Syllable Structure and Syllabification in Ammani Arabic: External Evidence from the Adaptation of English Loanwords

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Abstract

Drawing on external evidence from the adaptation of English loanwords in Ammani Arabic, (henceforth AA), the dialect spoken in the capital of Jordan, this paper accounts for syllable structure and syllabification in both native and loan words in AA. The data consists of more than 400 well-established English loanwords that are used by monolinguals in AA. To analyse the syllable structure and syllabification of these words, twelve monolingual AA speakers are asked to pronounce the words using pictures. The study reveals that English simplex nuclei, onsets and codas are accounted for by classic OT constraints whereas English complex margins are better analysed using Stratal OT. It is shown that the adaptation process is phonologically-based and is geared towards unmarkedness. A number of phonological processes, such as deletion and epenthesis are mainly provoked to render the adapted form less marked. Most interestingly, results shed light on hidden aspects of AA syllable structure, which would have remained latent had they not been stimulated by the introduction of English complex syllable structure.

Keywords: Syllable structure, Loanwords, Phonology, Optimality Theory

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1. Introduction

Syllable structure and syllabification have occupied phonologists over the last fifty years (see Bosch 2011). The study of the phonological adaptation of loanwords at the syllabic level is of paramount importance to phonological theory as it will contribute to a better understanding of thorny issues in syllable structure and syllabification. This study is of particular importance as it sheds light on many phonological issues in AA such as the status of complex onsets, superheavy syllables and syllable bimoraicity and eventually enhances our understanding of AA syllable structure. Moreover, the current study establishes syllable structure in native words as no previous study has tackled this dialect before. It will show that sonority alone cannot account for syllable structure in AA, and probably other Arabic dialects. It also suggests an OT constraint hierarchy that is better able to account for syllable structure in native and loan words. Furthermore, it contributes to Arabic phonology in general as previous studies on loanword phonology in Arabic have not paid enough attention to suprasegmental aspects (cf. Davis and Ragheb 2014).

This paper is organized as follows: Section 2 reviews syllable structure in native words. Section 3 describes the methodology. This is followed by an outline of syllable structure in loanwords in Section 4.1. In Section 4.2, I present a syllabification algorithm that incorporates two notions: mora sharing and semisyllables to account for CVVC syllables and complex clusters, respectively. The results will be translated into OT constraints and a constraint hierarchy will be suggested in Section 4.3 Section 5 concludes the paper.

2. Background

This section establishes syllable structure in AA native words, which will provide a background to the analysis of syllable structure in loanwords.

Like many modern Arabic dialects, the minimum syllable in AA is CV. That is, an onset and a vocalic nucleus are a must. The vowel can be long or short. Two-consonant onsets are attested word-initially as a result of syncope, as in /bilaad/ > *blaad* ‘countries’ (cf. Al-Bay 2001; Abu-Abbas 2003; Btoosh 2006; Amer et al. 2011) or from glottal stop and short vowel deletion, as in /ʔas.naan/ > *snaan*.

The optimal coda in AA is simple. Complex codas are generally disallowed in AA. Codas comprising an obstruent followed by a sonorant are ruled out due to a reversal in sonority as a sonorant is more sonorous than an obstruent according to the Sonority Sequencing Principle (henceforth SSP) (see Parker 2011). Codas made up of two sonorants, as in *ħilim* are also ruled out in AA although some of them do not violate SSP. Codas composed of a sonorant and an obstruent can form an optional complex coda (e.g. *kalb* ~ *kalib* 'dog' *ramz* ~ *ramiz* 'symbol') unless the obstruent is a guttural or a guttural is found within the same morpheme, as in /ɣulb/ > *ɣulub*. This suggests that although SSP is required for complex codas, it is not sufficient. Codas with two obstruents show great variation. The norm is to disallow the cluster; however, they are optionally allowed only if both obstruents are tautomorphemic, non-gutturals and agree in voice as in /ʔuxt/ > *ʔuxt*, ~ *ʔuxut* 'sister' and /ʕaks/ > *ʕaks*, ~ *ʕakis* 'opposite'. The only complex codas that always appear without epenthesis in AA relate to true geminates as in *sitt* 'grandmother' and *ʔaxaff* 'lighter'.

Examining possible and impossible complex codas in AA shows that sonority alone cannot account for coda clusters as some codas are disallowed although they abide by sonority. For example, a sonorant plus a guttural obstruent; whereas sonority plateaus are optionally allowed, as in *ʔuxt* ~ *ʔuxut*. Therefore, earlier accounts of coda clusters in terms of SSP (e.g. Abu-Salim 1982 for Palestinian Arabic; Abu-Abbas 2003 for Jordanian Arabic) cannot account for AA coda clusters. Also a modified version of SSP (e.g. Farwaneh's (1995) attempt for Palestinian Arabic) that requires coda clusters not to rise in sonority so as to allow sonority plateaux cannot account for codas as it would predict that sonority plateaus should be legitimate codas. Moreover, it cannot account for sonorant-guttural obstruent codas, which are categorically absent in AA. Therefore, I suggest a constraint that I will call 'CODA CLUSTER CONDITION', given in (1), that incorporates the facts presented above about codas in AA.

(1) CODA CLUSTER CONDITION (henceforth CODACON): a two-consonant coda must be well-formed.

A well-formed CC coda appears only tautomorphemically if i) the first member is a sonorant and the second is an obstruent provided that no guttural sound is found within the same morpheme (e.g. *kalb)*, or ii) in the case of two obstruents, they must agree in voice and none of them is a guttural (e.g. *ʔuxt)*, or iii) the CC coda is a geminate (e.g. *sitt*).

3. Methodology

Data came from a corpus of 412 established English loanwords in AA. The corpus was compiled by the researcher from different sources chief among which were the *Dictionary of Everyday Language in Jordan*, published by the Jordan Academy of Arabic in 2006, previous studies on loanwords in Jordanian Arabic (e.g. Butros 1963 and Al-Saqqa 2001) and personal observation (see Abu Guba 2016 for more details). Using pictures on a computer screen, the researcher elicited the words from twelve monolingual native speakers of AA (six males and six females) whose ages range from 30 to 60.[1] None of the participants is known for any speech or hearing disorders. They pronounced the words three times in a frame sentence, namely *baguul/ʔiʃtareet* _____ *ʔimbariħ/marra θanyih* (I say/bought ____ yesterday/once again).

This was recorded using an LG voice recorder at a 48 kHz sample rate and saved in wav. format. The researcher transcribed all the words and identified syllable structure. This was verified by an American native speaker and trained phonetician and it was found that inter-transcriber reliability stood at 98%. The analysis of syllable structure adopts both classic/parallel OT and Stratal OT. I assume that the reader is familiar with Classic OT so I give a brief overview of Stratal OT only.

3.1. Stratal OT

The inability of Classic OT to account for opacity and cyclicity has called for modified versions of Classic OT. Among the many attempts to account for opacity and cyclicity, Stratal OT seems to be the most successful. This is because Stratal OT keeps the well-defined and restrictive set of OT constraints, it is explanatorily adequate and fits better with learnability (for details, see Kiparsky 2000; Bermúdez-Otero 2003).

Unlike Classic OT, Stratal OT is a serial version of OT that echoes the lexical phonology and morphology interaction where constraints apply at different strata (Kiparsky 2000, 2003; Bermúdez-Otero 2003). The main idea of this theory is that constraints apply at different levels and their ranking status may differ according to the level (e.g. stem, word, postlexical for AA) where they apply.

[1] The minimum age was thirty to ensure that the participant's dialect has already been established.

4. Results and discussion

4.1. Syllable structure in loanwords

Results show that English syllable structure that has an AA counterpart is readily adapted into AA. However, AA has also adopted some complex structures, which would highlight the status of these structures in AA phonology.

