Arab World English Journal
INTERNATIONAL PEER REVIEWED JOURNAL ISSN: 2229-9327
مجلة اللغة الانكليزية في العالم العربي

Arab World English Journal: Special Issue: Application of Global ELT Practices in Saudi Arabia, September 2019 Pp. 103-117
DOI: https://dx.doi.org/10.24093/awej/elt1.8

An Optimality Approach to Saudi Learners' Production of Regular English Past Tense Verbs

Baraa A. Rajab
English Language Institute
King Abdulaziz University,
Jeddah, Saudi Arabia
brajab@kau.edu.sa

Abstract

This study provides an Optimality Theory (OT) analysis of morphological variability in Arabic coda productions of second language (L2) English. Previous studies show that L2 learners of English sometimes produce the verb with proper past tense inflectional morphology as in *help[t]* and sometimes repair the cluster, as in *helpø* or hel[pəd]. Complicating matters, these studies focused on L2 learners whose native languages disallowed codas or had very restricted codas. Thus, it is difficult to tell whether any problems in producing past tense morphology are due to L1-transferred coda constraints. To rule out native language syllable structure interference, this paper examines the production of the English regular past tense verb by Saudi learners, a language that allows complex codas. The analysis is done within and OT framework because OT allows possible outputs to be generated by the grammar based on the constraint ranking which one is the optimal candidate. The data come from 22 ESL students at three levels of proficiency. The task was a sentence list eliciting target clusters in past tense contexts fricative + stop ([st], [ft]) vs. stop + stop ([pt], [kt]). Results show that first language (L1) Arabic speakers have difficulty in producing past tense morphology, even though their L1 allows complex codas. The results show that L2 learners in this study do not begin with their native language constraint ranking because lower level learners delete a consonant from the coda cluster. However, the results do show that as the learners progress in the acquisition process, the constraints are re-ranked to reach target productions.

Keywords: English past tense morphology, Optimality Theory, Saudi learner, variable production

Cite as: Rajab, B. A. (2019). An Optimality Approach to Saudi Learners' Production of Regular English Past Tense Verbs. *Arab World English Journal, Special Issue 1: Application of Global ELT Practices in Saudi Arabia.* 103-117.
DOI: https://dx.doi.org/10.24093/awej/elt1.8

1. Introduction

The variability in the production of inflectional morphology by second language learners has been a well-studied issue in L2 research. Second language learners of English show an inconsistency in marking the regular past tense verb with proper inflection. For example, an L2 learner might produce *I help[t] my sister last night* with proper past tense marking. At other times, the learner might produce *I skipø school yesterday* with missing tense marking on the verb. Other times second language learners modify the cluster by adding an epenthetic vowel *I hel[pəd] John*. Various studies propose different reasons behind the variability of inflectional morphology (Goad, White & Steele, 2003; Lardiere, 1998, 2017; Prapobaratanakul & Pongpairoj, 2016; Prevost & White, 2000; Solt et al., 2004; Whatley, 2013). However, not many attempts at explaining the reason behind morphological variability in the second language have been done within an OT framework. Thus, this paper aims to investigate the production of the English regular past tense morpheme by L2 learners. The study examines these productions within an Optimality Theory framework (Prince & Smolensky 1993, McCarthy & Prince 1993). Optimality theory provides us with a set of possible grammars. It shows how these grammars can be learned through constraint re-ranking (Broselow & Xu, 2004). In addition, OT allows possible outputs to be generated by the grammar based on the constraint ranking which one is the optimal candidate (Hancin-Bhatt, 2000). These sets of constraints are presumed to be universal, but the rankings are language specific.

