised as μ (Hayes, 1989; Hyman, 1985; McCarthy & Prince, 1990). The weight of a syllable is measured by the number of moras that it contains (Hall, 2001; Hayes, 1989; McCarthy, 1979; McCarthy & Prince, 1990). A syllable is considered heavier than another if it contains more moras. According to this theory, vowels are inherently moraic, while consonants are not, except when they are geminates. A short vowel is monomoraic, whereas long vowels and diphthongs are bimoraic. Geminate consonants always carry a single mora, but a single consonant is not moraic unless the weight by position (WBP) constraint is applied (Hayes, 1989). This constraint assigns a mora to consonants in the coda position in the surface representation (SR), but not in the onset, as onset consonants never affect syllable weight (Morén, 1999) and are directly associated with the syllable node (McCarthy & Prince, 1990; Hayes, 1989). This theory distinguishes light syllables (which contain one mora), heavy syllables (which contain two moras), and superheavy syllables (which contain three moras). The following figure illustrates the weight representation of the different syllables in moraic theory.

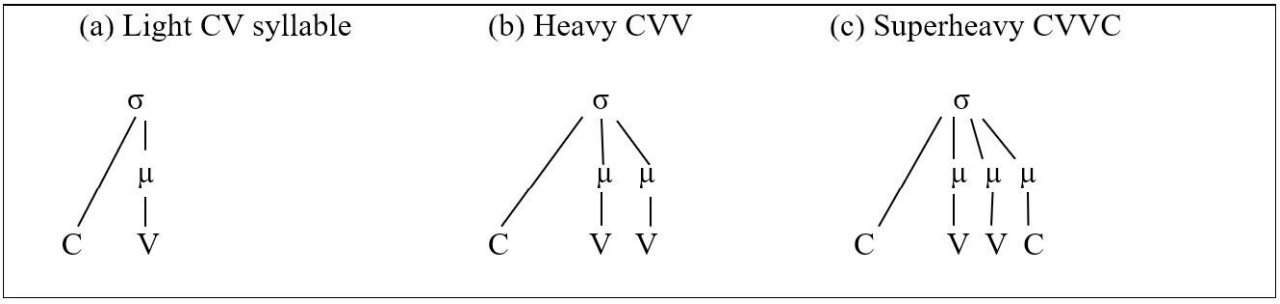

Figure 1. Weight Representation of Different Syllables in Moraic Theory

The maximum legitimate weight of a syllable in MSA and many Arabic dialects (including JA) is bimoraic (Broselow, 2018; Broselow et al., 1992, 1997; Kiparsky, 2003; Watson, 2002, 2007). In most Arabic dialects, including JA, the stress is predictable and governed by the syllable weight and position. Therefore, this paper analyses the stress patterns of English loanwords in JA and identify any differences between the stress placement in these two languages that are due to adaptation. The following table shows how the stress of English loanwords is adapted to JA to follow the stress patterns that govern this dialect.