4.1.1. Onsets

Results show that simplex onsets are almost always realised as is as long as the consonant is a legitimate AA phoneme. The only English simplex onset that is not mapped faithfully relates to the English phoneme /p/, which is realised as /b/. On the other hand, English onsetless syllables are augmented with a prosthetic glottal stop, as in *ʔakʃin* ‘action’ and *ʔiidz* ‘AIDS’.

The overwhelming majority of source two-consonant onsets are mapped faithfully onto AA as in *freezar* ‘freezer’, *kristaal* ‘crystal’, *staartar* ‘starter’ *and twiitar* ‘twitter’. On the face of it, one might assume that two-consonant onsets in AA native phonology are basic, which would explain the importation of these clusters in loanwords. However, I argue that such complex onsets are not basic in AA and the optimal onset is a simplex one.

The motivation for the above contention is threefold. First, complex onsets in native AA words are not basic as explained in Section 2. Second, there are no restrictions on these complex onsets in AA native words neither in terms of sonority nor homorganicity or voicing, which contradicts the cross-linguistically phenomenon whereby homorganic tautosyllabic consonants are not attested in onsets (Roca and Johnson 1999). That is, complex onsets such as /tl/ and /dl/ are ill-formed; nevertheless, they are frequent in AA. In terms of sonority, AA has onset consonant clusters that comply with SSP as well as those that contravene it. Third, not all source complex onsets in loanwords are retained in AA despite the fact that they comply with SSP (e.g. *fulumaaster* ‘flow master’ and *tarniib* ‘trump’). Note also that source complex onsets are optionally preceded by a vowel and a glottal stop, e.g. *ʔavwaal* ~ *vwaal* ‘voile’.

Deletion and epenthesis are also attested to fix some complex onsets. Deletion targets glides and liquids (e.g. *ʔambalanṣ* ‘ambulance’ and *karafoot* ‘grapefruit’) resulting in an obstruent in the onset. Vowel epenthesis into complex onsets occurs in some two-consonant onsets, as in trump’ > *ṭarniib*, ‘flow master’ > *fulumaastar*, and in all three-consonant onsets, as in ‘scrap’ > *sik.raab*.

4.1.2. Nucleus

A vocalic nucleus, which could be short or long, is a must in AA. Therefore, English syllabic consonants are provided with the default epenthetic vowel /i/, as in 'double' > *da.bil* and 'single' > *sin.gil*.

Generally, English vowels are mapped faithfully unless metrical constraints are violated. That is, some vowels undergo shortening or lengthening to render the output well-formed in terms of foot-binarity, as in *kiks* 'cakes' and *raabiʃ* 'rubbish'.

Finally, English diphthongs usually undergo monophthongisation as they do not have AA counterparts, as in *sbeer* 'spare' and *ʔuzoon* 'ozone'.

4.1.3. Codas

There are no restrictions on simplex codas in AA so they are almost always mapped faithfully. Three types of two-consonant complex codas are attested in the corpus: Sonorant + obstruent, as in *band* 'band'and *balf* 'valve'; Obstruent + obstruent, as in *triks* 'tricks' and *ʃift* 'shift'; and geminates, as in *nitt* 'net' and *diʃʃ* 'dish'.

All these codas are well-formed according to AA phonotactics (except for very few cases such as *klatʃ*[2] 'clutch' and *ʔiidz* 'AIDS'). In all these CC codas, the coda consists of a sonorant /m, n, l, r, w, y/ followed by a stop /t, d, k, g/, a fricative /f, θ/, an affricate /dʒ/ or a sibilant /s, z/. All these codas are unmarked as they satisfy SSP and all of them abide by the CODACON suggested in (1).

Finally epenthesis and deletion are attested in some cases to render the syllable less marked, as in *ʔubtikus* 'optics' and *kuntak* 'contact'.

4.1.4. Medial -CCC- clusters

The majority of source -CCC- clusters are retained in loanwords. This is because they are well-formed with respect to CODACON and most of them belong to compound words, as in *kung fuu* 'ku**ng f**u' and *land.roo.var* 'la**nd r**over'. The stray consonant will be licensed as a semisyllable, as will be demonstrated in Section 4.2. A few of them undergo vowel epenthesis, as in ban.kir.yaas 'pa**ncr**eas' and fu.lis.kaab 'foo**lsc**ap'. Some undergo deletion, as in am.bi.fa.yar 'a**mpl**ifier' and ka.ra.foot 'gra**pefr**uit'.

[2] Note that the affricate is bisegmental in AA.

4.1.5. CCCC clusters

Four-consonant clusters are marked in AA and are never retained. The majority undergo vowel epenthesis, as in *koor.nif.liks* 'corn flakes' and *lan.dik.roo.zar* 'land cruiser'. However, deletion is attested in one case, namely *ban.far* 'puncture' where the least salient consonants are deleted.

To summarize, AA imports the majority of complex onsets and codas while it repairs more marked structures such as four-coda clusters. The importation of such syllables calls for a modification of earlier analyses of syllabification of Arabic dialects in general, which is the topic of the next section.

4.2. Syllabification

All previous accounts of syllabification in Arabic dialects (e.g. Watson 2002) fall short of accounting for superheavy syllables and complex margins in AA. In this subsection, I propose a syllabification algorithm for loanwords as well as native words that accounts for these problematic aspects. Adopting moraic theory within a Stratal-OT framework, as laid out in Section 2.1, I assume that the maximum syllable is bimoraic. Under moraic theory (Hyman 1985; McCarthy and Prince 1986; Hayes 1989), short vowels contribute one mora while long vowels and diphthongs contribute two. Geminates contribute one mora and non-final coda consonants are assigned a mora through the parametric constraint WEIGHT-BY-POSITION. So a superheavy syllable such as CVVC and CVCC would be trimoraic according to moraic theory; however, these syllables are bimoraic in AA as evident from stress rules which do not distinguish between superheavy and heavy syllables. Therefore, mora sharing is invoked to account for CVVC syllables and semisyllables are called for to account for complex margins.

4.2.1. Syllabification algorithm

Following Watson (2002), the following syllabification algorithm is suggested to assign syllabic positions within the prosodic word, which is assumed to be the domain of syllabification in AA. (A dot designates syllable boundaries).

(2) Syllabification algorithm (after Clements 1990; Watson 2002)

I. Word-final consonant extrametricality: final consonants are extrametrical (placed between angled brackets). C > <C> /___]word.

II. Associate moraic segments to a syllable node.

III. Associate a preceding consonant to onset position.

IV. Assign a mora to a coda consonant (Weight-by-Position(WBP)).

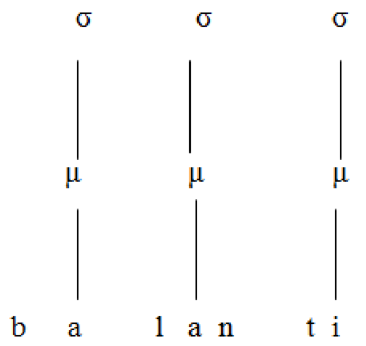
V. Adjoin moraic coda to the syllable node.

VI. Incorporate the extrametrical consonant to the final syllable.

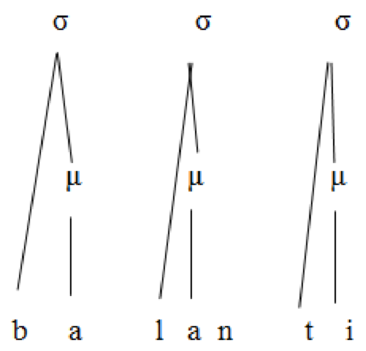
Let us illustrate this with an example below.