2. Literature Review

Many studies in L2 phonology done in an OT framework have been able to account for structures that have been observed by second language learners. For example, Hancin-Bhatt (2000) examines Thai second language learners' production of English codas within an OT framework. She studies 11 native speakers of Thai enrolled in an intensive English program in the United States. She chose Thai native speakers because Thai codas are restricted than English. Thai only allows simple codas and not any segment is permitted. The possible codas in Thai are voiceless stops, the three nasals in their inventory (m, n, ŋ) and glides. In addition, Thai has a constraint called CODA-AC which states that it is more harmonious to have nasals, glides and simple stops (non-aspirated, voiceless no co-articulated points of articulation) in coda position than fricatives and /l/. Thai does not allow complex codas as well. In summary, Thai codas have the following ranking, (taken from Hancin-Bhatt, 2000):
*Complex, CODA-AC >> DEP-IO >> MAX-IO >> IDENT-IO

Hancin – Bhatt (2000) assumes FA/FT proposed by Schwarz and Sprouse (1996). She claims that Thai second language learners of English will transfer their Thai constraint ranking into English at the initial stage. She also states that since these constraints are part of UG, learners will have access to additional constraints. She hypothesizes that for Thai speakers to produce English codas, they must re-rank their native Thai constraints. They must demote *Complex to produce English complex clusters. They must also re-rank the constraints within CODA-AC to allow a greater range of segments in the coda. Hancin-Bhatt (2000) tests 72 monosyllabic nonsense English words. She conducts two tasks: a coda identification task and a production task (divided between simple and complex codas). The results of the production of the simple codas show that the participants produce nasals close to 100% accuracy, fricatives reach 89% accuracy, and voiceless stops reach 67% accuracy only. These results show that nasals are the easiest to

produce in coda position. If compared with CODA-AC constraint in Thai, learners have already started to re-rank the constraints within CODA-AC. Another observation in the simple coda production is the type of errors produced. The participants preferred to substitute rather than delete or epenthesize. This suggests that these L2 learners are transferring their highly ranked faithfulness constraints into the L2 grammar. They prefer not to violate MAX-IO and DEP-IO similar to Thai. The complex coda production shows that error rates on complex codas are higher than simple codas. Liquid + stop clusters have a 61% accuracy rate, liquid + fricative are 73% and liquid + nasal have a 55% accuracy rate. These percentages suggest that these L2 learners have demoted *Complex below faithfulness in order to produce complex codas, but this constraint re-ranking is not stable yet. The major findings of the study suggest that Thai learners of English use their native ranking in parsing English syllables. The stages of development are as follows: Stage0 (initial stage) *Complex and Coda-AC are ranked higher than FAITH constraints (Thai constraint ranking transferred). Stage1 represents the re-ranking of constraints within CODA-AC. Stage2 shows demotion of *Complex below FAITH. However, these learners do not show any re-ranking within faithfulness constraints. In conclusion, OT provides for an explicit definition of the stages of L2 phonological development. Another study that uses Optimality theory in their analysis was conducted by Broselow et al. (1998). Their data comes from Wang's (1995) study done on native Mandarin speakers learning English as a second language. The study that Wang (1995) conducted tested ten native Mandarin speakers that learned English in an English as a foreign language(EFL) context for an average of 6-7 years and had been in an English-speaking country for less than a year. Mainly, the focus of the study was on coda production. Mandarin is highly restrictive in their codas. It only allows glides and nasals (n, ŋ) in coda position and no obstruents. Broselow et al. (1998) looked at the production of English voiceless stops /p,t,k/ and voiced stops /b, d, g/ in coda position. Broselow et al. (1998) claim that Mandarin speakers begin with their native Mandarin ranking of codas: NO OBS CODA >> MAX (C) >> DEP (V). These Mandarin L2 speakers of English will not violate the highly ranked markedness constraint NO OBS CODA when producing English codas. The choice then becomes either violating MAX (C) or DEP (V). The data shows that there is variation in which constraint to violate entailing that there is a variation in the simplification strategy (epenthesis vs. deletion) chosen. Based on the data, these learners prefer bi-syllabic forms. Therefore, the constraint WD BIN (words should consist of two syllables) was added to the analysis. The way this constraint plays into the grammar is if the learner is faced with an input that contained a word-final voiced stop coda, the learner cannot violate the highly ranked NO OBS CODA. Therefore, the learner has a choice to violate either MAX (C) or DEP (V). When faced with which constraint to violate, the learner then chooses the form that satisfies the constraint WD BIN (i.e. bi-syllabic). Broselow et al (1998) also examined the devoicing of coda obstruents in these learners' productions. Mandarin does not do allow either voiced or voiceless obstruents, but English allows them. In spite of this, some participants choose to devoice the obstruent (a process that does not occur in English). As a result, Broselow et al. (1998) argue that this is a clear case of the emergence of the unmarked. They propose a new ranking of constraints for Mandarin: NO CODA OBS, NO VOICED OBS CODA >> MAX (C), DEP (v), IDENT (VOI). Participants who devoice their obstruent codas have demoted the constraint NO OBS CODA below the faithfulness constraints, but NO VOICED OBS CODA is still highly ranked. This interlanguage grammar is different from both the native language and target language. Broselow et al. (1998) conclude that the interlanguage of a second language learner does not necessarily have to show structures from the native language or the