TABLE 3
STRESS ADAPTATION OF ENGLISH LOANWORDS IN JA

English loanwords	UK English stress	JA stress	English loanwords	UK English stress	JA stress
Acid	[ˈæs.ɪd]	[ʔa.ˈ**si**:**d**]	Doughnut	[ˈdəʊ.nʌt]	[doː.ˈ**na**:**t**]
Airbag	[ˈeə.bæg]	[ʔir.ˈ**ba**:**g**]	Drama	[ˈdrɑː.mə]	[di.ˈ**ra**:.ma]
Album	[ˈæl.bəm]	[ʔal.ˈ**bu**:**m**]	Excel	[ɪkˈsel]	[ˈ**ʔik**.sil]
April	[ˈeɪ.prəl]	[ʔabˈ**ri**:**l**]	Freezer	[ˈfriː.zər]	[fi.ˈ**re**:.zar]
Archive	[ˈɑː.kaɪv]	[ʔar.ˈ**ʃi**:**f**]	Gallon	[ˈgæl.ən]	[dʒaː.ˈ**lu**:**n**]
Aspirin	[ˈæs.prɪn]	[ʔas.bi.ˈ**ri**:**n**]	Jacket	[ˈdʒæk.ɪt]	[dʒa.ˈ**ke**:**t**]
Batman	[ˈbæt.mən]	[ˈ**ba**:**t.** maːn]	Massage	[ˈmæs.ɑːʒ]	[ma.ˈ**sa**:**dʒ**]
Casino	[kəˈsiː.nəʊ]	[ˈ**ka**.zi.nu]	Mascara	[mæsˈkɑː.rə]	[ˈ**mas**.ka.ra]
Ceramics	[səˈræm.ɪks]	[sa.ra.ˈ**mi**:**k**]	Oxygen	[ˈɒk.sɪ.dʒən]	[ʔuk.si.ˈ**dʒi**:**n**]
Cholesterol	[kəˈles.tər.ɒl]	[ku.list.ˈ**ro**:**l**]	Ozone	[ˈəʊ.zəʊn]	[ʔoː.ˈ**zo**:**n**]
Cocktail	[ˈkɒk.teɪl]	[kuk.ˈ**te**:**l**]	Pancake	[ˈpæn.keɪk]	[ban.ˈ**ke**:**k**]
Coupon	[ˈkuː.pɒn]	[ku.ˈ**bo**:**n**]	Petrol	[ˈpet.rəl]	[bit.ˈ**ro**:**l**]
Crystal	[ˈkrɪs.təl]	[ki.ris.ˈ**ta**:**l**]	Professor	[prəˈfes.ər]	[bu.ru.fi.ˈ**so**:**r**]
Custard	[ˈkʌs.təd]	[kas.ˈ**tard**]	Protocol	[ˈprəʊ.tə.kɒl]	[bu.roː.tu.ˈ**ko**:**l**]
Doctor	[ˈdɒk.tər]	[dak.ˈ**tu**:**r**]	Transit	[ˈtræn.zɪt]	[ti.ran.ˈ**ze**:**t**]

The above table indicates a variation between the stressed syllable in English and JA. This variation occurs to obey the constraints that govern stress placement in JA. Thus, the stress shifts to the heaviest syllable in a word to follow the stress pattern in JA. For instance, JA speakers adapt the word 'album' as [ʔal.ˈbuːm]. The glottal stop is inserted in the first syllable to avoid an onsetless syllable, which is strongly prohibited in all Arabic dialects (including JA). Based on the *Online Cambridge Dictionary*, UK English speakers tend to stress the first syllable [ˈæl.bəm]. However, when this word is adapted into JA, the stress shifts to the second syllable because it is the heaviest one in the word. The second syllable of this word [ʔal.ˈbuːm] is bimoraic because the last consonant is analysed as either an extrasyllabic consonant or a degenerate syllable that does not affect the syllable weight (Watson, 2002).[2] Thus, this variation occurs due to suprasegmental adaptation to make it possible to obey the stress constraints that govern JA phonology. In all examples in the table above, stress shifts to the heaviest syllable to adapt English loanwords into JA. In cases where there is no distinction between the syllables' weight, the stress usually falls on the penultimate syllable. The following section explains the OT analysis of the segmental and suprasegmental adaptation of English loanwords in JA.

V. OT ANALYSIS

This section describes the OT analysis of the segmental and suprasegmental adaptation of English loanwords into JA. Initially, the OT analysis for segmental adaptation is presented, followed by a discussion of the analysis using OT constraints for suprasegmental adaptation (stress). This study assumes that the underlying representation (UR) or input comes from the source language (English pronunciation). Prior to the analysis, the constraints and their corresponding definitions are presented.