(3) A tree for *ba.lan.ti* 'penalty' (only the number of the relevant step is shown)

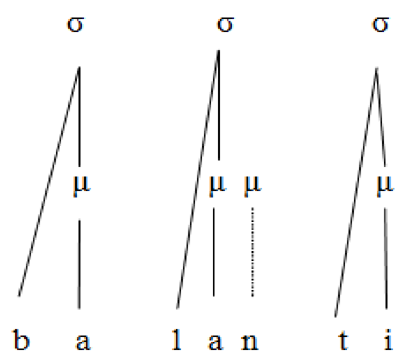
ii) Association of moraic segments to syllable node



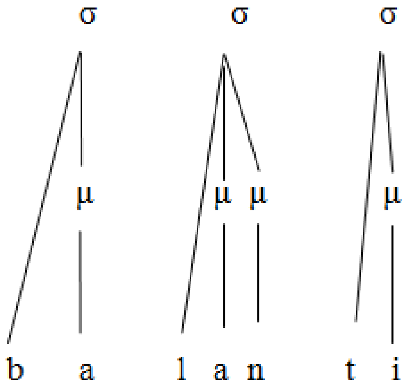
iii) Association of onset to syllable node



iv) Assignment of mora through WBP



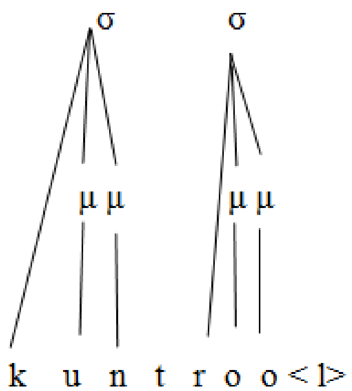
v) Adjunction of WBP mora to syllable node



The above algorithm accounts well for syllables with simplex codas and onsets. However, complex margins and superheavy syllables require an amendment to this algorithm. To account for CVCC syllables and complex onsets, I adopt Kiparsky's (2003) semisyllable analysis and assume that the stray consonant is licensed as a semisyllable, i.e. an unsyllabified mora that is directly associated to the prosodic word.[3]

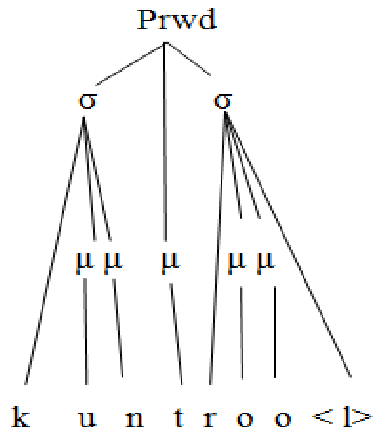
To see how the semisyllable operates in CVCC syllables, take the syllabification of *kuntrool* 'control' below. The algorithm in (2) will yield the tree in (4).

(4) A tree for *kunt.rool* 'control'



[3] The motivation for adopting a semisyllable comes from stress assignment opacity in words such as *ka'tabit* (Kiparsky 2003) where stress falls on a light penult rather than the antepenult. Kiparsky argues that stress applies at the lexical level /katab-t/ where the last consonant is licensed as a semisyllable yielding *ka'tabt* so here stress assignment is not opaque as stress falls correctly on the heavy ultimate syllable. Later at the postlexical level where semisyllables are not licensed, due to the promotion of LICENSE-μ, epenthesis is called for to repair the ill-formed coda cluster –bt yielding *ka'tabit*.

This is incomplete as it has a stray consonant --/t/. Adjoining the stray consonant to either syllable will end up with a complex margin so the stray consonant is licensed as a semisyllable affiliated directly to the prosodic word as shown below.

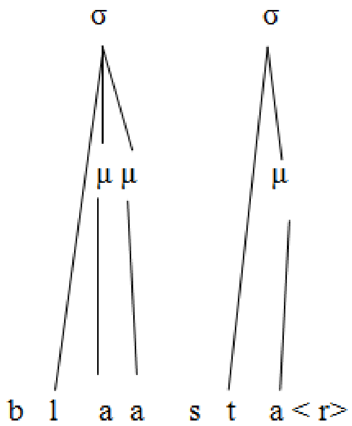


To account for CVVC syllables, a semisyllable analysis cannot be adopted. This is because CVVC syllables can occur word-internally postlexically (Watson 2007). Watson (2007: 349) argues that if LICENSE-μ, which bans semisyllables, is promoted at the postlexical level according to Kiparsky's analysis (see Section 4.3), then CVVC syllables cannot surface and so should appear with an epenthetic vowel or undergo vowel shortening. However, given that such syllables do not undergo vowel shortening or vowel epenthesis in some dialects, it follows that these syllables are licensed. To this end, she proposes a mora-sharing analysis. She argues that a mora sharing approach would account for both lexical and postlexical levels assuming that a mora is shared between the second leg of the vowel and the following consonant.

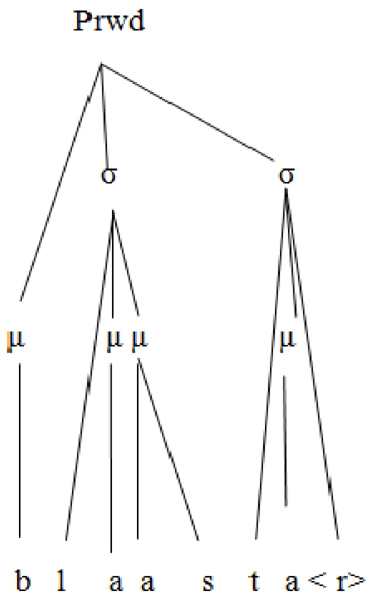
Acoustic evidence lends support to this contention. Broselow et al. (1997: 59) found statistically significant differences in length between long vowels in open syllables and long vowels closed by a coda. Also, the coda consonant following a long vowel is significantly shorter than a coda following a short vowel.

To show how mora sharing functions, take the word *blaas.tar* below. The algorithm in (2) would yield the tree in (5), which is ill-formed as it has two stray consonants.

(5) A tree for *blaas.tar* ‘plaster’



Recall that the first consonant is licenced as a semisyllable. The middle consonant will be licensed as it will share a mora with the preceding vowel. Assigning a mora through WBP will render the syllable trimoraic, which is categorically illicit in AA, so mora sharing renders the syllable bimoraic. After applying mora sharing we get the representation below.



Note that a mora sharing analysis cannot account for CVCC syllables or complex onsets. Mora sharing fits well with dialects that do not allow CVCC syllables word-internally. However, AA does have CCC clusters word-medially that satisfy CODACON such as *kalbna* ‘our dog’. Moreover, a shared mora analysis (cf. Farwaneh 1995; McCarthy 2007) cannot be maintained as it fails to account for cases such as /bayyan-t-l-ha/ > *bay.yan.'til.ha* ‘I pointed out to her’ with a stressed penult (Abu-Rakhieh 2009). This is because the stressed epenthetic vowel is inserted lexically as stress assignment is a lexical process (Kiparsky 2003). If mora sharing was allowed between the nasal and the alveolar stop in /nt/ then the string would end up with one stray consonant, i.e. /l/, which would be analysed as a semisyllable and vowel epenthesis would not happen at the lexical level (cf. Btoosh 2006; Abu-Rakhieh 2009). Note also that mora sharing between two consonants is marked phonetically as the sonority distance between the consonants is not wide enough to allow mora sharing (Broselow 1992: 15). Note further that mora sharing cannot account for CC onsets.