ONSET → A syllable must have an onset. (Kager, 1999)
MAX-IO → Every segment in the input has a correspondent in the output. ('No deletion'; Kager, 1999)
DEP-IO →The output segments must have input correspondents. ('No epenthesis'; Kager, 1999)
IDENT-IO → An input segment and its output correspondent must be identical.
Weight-to-stress principle (WSP) → If a syllable is heavy, then it is stressed. (Prince, 1990)
***p** → A voiceless labial stop is not allowed. (Al-Qudah & Mahadin, 2024)
***v**→ A voiced labial fricative is banned. (Al-Qudah & Mahadin, 2024)
***ə** → Schwa is prohibited.
***ɪ** → A short front (near-) high unrounded vowel is banned.
***tʃ** → A voiceless alveopalatal affricate is not allowed. (Al-Qudah & Mahadin, 2024)

TABLE 4
/pet.rəl/ → [bit.roːl]
*p, *ə , ONSET >>MAX-IO>> DEP-IO, IDENT-IO

pet.rəl	*p	*ə	ONSET	MAX-IO	DEP-IO	IDENT-IO
☞ a. [bit.roːl]					*	*
b. [pet.rəl]	*!					
c. [petr.əl]			*!			

As the table above shows, candidate (a) is the optimal one, as it obeys all the highly ranked constraints that cannot be violated in the grammar of JA. The faithful candidate (b; faithful to the input) fails to be optimal because it violates constraint *p, as the phonemic inventory of this dialect does not contain this phoneme. Candidate (c) has a syllable without an onset, which violates one of the undominated constraints in the grammar of JA, and its failure to satisfy this constraint is fatal. The sound /p/ in English loanwords is adapted as [b] in JA, and OT accounted for this change by assuming that constraint *p was one of the highly undominated constraints in JA grammar. The following table

[2] Kiparsky (2003) refers to this consonant as a semisyllable where Watson (2011) uses the term extrametrical consonant.

illustrates how JA speakers replace /v/ with [f].

TABLE 5

/viː.zə/ → [fiː.zaː]

***v**, *ə, ONSET>>MAX-IO>> DEP-IO, IDENT-IO

/viː.zə/	***v**	***ə**	**ONSET**	**MAX-IO**	**DEP-IO**	**IDENT-IO**
☞ a. [fiː.zaː]					*	*
b. [viː.zə]	*!					
c. [fiːz.aː]			*!			

Candidates (b) and (c) are ruled out from the competition because they incur fatal violations for the undominated constraints *v, *ə, and ONSET. Candidate (a) is optimal, as it obeys all the highly ranked constraints outlined above and shows two violation marks for the low-ranked constraint relative to other constraints, based on the constraints hierarchy presented in table 5 above. The violations of these constraints are not harmful as violating *v, *ə, and ONSET, which are considered undominated in the JA grammar. The following table illustrates OT constraints that are used to explain the adaptation of /tʃ/ in JA.

TABLE 6

/ɪntʃ/ → [ʔinʃ]

*tʃ, *ɪ, ONSET>>MAX-IO>> DEP-IO, IDENT-IO

/ɪntʃ/	***tʃ**	***ɪ**	**ONSET**	**MAX-IO**	**DEP-IO**	**IDENT-IO**
a. ɪntʃ	*!					
☞ b.ʔinʃ				*	*	*
c. inʃ			*!			

Based on this table, candidate (a) is eliminated due to the fatal violations it incurs for the undominated and highly ranked constraints *tʃ, *ɪ, and ONSET. Candidate (b) is optimal because it satisfies the highly ranked constraints and show violations of some of the violable and low-ranked constraints. Violating these constraints MAX-IO, DEP-IO, and IDENT-IO is less harmful than violating the undominated constraints in JA grammar. Candidate (c) begins with a vowel, which violates one of the undominated constraints in JA grammar that requires syllables to start with a consonant. Thus, this candidate is eliminated. The following table presents the OT analysis of stress adaptation in JA.