To summarize, the suggested algorithm is better able to account for complex syllables by incorporating semisyllables and mora sharing. However, it differs from Kiparsky's in that it restricts the semisyllable analysis to complex margins only and it differs from Watson's in that it allows mora sharing only between a vowel and a consonant. Moreover, this analysis differs from Kiparsky's in the ranking of constraints especially LICENSE-μ., as will be demonstrated below.

In the following subsection, I translate these facts into OT constraints and suggest a constraint hierarchy for AA syllable structure at lexical and postlexical levels.

4.3. OT analysis of syllable structure

This subsection suggests a Stratal OT ranking that accounts for syllable structure in AA. As we have seen, an onset and a vocalic nucleus (to the exclusion of syllabic sonorants) are obligatory in AA. In OT terms this means that the following two constraints in (6) and (7) are undominated.

(6) ONSET: Syllables must have onsets (Prince and Smolensky 1993/2004).
(7) NUC/V: The head of a syllable must be a vowel (Prince and Smolensky 1993/2004).

These two constraints also dominate the faithfulness constraint in (8).

(8) DEP-IO-C: Output consonants must have input correspondents (cf. McCarthy & Prince 1995).

The tableau in (9) below illustrates this ranking. (Only relevant constraints are shown).

(9) ONSET >> DEP-IO-C

Input: action	ONSET	DEP-IO-C
a. ☞ʔak.ʃi<n>		*
b. ak.ʃi<n>	*!	

Candidate (a) wins as it satisfies ONSET at the expense of DEP-IO-C. Another option to fix this ill-formed structure is to delete the vowel in the first syllable yielding **kʃin*. However, this will render the adapted form and the source form widely dissimilar, which is avoided in loanword phonology (cf. Kenstowicz 2003, 2007). This strategy violates the faithfulness constraint MAX-IO (given in (10) below), which requires input segments to be faithfully realised in the output (McCarthy and Prince 1995). Since AA resorts to epenthesising a consonant rather than deleting the vowel, it entails that MAX-IO in (10) dominates DEP-IO.

(10) MAX-IO: Input segments must have output correspondents (no deletion).

Further evidence for ONSET comes from hiatus resolution where an epenthetic glide or a glottal stop is inserted to provide an onset for otherwise onsetless syllables, as in *ku.ka.ʔiin* 'cocaine' and *ma.yu.neez* 'mayonnaise'. There are no restrictions on simplex codas, which means that *CODA, given in (11), is low ranked in AA and is dominated by MAX-IO and DEP-IO.

(11) *CODA: A syllable must not have a coda (cf. Prince and Smolensky 1993/2004).

So far the ranking in (12) can be established.

(12) ONSET, NUC/V, MAX-IO >> DEP-IO >> *CODA.

For the analysis of complex onsets, recall that the first member is licensed as a semisyllable. Attaching semisyllables to the prosodic word violates the Strict Layering Hypothesis, which requires a prosodic constituent of level n immediately dominate a constituent of level n-1 only (Selkirk 1984). Associating them to the syllable node will violate constraints against complex margins. However, associating them to the prosodic word is the safest option as size restrictions on prosodic words are weaker (Kiparsky 2003; Watson 2007).

So a semisyllable violates the constraint LICENSE-μ in (13) meaning that LICENSE-μ is ranked below COMPLEX ONSET in (14). Also, the consonant cannot be left unparsed, which means that the constraint PARSE-C, given in (15), ranks above LICENSE-μ.

(13) LICENSE-μ: A mora must be affiliated with a syllable (Kiparsky 2003).

(14) *COMPLEX ONSET: Syllables must not have more than one segment in the onset (Prince and Smolensky 1993/2004).

(15) PARSE-C: A consonant must be parsed into a mora or a syllable (Kiparsky 2003).

The tableau in (16) exemplifies this.

(16) *COMPLEX ONSET, PARSE-C >> LICENSE-μ

Input: flash	*COMPLEX ONSET	PARSE-C	LICENSE-μ
a. ☞ f_{μ}.laa<ʃ>			*
b. f.laa<ʃ>		*	
c. flaaʃ	*!		

Note that a complex onset also appears with an optional epenthetic vowel postlexically. Inserting a vowel violates DEP-V, so DEP-V should rank below COMPLEX ONSET. (Note that vowel epenthesis induces glottal stop insertion (violating DEP-C) to provide an onset to the onsetless syllable). Given that the form appears with or without an epenthetic vowel, then LICENSE-μ and DEP-V are not ranked with respect to each other as the tableau below shows.

(17) ONSET, *COMPLEX ONSET, PARSE-C >> LICENSE-μ, DEP-V, DEP-C

Input: flash	ONSET	*COMPLEX ONSET	PARSE-C	LICENSE-μ	DEP-V	DEP-C
a. ☞f_{μ}.laa<ʃ>				*		
b. f.laa<ʃ>			*			
c. flaaʃ		*!				
d. iflaaʃ	*!				*	
e. ☞ʔiflaaʃ					*	*

Another possible way to satisfy COMPLEX ONSET without violating ONSET is epenthesising a vowel after the stray consonant, as in *fi.laa<ʃ>. This option is not attested in AA due to the high ranked No[i] constraint, given in (18), which dominates LICENSE-μ.

(18) No[i]: High short unstressed vowels in open syllables are banned (Kager 1999).

Based on the adaptation of complex onsets, the following ranking can be established.

(19) ONSET, COMPLEX ONSET, No[i], PARSE-C >> LICENSE-μ, DEP-V, DEP-C

4.3.1. CVVC syllables

As argued above in Section 4.2, these syllables are bimoraic in AA and licensed by sharing a mora between the second leg of the vowel and the following consonant. This violates a constraint that bans mora sharing between a vowel and a consonant, presented in (20).

(20) *SHAREDMORA (VC) (henceforth *NSμ(VC))
A mora cannot be linked to a vowel and a consonant (Broselow et al. 1997: 65).

In OT terms, *NSμ(VC) is dominated by WBP, which assigns moras to coda consonants, and FOOT-BINARITY, which requires feet to be bimoraic. The coda consonant will retain its mora only if the vowel is monomoraic. If the vowel is already bimoraic, mora sharing will render the foot bimoraic. Notice that mora sharing does not violate WBP (Morén 2001: 241) as the consonant here is still moraic although it does not have its independent mora. So WBP should outrank *NSμ(VC). Consider the tableau in (21) that lays out the ranking of the three constraints in question.

(21) FTBIN, WBP >> * NSμ (VC)

Input: corner	FTBIN	WBP	*NSμ(VC)
a. μμ |/\\ ☞koor.na<r>			*
b. μμμ | || koor.na<r>	*!		
c. μμ | | koor.naμ<r>		*	

The tableau shows that candidate (b) incurs a fatal violation of FTBIN as it assigns a mora to the coda consonant rendering the syllable trimoraic. To avoid this, candidate (c) does not assign a mora to the coda and is consequently ruled out by WBP.

Incorporating the already established constraints above gives us more options. To satisfy FTBIN, an attempt to syllabify the stray consonant as part of a complex onset of the following syllable is ruled out by *COMPLEX ONSET. Unparsing the segment, as well as deleting it, is also avoided as it falls victim to PARSE-C and MAX-C, respectively. Again, inserting a vowel after the offending segment is not possible as it violates both No[i] and DEP-V, which shows that all these constraints are ranked above *NSμ(VC). So far the partial ranking in (22) has been established.

(22) *COMPLEX-ONSET, FTBIN, No[i], PARSE-C, WBP, MAX-C >> DEP-V >> *NSμ(VC) >> *CODA

4.3.2. Complex codas

Complex codas appear word-internally and word-finally. Word-final complex codas are not problematic as they are justified by the fact that the last consonant is extrametrical. (This also applies to CVVC syllables word-finally). So a word-final consonant is weightless. This is accomplished by the constraint *FINAL-C-μ, presented in (23).