TABLE 7

/ˈæl.bəm/ → [ʔalˈbuːm]

WSP, ONSET>> MAX-IO>> DEP-IO>> IDENT-IO

/ˈæl.bəm/	**WSP**	**ONSET**	**MAX-IO**	**DEP-IO**	**IDENT-IO**
☞ a. [ʔalˈbuːm]				**	*
b.[ˈælbuːm]	*!				
c. [ælˈbuːm]		*!			

The stress in the input falls on the first syllable. However, when JA speakers adapt this word, the stress shifts to the second syllable to follow the stress constraints governing this dialect, in which a syllable's weight plays a significant role in attracting the stress. Therefore, candidate (a) is the optimal one, although it has three violation marks. These violations are not crucial because these constraints are ranked lower in the grammar of JA based on the constraint hierarchy above. As explained earlier, the stress in JA falls on the heaviest syllable within a word. Thus, WSP should be undominated, and any candidate that violates this constraint cannot be chosen as optimal. For this reason, candidate (b) is eliminated because the stress falls on the first syllable, which violates WSP. Further, candidate (c) is eliminated, as the first syllable starts with a vowel rather than a consonant, which is not tolerated in any Arabic dialect, including JA.

VI. CONCLUSION

JA, like many Arabic dialects, has borrowed words from English. However, JA's English loanwords have not previously been investigated phonologically using OT constraints. This study revealed that, at the segmental level, JA speakers tend to replace English phonemes that do not exist in this dialect (such as /p/, /v/, /tʃ/, /ʒ/ and /ŋ/) with the sound that is closest in articulation within JA's phonemic inventory through a process of nativisation, employing various phonological processes, such as voicing, devoicing, affrication and deaffrication. At the suprasegmental level, JA speakers inserted a glottal stop to avoid having an onsetless syllable or complex onset. The stress within loanwords shifts to the heaviest syllable within a word. In cases where there is no distinction between the weight of the syllables, the stress usually falls on the penultimate one (for instance, [ˈlaːb.toːb] 'laptop'), similar to the pattern within native JA words. This study illustrated that OT can account for phonological changes at both phonological levels: segmental and suprasegmental.