(23) *FINAL-C-μ: Domain final consonants are moraless (kager 1999).

This constraint must dominate WBP, as laid out in the tableau below.

(24) *FINAL-C-μ >> WBP

Input: bank	*FINAL-C-μ	WBP
a. ☞ban_{μ}<k>		*
b. $ban_{\mu}k_{\mu}$	*!	

Word-internal complex codas in AA are of two types: those that satisfy CODACON and those that contravene it. Here we need to account for these codas at both levels: lexical and postlexical. At the lexical level the second consonant is licensed as a semisyllable as stress assignment shows. Given that the attested form of loanwords corresponds to the surface form, the postlexical level, I refer to AA native words to establish the OT ranking at both levels.

The four relevant constraints to account for CVCC syllables at both levels are DEP-V, LICENSE-μ, CODACON and *COMPLEX CODA. These constraints are ranked differently at each level to yield the optimal output as will be demonstrated below.

Given that CC codas optionally appear internally in AA, as in /kalb-hum/ > *kalbhum*, ~ *kalibhum*, it follows that a semisyllable is attested at the postlexical level. Also, the alternate form with an epenthetic vowel means that DEP-V is equally ranked with LICENSE-μ.

However, this cannot account for coda clusters that violate CODACON such as /dʒisr-hum/ > *dʒisirhum* which always surface with an epenthetic vowel. So here, it cannot be the case that LICENSE-μ is ranked above DEP-V. If LICENSE-μ was promoted postlexically, vowel epenthesis would be obligatory in AA, which cannot account for cases such as *kalbhum*. Therefore, in contrast to Kiparsky, I argue that the ranking of LICENSE-μ is not the only crucial factor. Rather it is the ranking of CODACON, DEP-V and LICENSE-μ with respect to each other that is crucial in AA. At the lexical level, DEP-V dominates both LICENSE-μ and CODACON so epenthesis is blocked and the unsyllabified consonant is licensed as a semisyllable regardless of the well-formedness of the coda.

On the other hand, at the postlexical level, CODACON ranks higher than both LICENSE-μ and DEP-V, which are not ranked with respect to each other. Thus, epenthesis is obligatory in codas violating CODACON but optional in codas satisfying CODACON. This ranking will give rise to optional CCC clusters that do not flout CODACON while it rules out CCC clusters contravening it –hence epenthesis.

This means that AA cannot be categorized as a purely VC dialect according to Kiparsky's (2003) classification. Kiparsky argues that dialects such as AA would always insert a vowel before unsyllabified consonants rendering the stray consonant in coda position. However, results here point out that AA would be better described as an intermediate dialect type between C (where no epenthesis is required) and VC dialects as it shares with C dialects licensing a semisyllable postlexically if CODACON is satisfied.

Consider the tableaux below that show the derivation of native AA words with internal CVCC syllables at the lexical and postlexical levels.

(25) DEP-V >> LICENSE-μ, CODACON

Input: xubz.na 'our bread' Lexical level	DEP-V	LICENSE-μ	CODACON
a. ☞ ('xub)z_{μ}.na		*	*
b. xu.('biz).na	*		

Stress assignment shows that candidate (b) is suboptimal and loses out to candidate (a). The tableau shows that DEP-V outranks LICENSE-μ and CODACON at the lexical level. At the postlexical level, as demonstrated in (26) below, the optimal form appears with an epenthetic vowel that is unstressed. This means that DEP-V is demoted below CODACON. Candidate (a) is already ruled out as it violates CODACON.

(26) CODACON >> DEP-V, LICENSE-μ

Input: xubz.na Postlexical level	CODACON	DEP-V	LICENSE-μ
a. 'xub.z_{μ}.na	*		*
b. ☞'xu.biz.na		*	

The same rankings apply to words with well-formed coda clusters, as in /galb-na/ ‘our heart’. At the postlexical level, both 'ga.lib.na and 'gal.b_{μ}.na are attested as DEP-V and LICENSE-μ are equally ranked.

The same analysis applies to loanwords. Recall that the adapted form of a loanword corresponds to the postlexical level. However, this does not mean that loanwords are not evaluated at the lexical level. Rather, they are evaluated and then the output of the lexical level is fed into the postlexical level. A form with a medial cluster such as ‘control’, which is realised as *kunt.rool* shows that the stranded consonant /t/ is licensed as a semisyllable. Tableau (27) shows the evaluation of the word ‘control’.

(27) FTBIN, PARSE-C, No[i], *COMPLEX,[4] MAX-C >> LICENSE-μ, DEP-V

Input: control	FT BIN	PARSE-C	No [i]	*COMP LEX	MAX- C	LICENSE- μ	DEP-V
a. ☞kun.t_{μ}.roo<l>						*	
b. kun.t.roo<l>		*					
c. μμμ │││ kunt.roo<l>	*!						
d. kun.troo<l>				*			
e. kun.roo<l>					*		
f. kun.ti.roo<l>			*				*
g. ? ku.nit.roo<l>							*

[4] I will use the cover constraint *COMPLEX to refer to both complex onsets and codas.

The optimal output in (27a) violates LICENSE-μ to satisfy the higher ranked constraints. Candidates (b) and (c) fare worse on PARSE-C and FTBIN, respectively. Again, *COMPLEX renders candidate (d) suboptimal as it syllabifies the stray consonant as part of a complex onset. Candidate (e) is ruled out as it violates MAX-C and candidate (f) falls victim to the markedness constraint No[i]. Finally, candidate (g) is marked with a question mark as its status requires some comment. According to the established hierarchy, such a form is optimal as it only violates DEP-V, which is equally ranked with LICENSE-μ. In fact, such a pronunciation is attested among old people, especially illiterate ones, and is usually associated with uneducated people; hence avoided.

Before closing this discussion, we still need to introduce another constraint that rules out mora sharing between two consonants, presented in (28).

(28) NOSHAREDMORA-(CC) (henceforth *NSμ(CC)) (after Watson 2007)

A mora cannot be linked to two consonants.

Ranking this constraint above LICENSE-μ ensures that a stray consonant in CVCC is licensed as a semisyllable as sharing a mora between two consonants is worse than affiliating the stray consonant to the prosodic word. However, LICENSE-μ should outrank *NSμ(VC) so that mora sharing between a vowel and a consonant would be less costly than licensing the consonant as a semisyllable, as we have seen above.

Incorporating all constraints, the following two constraint rankings account for AA syllables at both lexical and postlexical levels.

(29) Constraint rankings

a) Lexical level: NUC/V, *FINAL-C-μ, FTBIN, PARSE-C, COMPLEX CODA, COMPLEX ONSET, ONSET, MAX-IO, *NSμ(CC), No [i] >> WBP >> DEP-IO, >> LICENSE-μ, *NSμ(VC), CODACON >> *CODA

b) Postlexical: NUC/V, *FINAL-C-μ, FTBIN, PARSE-C, COMPLEX CODA, COMPLEX ONSET, ONSET, MAX-IO, *NSμ(CC), No [i] >> CODACON, WBP >> LICENSE-μ, DEP-IO >> *NSμ(VC) >> *CODA

5. Conclusion

The adaptation of English loanwords into AA, which is phonologically-based and is geared towards unmarkedness, has enhanced our understanding of AA syllable structure. It has shed light on the status of complex onsets and superheavy syllables. Also, it has shown that all two-consonant codas comprising non-guttural obstruents are legitimate in AA provided that they agree in voicing and the fact that some of such codas are missing in native AA words represents accidental rather than systematic gaps in AA.

The contribution of this paper is threefold. It has demonstrated that SSP cannot account for complex codas. Instead it has proposed a new constraint, CODACON, that better accounts for coda clusters in AA and other Arabic dialects. Also it has suggested a revised syllabification algorithm that better accounts for CVVC syllables and complex margins thanks to mora sharing and semisyllables. In this regard, it has been shown that AA would be better described as an intermediate dialect type between C and VC dialects as it shares with C dialects licensing a semisyllable postlexically if CODACON is satisfied. Finally, it has offered a new OT hierarchy that successfully accounts for problematic aspects of Arabic syllable structure.

Findings are also of relevance to phonological theory in general. It has been shown that sonority alone is not enough to account for syllable structure. Rather, it would be better to incorporate markedness factors to account for complex codas as demonstrated in Section 2.
Although this paper has drawn on data from AA only, it is believed that the same analysis could account for other Arabic dialects especially Levantine dialects as they share with AA the same syllable structure. Therefore, further research that applies these constraint hierarchies and syllabification algorithms to other Arabic dialects is highly recommended.

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Appendix: Loanword corpus

English word	English Pronunciation	AA typical pronunciation
accordion	əˈkɔːdɪən	ʔa'koordyun
acetone	ˈasɪtəʊn	'ʔasitun
acid	ˈasɪd	ʔa'siid
action	ˈakʃ(ə)n	'ʔa(a)kʃin
adrenaline	əˈdren(ə)lɪn	ʔadrina'liin
advantage	ədˈvɑːntɪdʒ	ʔad'vaantidʒ
aids	eɪdz	ʔeedz
airbag	ˈeəbag	ʔer'baag
airbus	ˈe(ə)rˌbəs	'ʔer'baṣṣ
album	ˈalbəm	ʔal'buum
ambulance	ˈambjʊl(ə)ns	ʔamba'lanṣ
amplifier	ˈamplɪfʌɪə	ʔambi'fa(a)yar
antenna	anˈtenə	ʔan'teen
antifreeze	ˈantɪfriːz	ʔanti'friiz
antivirus	ˈantivʌɪrəs	ʔanti'vaayrus
archive	ˈɑːkʌɪv	ʔar'ʃiif
aspirin	ˈasp(ə)rɪn	ʔasbi'riin
axle	ˈaks(ə)l	ʔaks
baby	ˈbeɪbi	'beebi
baby	ˈbeɪbi	'bubbu
back axle	'bak aks(ə)l	ba'kaks
backfire	bakˈfʌɪə, ˈbakfʌɪə	baak'fa(a)yar
baggy	ˈbagi	'baagi
baking powder	'beɪkɪŋ paʊdə	bakim'bawdar
balance	ˈbal(ə)ns	ba'lanṣ
band	band	band

bandana	banˈdanə	ban'daane
beige	beɪ(d)ʒ	beedj
bermuda	bəˈmjuːdə	bar'mooda
between	bɪˈtwiːn	'batwane
bikini	bɪˈkiːni	bik'kiini
billionaire	bɪljəˈneə	bilju'neer
biology	bʌɪˈɒlədʒi	bu'loodʒya
block	blɒk	'blukke
body	ˈbɒdi	'badi
body	ˈbɒdi	'budi
boiler	ˈbɔɪlə	'boylar
boot	buːt	boot
boss	bɒs	buṣṣ
bouquet	bʊˈkeɪ, bəʊˈkeɪ, ˈbʊkeɪ	bo(o)'kee
boutique	buːˈtiːk	bo(o)'tiik
box	bɒks	buks
brake	breɪk	brikk
bravo	brɑːˈvəʊ, ˈbrɑːvəʊ	'braavu
bulldozer	ˈbʊldəʊzə	bal'doozar
bye	bʌɪ	baay
cafeteria	kafɪˈtɪərɪə	kaf'tiirya
caffeine	ˈkafiːn, ka'fiːn	kafa'yiin
cake	keɪk	keek
cakes (pl)	keɪks	kiks
camellia	kəˈmiːlɪə,ˈmelɪə	kaa'miilya
cancer	ˈkansə	'kaansar
cappuccino	ˌkapʊˈtʃiːnəʊ	kabat'ʃiinu
caravan	ˈkarəvan, karəˈvan	kara'vaan

carbohydrate	kɑːbəˈhʌɪdreɪt	karbuhay'draat
carburettor	kɑːbjʊˈretə, bə	karbu'reetar
carnival	ˈkɑːnɪv(ə)l	karna'vaal
case	keɪs	kees
cash	kaʃ	kaaʃ
cashew	ˈkaʃuː, kəˈʃuː	'kaadʒu
cashier	kaˈʃɪə, kə	ka(a)'ʃiir
casket	ˈkɑːskɪt	kas'keet
cassette	kəˈset	'kasit
caviar	ˈkavɪɑː, ˌkavɪˈɑː	kav'jaar
centre	sentə	'santar
central locking	sentə lɒkɪŋ	'santarlukk
ceramic	sɪˈramɪk	sara'miik
chamois	ˈʃamwɑː	ʃam'waa
chance	tʃɑːns	ʃanṣ
charleston	ˈtʃɑːlstən	ʃal'listun
chat	tʃat	'ʃayyat
chat	tʃat	ʃaat
cheetah	ˈtʃiːtə	'ʃiita
chef	ʃef	ʃiff
chenille	ʃəˈniːl	'ʃanil
chimpanzee	tʃɪmpanˈziː	ʃam'baazi
chips	tʃɪps	ʃibs
cholesterol	kəˈlestərɒl	kulis'trool
christmas	ˈkrɪsməs	'kriṣmaṣ
clip	klɪp	klibb
clips (pl)	klɪps	'klibse
clutch	klʌtʃ	klatʃ

cocaine	kə(ʊ)ˈkeɪn	kuka'?iin
cobra	ˈkəʊbrə	'koobra
coffee shop	ˈkɒfi ʃɒb	kufi'ʃubb
coiffure	kwɑːˈfjʊə	kwaa'feer
coil	kɔɪl	'koyl
collage	ˈkɒlɑːʒ	kul'laadʒ
compressor	kəmˈpresə	kum'breeṣa
computer	kəmˈpjuːtə	kum'byuutar
condenser	kənˈdensə	kun'dinsar
condition	kənˈdɪʃ(ə)n	'kundiʃin
condom	ˈkɒndəm	'kundum
congress	ˈkɒŋgres	'kungris
contact	ˈkɒntakt	'kuntak
container	kənˈteɪnə	kun'teenar
control	kənˈtrəʊl	kun'trool
convoy	ˈkɒnvɔɪ	kam'boy
cooler	ˈkuːlə	'kuular
corn flakes	ˈkɔːnfleɪks	ko(o)rnif'liks
corner	ˈkɔːnə	'koornar
corridor	ˈkɒrɪdɔː	kara'door
cortisone	ˈkɔːtɪzəʊn	kurti'zoon
counter	ˈkaʊntə	'kaawntar
coupon	ˈkuːpɒn	koo'boon
cowboy	ˈkaʊbɔɪ	ka(a)'boy
crystal	ˈkrɪst(ə)l	kris'taal
custard	ˈkʌstəd	'kastar
cut-out	kʌtaʊt	ka'tawt
cyanide	ˈsʌɪənʌɪd	saya'niid