APPENDIX. LIST OF BORROWED WORDS IN JA

No.	Loanwords	UK English pronunciation	JA pronunciation	No.	Loanwords	UK English pronunciation	JA pronunciation
1	Action	[ˈækʃən]	[ˈʔak.ʃin]	**58**	Ice-cream	[aɪs.ˈkriːm]	[ʔas.ki.riːm]
2	Acid	[ˈæsɪd]	[ʔa.ˈsiːd]	**59**	Inch	[ɪntʃ]	[ʔinʃ]
3	Admin	[ˈædmɪn]	[ˈʔad.min]	**60**	Insulin	[ˈɪn.sjə.lɪn]	[ʔan.su.ˈliːn]
4	Agenda	[əˈdʒɛndə]	[ʔaˈdʒin.da]	**61**	Jacket	[ˈdʒæk.ɪt]	[dʒa.kitː]
5	Airbag	[ˈeə.bæg]	[ʔir.ˈbaːg]	**62**	Jacuzzi	[dʒəˈkuː.zi]	[dʒaˈkuː.zi]
6	Album	[ˈælbəm]	[ʔal.ˈbuːm]	**63**	Jeans	[dʒiːnz]	[dʒinz]
7	April	[ˈeɪprəl]	[ʔabˈriːl]	**64**	Jelly	[ˈdʒel.i]	[ˈdʒi.li]
8	Archive	[ˈɑːkaɪv]	[ʔar.ˈʃiːf]	**65**	Keyboard	[ˈkiː.bɔːd]	[ˈkiː.boːrd]
9	Aspirin	[ˈæs.prɪn]	[ʔas.biˈriːn]	**66**	Ketchup	[ˈketʃ.ʌp]	[ˈkat.ʃab]
10	Avocado	[ævəʊˈkɑːdəʊ]	[ʔu.fuˈkaː.du]	**67**	Kiwi	[ˈkiː.wiː]	[ˈkiː.wi]
11	Balloon	[bəˈluːn]	[baˈloːn]	**68**	Laptop	[ˈlæp.tɒp]	[ˈlaːb.toːb]
12	Bank	[bæŋk]	[bank]	**69**	Laser	[ˈleɪ.zər]	[ˈleː.zar]
13	Batman	[ˈbætmən]	[ˈbaːtmaːn]	**70**	Lavender	[ˈlæv.ɪn.dər]	[ˈlaː.vin.dar]
14	Beige	[beɪʒ]	[beːdʒ]	**71**	Mall	[mɔːl]	[moːl]
15	Brake	[breɪk]	[breːk]	**72**	Mask	[mɑːsk]	[maːsk]
16	Broach	[brəʊʧ]	[broːʃ]	**73**	Mascara	[mæsˈkɑː.rə]	[ˈmas.ka.ra]
17	Bronze	[brɒnz]	[buː.ˈrun.zi]	**74**	Massage	[ˈmæs.ɑːʒ]	[maː.ˈsaːdʒ]
18	Cake	[keɪk]	[keːk]	**75**	Message	[ˈmes.ɪdʒ]	[ˈmaːsidʒ]
19	Captain	[ˈkæptɪn]	[ˈkab.tin]	**76**	Oxygen	[ˈɒk.sɪ.dʒən]	[ʔuk.siˈdʒiːn]
20	Cartoon	[kɑːˈtuːn]	[karˈtuːn]	**77**	Ozone	[ˈəʊ.zəʊn]	[ʔoːˈzoːn]
21	Cashew	[ˈkæʃuː]	[ˈkaː.dʒo]	**78**	Pancake	[ˈpæn.keɪk]	[baːnˈkeːk]
22	Cash	[kæʃ]	[kaːʃ]	**79**	Panda	[ˈpæn.də]	[ˈbaːn.da]
23	Cashier	[kæˈʃɪə]	[ka.ˈʃeːr]	**80**	Petrol	[ˈpet.rəl]	[bit.ˈroːl]
24	Casino	[kəˈsiː.nəʊ]	[ˈka.zi.nu]	**81**	Phobia	[ˈfəʊ.biː.ə]	[ˈfuːb.ja]
25	Centre	[ˈsen.tər]	[ˈsin.tar]	**82**	Piano	[piˈæn.əʊ]	[biː.ˈjaː.no]
26	Ceramics	[səˈræm.ɪks]	[sa.raˈmiːk]	**83**	Pizza	[ˈpiːt.sə]	[ˈbit.za]
27	Chat	[ʧæt]	[ʃaːt]	**84**	PlayStation	[ˈpleɪˌsteɪ.ʃən]	[bi.lis.ˈteː.ʃan]
28	Cheesecake	[ˈʧiːz.keɪk]	[ˈʃeez.keːk]	**85**	Platinum	[ˈplæt.ɪ.nəm]	[bi.laː.ˈtiːn.jum]