defrost	diːˈfrɒst	di(i)'frust
deluxe	dɪˈlʌks, ˈlʊks	di(i)'luks
derby	ˈdɑːbi	'deerbi
desk	desk	disk
dettol	ˈdetɒl	di(i)'tool
diesel	ˈdiːz(ə)l	'diizil
digital	ˈdɪdʒɪt(ə)l	'didʒital
dinosaur	ˈdʌɪnəsɔː	dayna'ṣoor
disco	ˈdɪskəʊ	'diisku
dish	dɪʃ	diʃʃ
distributor	dɪˈstrɪbjʊtə	disbara'toor
double	ˈdʌb(ə)l	'dubul
double	ˈdʌb(ə)l	'dabil
double kick	ˈdʌb(ə)l kɪk	dabil'kikk
drill	drɪl	drill
drum(s)	drʌm	dramm
dry clean	drʌɪ kliːn	dray'kliin
dumdum	ˈdʌmdʌm	'dumdum
duplex	ˈdjuːpleks	dub'liks
earth	ɜːθ	ʔeerθ
emulsion	ɪˈmʌlʃ(ə)n	ʔa'milʃin
eskimo	ˈeskɪməʊ	ʔas'kiimu
eskimo	ˈeskɪməʊ	'ʔaskimu
essence	ˈes(ə)ns	ʔa'ṣanṣ
etiquette	ˈetɪket	ʔiti'keet
exhaust	ɪgˈzɔːst	ʔug'zust
extra	ˈekstrə	ʔi'kistra
fabricate	ˈfabrɪkeɪt	'fabrake
facebook	ˈfeɪsbʊk	'feesbuk

fax	faks	faaks
fibre glass	ˈfʌɪbə glɑːs	fiibarig'laaṣ
fillet	ˈfɪlɪt, US fiˈlā	fii'lee
filter	ˈfiltə	'filtar
flash	flaʃ	flaaʃ
flasher	ˈflaʃə	'flaʃar
flow master	fləʊ mɑːstə	fulu'maastar
fluoride	'flʊərʌɪd, flɔː	floo'rayd
folklore	'fəʊklɔː	fulu'kloor
foolscap	ˈfuːlzkap, ˈfuːls	fulis'kaab
football	ˈfʊtbɔːl	'fuṭbul
formica	fɔːˈmʌɪkə	fur'maayka
foul	faʊl	'fawl
freezer	ˈfriːzə	'freezar
full	fʊl	full
full	fʊl	'fallal
full options	fʊl ˈɒpʃ(ə)nz	full'ʔubʃin
fuse	fjuːz	fjuuz
gallon	ˈgalən	'galan
gardenia	gɑːˈdiːnɪə	gar'diinya
gateau	ˈgatəʊ, ga'təʊ	'gaatu
gear	gɪə	giir
gel	dʒel	dʒill
gene	dʒiːn	dʒiin
gentle	ˈdʒent(ə)l	'dʒintil
georgette	dʒɔːˈdʒet	dʒur'dʒeet
geyser	'giːzə	'kiizar
gin	dʒɪn	dʒinn
glucose	'gluːkəʊs/z	klo(o)'kooz

goal	gəʊl	goon
grapefruit	'greɪpfruːt	kara'foot
hamburger	ˈhambɜ:gə	ham'burgar
hand brake	'hand breɪk	handib'rikk
hand rummy	handˈrʌmi	hand
hands	han(d)z	hanz
hangar	ˈhaŋə	hangar
hard luck	'hɑːd lʌk	haard'lakk
hatchback	ˈhatʃbak	hatʃ'baak
head phone	ˈhedfəʊn	'hitfun
heater	ˈhiːtə	'hiitar
hula-hoop	ˈhuːləhuːp	hila'hubb
hummer	ˈhʌmə	'hamar
insulin	ˈɪnsjʊlɪn	ʔansu'liin
intercom	ˈɪntəkɒm	ʔantar'kamm
internet	ˈɪntənet	ʔantar'nitt
interpol	ˈɪntəpɒl	ʔantar'bool
jack	dʒak	dʒakk
jacuzzi	dʒəˈkuːzi	dja(a)'kuuzi
jeans	dʒiːnz	dʒinz
jelly	ˈdʒeli	'dʒili
jerry can	ˈdʒerɪkan	'dʒarkan
jersey	ˈdʒɜːzi	dʒur'zaaye
joker	ˈdʒəʊkə	'dʒookar
judo	ˈdʒuːdəʊ	'dʒuudu
jumbo	ˈdʒʌmbəʊ	'dʒaambu
kaki	ˈkɑːki	'kaaki
karate	kəˈrɑːti	kara'tee
kata	ˈkɑːtɑː	'kaata

ketchup	ˈketʃəp, -ʌp	kat'ʃabb
key board	ˈkiːbɔːd	ki(i)'boord
kiwi	ˈkiːwiː	'kiiwi
kong fu	kʊŋ ˈfuː	kung'fuu
land cruiser	landˈkruːzə, ˈland kruːzə	landik'roozar
land rover	landˈrəʊvə	land 'roovar
laptop	ˈlaptɒp	laab'tubb
large	lɑːdʒ	'laardʒ
laser	ˈleɪzə	'leezar
lego	ˈlegəʊ	'liigu
limousine	ˈlɪməziːn, lɪməˈziːn	limu'ziin
list	lɪst	'leesta
lobby	ˈlɒbi	'luubi
lux	lʌks	luks
madam	ˈmadəm	ma'daam
mafia	ˈmafɪə	'maafya
magic (marker)	' madʒɪk	'madʒik
mall	mɔːl	mool
manhole	'manhəʊl	'munhul
manicure	ˈmanɪkjʊə	mana'kiir
manifold	ˈmanɪfəʊld	mana'vult
marathon	ˈmarəθ(ə)n	mara'θoon
marshmallow	mɑːʃˈmaləʊ	marʃa'millu
mascara	maˈskɑːrə	mis'kaara
mask	mɑːsk	maask
massage	ˈmasɑːʒ, məˈsɑːʒ -dʒ/	ma'saadʒ
master key	ˈmɑːstə	maastar 'kii
matriculation	mətrɪkjʊˈleɪʃ(ə)n	'matrik
mauve	məʊv	muuv

maxi	ˈmaksi	maksi
mayonnaise	meɪəˈneɪz	mayu'neez
melamine	ˈmeləmiːn	mila'miin
metallic	mɪˈtalɪk	'mitalik
microscope	ˈmʌɪkrəskəʊp	maykru'skoob
microwave	ˈmʌɪkrə(ʊ)weɪv	maykru'weev
militia	mɪˈlɪʃə	mi'liiʃya
millionaire	mɪljəˈneə	milyu'neer
mini market	mɪni mɑːkɪt	mini 'maarkit
minus	ˈmʌɪnəs	'maaynus
mobile	ˈməʊbaɪl	mo(o)'bayl
monopoly	məˈnɒp(ə)li	munu'buli
montage	mɒnˈtɑːʒ, ˈmɒntɑːʒ	mun'taadʒ
moquette	mɒˈket	moo'keet
morris (trademark)	ˈmɒrɪs	'muris
motor	ˈməʊtə	maa'toor
naphthalene	ˈnafθəliːn	nifta'liin
NASA	ˈnasə	'naasa
NATO	ˈneɪtəʊ	'naatu
nectarine	ˈnektərɪːn	nikta'riin
negative	ˈnegətɪv	'nigativ
negro	ˈniːgrəʊ	'niigru
neon	ˈniːɒn	'niyun
nescafe	ˈneskafi/, neskaˈfee	niska'fee
net	net	nitt
neuter (neutral)	ˈnjuːtə	'nootar
niagara (a trademark)	nʌɪˈag(ə)rə	na'yaagra
nicotine	ˈnɪkətiːn	niku'tiin
night club	ˈnʌɪtklʌb	naaytik'labb

nougat	ˈnuːgɑː	'nooga
nurse	nɜːs	neers
off side	ɒfˈsʌɪd	ʔuff 'saayd
off white	ɒfˈwʌɪt	ʔuff 'waayt
okay	əʊˈkeɪ	'ʔukkee
optics	ˈɒptɪks	'ʔubtikus
orchid	ˈɔːkɪd	ʔur'kiida
organ	ˈɔːg(ə)n	ʔoorg
ounce	aʊns	ʔoonṣa
out	aʊt	ʔawt
overtime	ˈəʊvətʌɪm	ʔuvar'taaym
ozone	ˈəʊzəʊn	ʔo(o)'zoon
packet	ˈpakɪt	ba(a)'keet
pager	ˈpeɪdʒə	'beedʒar
pancreas	ˈpaŋkrɪəs	bankir'yaas
panda	ˈpandə	'baanda
panel	ˈpan(ə)l	ba(a)'neel
party	ˈpɑːti	bar'tiyye
pass	pɑːs	baaṣ
patron	ˈpeɪtr(ə)n	baṭ'roone
pedicure	ˈpedɪkjʊə	budi'keer
penalty	ˈpen(ə)lti	ba'lanti
pentagon	ˈpentəg(ə)n	bin'taagun
pepsi	'pepsi	'bibsi
piano	pɪˈanəʊ	'byaanu
pick up	'pɪk ʌp	'bikam
pixel	ˈpɪks(ə)l, sel	'biksil
pizza	ˈpiːtsə	'biidza
plaster	ˈplɑːstə	'blaastar

playstation	pleɪ ˈsteɪʃ(ə)n	blis'teeʃin
poker	ˈpəʊkə	'bookar
polish	ˈpɒlɪʃ	'buliʃ
polyester	ˌpɒlɪˈestə	bu'listar
polystyrene	ˌpɒlɪˈstʌɪriːn	bulis'triin
polytechnic	ˌpɒlɪˈteknɪk	buli'tiknik
porcelain	ˈpɔːs(ə)lɪn	bursa'laan
poster	ˈpəʊstə	'boostar
power steering	ˈpaʊə stɪərɪŋ, paʊə ˈstɪərɪŋ	'bawar ('stiiring)
primus	ˈprʌɪməs	'briimus
prince	prɪns	brins
printer	ˈprɪntə	'brintar
professor	prəˈfesər	brufu'soor
prostate	ˈprɒsteɪt	brus'taat
protein	ˈprəʊtiːn	bro(o)'tiin
puncture	ˈpʌŋ(k)tʃə	'banʃar
racquet	ˈrakɪt	'rikit
rally	ˈrali	'raali
range (rover)	reɪndʒ ˈrəʊvə	rindʒ (roovar)
radiator	ˈreɪdɪeɪtə	ro(o)'deetar
receiver	rɪˈsiːvə	ri(i)'siivar
regime	reɪˈʒiːm	ro(o)'dʒiim
remote (control)	rɪˈməʊt	ri(i)'moot
reverse	rɪˈvɜːs	ri(i)'virs
ribs	ribz	'ribs[e]
ring (spanner)	rɪŋ	ring
roll	rəʊl	rull
rolls royce	rəʊlzˈrɔɪs	ro(o)z'raayz

roof	ruːf	ruuf
roundel	ˈraʊnd(ə)l	run'deella
routine	ruːˈtiːn	ro(o)'tiin
rubbish	ˈrʌbɪʃ	'raabish
salmon	ˈsamən	'salamun
samsonite	' samsənʌɪt	samsu'naayt
sandwich	ˈsan(d)wɪtʃ	'sandwiʃ
satellite	ˈsatəlʌɪt	sata'laayt
sauna	ˈsɔːnə, US ˈsou	'saawna
scallop	ˈskɒləp/ˈskaləp	ska(a)'lubb
scanner	ˈskanə	'skanar
scooter	ˈskuːtə	'skootar
scrap	skrap	sik'raab
seesaw	ˈsiːsɔː	'siisu
self	self	silf
sensor	ˈsensə	'sunsur
service	ˈsɜːvɪs	sar'fiis
seven up	ˈsev(ə)n ʌp	sivin 'ʔabb
sex	seks	siks
shampoo	ʃamˈpuː	'ʃaambu
shell	ʃel	ʃill
shift	ʃɪft	ʃift
shoot	ʃuːt	ʃuuṭ
short (circuit)	ʃɔːt	ʃurṭ
shorts	ʃɔːts	ʃurṭ
shower	ˈʃaʊə	'ʃawar
silicon	ˈsɪlɪk(ə)n	'silikun
single	ˈsɪŋg(ə)l	'singil
siphon	ˈsʌɪf(ə)n	si(i)'foon

snubbers	ˈsnʌbəz	ṣno(o)'barṣ
solid	ˈsɒlɪd	ṣuld
sonar	ˈsəʊnɑː	so(o)'naar
spade	speɪd	'sbaati
spaghetti	spəˈgeti	sba(a)'gitti
spare	speə	sbeer
spiky	ˈspʌɪki	'sbaayki
spoiler	ˈspɔɪlə	'sboylar
spray	spreɪ	ʔasbiree
stainless steel	steɪnləsˈstiːl	staallisis'tiil
starter	ˈstɑːtə	'staartar
steak	steɪk	steek
steam	stiːm	stiim
steering	ˈstɪərɪŋ	'stiiring
stereo	ˈstɪərɪəʊ, ˈsterɪəʊ	'stiiryu
stick	stɪk	ʔas'tiika
stock	stɒk	stukk
super market	ˈsuːpə mɑːkɪt, suːpə ˈmɑːkɪt	subar'maarkit
superman	ˈsuːpəman	subar'maan
surf (trademark)	sɜːf	sirf
sweater	ˈswetə	'swiitar
switch	swɪtʃ	switʃ
syringe	sɪˈrɪn(d)ʒ, ˈsɪ-/	'srindʒe
system	ˈsɪstəm	'sistim
tank	taŋk	tank
tanker	ˈtaŋkə	tank
tape	teɪp	tibb
tartan	ˈtɑːt(ə)n	tir'taan

tattoo	taˈtuː	tat'tuu
taxi	ˈtaksi	'taksi
technology	tekˈnɒlədʒi	tiknu'loodjʒa
telefax	ˈtelɪfaks	tili'faaks
tester	ˈtestə	'tistar
thermos	ˈθɜːmɒs	'teermus
thermostat	ˈθɜːməstat	θeermu'staat
thinner	ˈθɪnə	'tinar
tights	tʌɪts	taayt
toffee	ˈtɒfi	'toofe
topsider (a trademark)	ˈtɒpsʌɪdə	tub'saydar
tractor	ˈtraktə	ta'raktur
trailer	ˈtreɪlə	'treella
trampoline	ˈtrampəliːn	trambu'liin
transit	ˈtransɪt , ˈtrɑːns-, -nz	tran'ziit
tricks	trɪks	triks
trump	trʌmp	ṭar'niib
tsunami	tsuːˈnɑːmi	so(o)'naami
tube	tjuːb	tjuub
tubeless	'tjuːbləs	'tjuublis
tuna	ˈtjuːnə	'tuuna
tupperware	ˈtʌpəweə	ṭabar'weer
turbo	ˈtɜːbəʊ	'teerbu
twitter	ˈtwɪtə	twiitar
valium	ˈvalɪəm	'vaalyum
valve	valv	balf
van	van	vaan
vanilla	vəˈnɪlə	va(a)'neella
video	ˈvɪdɪəʊ	'viidyu

vitrine	ˈvɪtriːn	bat'riina
vodka	ˈvɒdkə	'vootka
voile	vɔɪl/ vwɑːl	vwaal
wafer	ˈweɪfə	'weevar
x large	'eks lɑːdʒ	ʔiks 'laardʒ
yen	jen	yann
yoga	ˈjəʊgə	'yooga
you tube	juː tjuːb	yu(u)'tyuub
zigzag	ˈzɪgzag	zig'zaag
zoom	zuːm	zuum

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