29	Chef	[ʃɛf]	[ʃiːf]	**86**	Police	[pəˈliːs]	[buː.ˈliːs]
30	Chips	[ʧɪps]	[ʃibs]	**87**	Poster	[ˈpəʊ.stər]	[ˈboː.s.tar]
31	Chocolate	[ˈʧɒklət]	[ʃu.ka.ˈlaː.ta]	**88**	Powder	[ˈpaʊ.dər]	[ˈboː.da.ra]
32	Cholesterol	[kəˈles.tər.ɒl]	[ku.lis.ti.ˈroːl]	**89**	Projector	[prəˈdʒek.tər]	[bu.ru.ˈdʒik.tor]
33	Christmas	[ˈkrɪsməs]	[ki.ˈris.mis]	**90**	Professor	[prəˈfes.ər]	[bu.ru.fi.ˈsoːr]
34	Cocktail	[ˈkɒk.teɪl]	[kukˈteːl]	**91**	Protocol	[ˈprəʊ.tə.kɒl]	[bu.roː.tu.ˈkoːl]
35	Coffee	[ˈkɒfi]	[ˈko.fi]	**92**	Pullover	[ˈpʊlˌəʊ.vər]	[biˈloː.far]
36	Computer	[kəmˈpjuːtə]	[kum.biˈjuː.tar]	**93**	Pyjamas	[pɪˈdʒɑː.məz]	[ba.ˈdʒaː.mah]
37	Coupon	[ˈkuː.pɒn]	[kuːˈboːn]	**94**	Receiver	[rɪˈsiː.vər]	[riˈseː.far]
38	Cover	[ˈkʌvə]	[ˈka.far]	**95**	Sandwich	[ˈsæn.wɪdʒ]	[san.di.ˈwiʧ]
39	Crystal	[ˈkrɪs.təl]	[ki.ris.ˈtaːl]	**96**	Shampoo	[ʃæmˈpuː]	[ˈʃaːm.boː]
40	Cup	[kʌp]	[koːb]	**97**	Snapchat	[ˈsnæp.tʃæt]	[si. ˈna:b.ʃaːt]
41	Custard	[ˈkʌs.təd]	[ˈkas.tard]	**98**	Sonar	[ˈsəʊ.nɑːr]	[soːˈnaːr]
42	Doctor	[ˈdɒk.tər]	[dak.ˈtuːr]	**99**	Spare	[speər]	[ʔis.ˈbeːr]
43	Dollar	[ˈdɒl.ər]	[duˈlaːr]	**100**	Spray	[spreɪ]	[ˈʔis.bi.reː]
44	Doughnut	[ˈdəʊ.nʌt]	[doːˈnaːt]	**101**	Steak	[steɪk]	[ʔis. ˈteːk]
45	Drama	[ˈdrɑː.mə]	[di.ˈraː.ma]	**102**	Tactic	[ˈtæk.tɪk]	[takˈtiːk]
46	Excel	[ɪkˈsel]	[ˈʔik.sil]	**103**	Tattoo	[təˈtuː]	[ˈtaː.to]
47	Fax	[fæks]	[faːks]	**104**	Taxi	[ˈtæk.si]	[ˈtak.si]
48	Filter	[ˈfɪltə]	[ˈfil.tar]	**105**	Transit	[ˈtræn.zɪt]	[ti.ran.ˈzeːt]
49	Filler	[ˈfɪlə]	[ˈfi.lar]	**106**	Van	[væn]	[faːn]
50	Flash	[flæʃ]	[fi.laːʃ]	**107**	Video	[ˈvɪd.i.əʊ]	[ˈfid.jo]
51	Fresh	[frɛʃ]	[freʃ]	**108**	Virus	[ˈvaɪə.rəs]	[faːjˈruːs]
52	Freezer	[ˈfriːzə]	[fi.ˈreː.zar]	**109**	Visa	[ˈviː.zə]	[ˈfiːza]
53	Gallon	[ˈgæl.ən]	[dʒaː.ˈluːn]	**110**	Vitamin	[ˈvɪt.ə.mɪn]	[fi.ta.ˈmiːn]
54	Garage	[ˈgærɑːʒ]	[ga.ˈraːdʒ]	**111**	Waffle	[ˈwɒf.əl]	[ˈwaː.fil]
55	Gel	[ʤɛl]	[dʒil:]	**112**	Whisky	[ˈwɪs.ki]	[ˈwis.ki]
56	Group	[gruːp]	[guː.ˈruːb]	**113**	Yoga	[ˈjəʊ.gə]	[ˈjoː. ga]
57	Guitar	[gɪ.ˈtɑːr]	[gi.ˈtaːr]	**114**	YouTube	[ˈjuː.tʃuːb]	[juːti. ˈjuːb]

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