target language. The Mandarin speakers in Wang's (1995) demonstrated that many of the forms are dependent on their native and target languages. In addition, the results support that constraints are always present in the grammar, but learners must induce the re-ranking of these constraints and not the constraints themselves. Alves (2004) examines the acquisition of English "ed" morpheme by Brazilian Portuguese speakers within and OT framework. The data were collected from seven undergraduate Brazilian Portuguese (BP) speakers learning English as a second language. BP allows a restrictive set of segments in a single coda (/n, s, r, l/) and the only complex coda is /rs/. Alves (2004) tested target forms such as: [pt], [kt], [ft], [bd], [vd], [nd], [md], [st], [ld], [rd] which were divided into two groups (A and B). Group A verbs contained a complex coda whose penultimate consonant is not allowed in a single coda position by BP ex: lived, watched and stopped. Group B verbs contained a complex coda whose penultimate consonant is allowed in a single coda position by BP ex: missed, passed, traveled and remembered. Alves (2004) claims that learners do not begin with BP syllabic constraint ranking: MAX >> CodaCond >> DEP >> Contig >> NoCoda >> NoComplex. Alves (2004) has shown that the learners' interlanguage goes through various processes of constraint re-ranking. In addition, the results have shown not just constraint demotion, but the acquisition of new underlying structure as seen in ([lɪvɪd] and [mɪsɪd]). The above studies have been able to provide a clear picture of the developmental stages L2 learners go through in order to reach target productions in the second language. However, the participants in the study all had restricted codas in their native language. Therefore, one can assume that these learners begin with the constraint rankings from their native language. On the other hand, if L2 learners' native language does allow similar codas as the target language, shall we expect them to transfer the constraint ranking as well? The goal of this study is to look at the production of the regular English past tense by native Arabic learners, specifically from Saudi Arabia. Will these learners simply begin with their native language constraints on codas? This study will also explain the various stages that second language learners go through in order to achieve target-like productions in regular English past verbs.

3. Methodology

The data is this study come from 22 native Arabic speakers from Jeddah, Saudi Arabia who are enrolled in ESL classes in the United States. The participants were tested on the production of the regular English past tense verb. They all speak one dialect: Hijazi Arabic (spoken in the Western province of Saudi Arabia). The participants were divided into three groups according to their proficiency level (low, n= 7, intermediate, n= 9, and high, n= 6). Their placement in the three proficiency levels was based on their level placement in the English Language Institute at George Mason University. For the low proficiency group, they were enrolled in mid-beginning classes. For the intermediate proficiency group, they were enrolled in high intermediate classes and for the high proficiency group they were enrolled in high advanced classes. In addition, nine native speakers of English were used as a control group.

3.1 Experiment

An elicited production task was used to obtain target clusters in English. The participants were asked to read sentences that consisted of regular past tense verbs. In order to rule out orthographic interference, the participants were asked to place the verb in parentheses in the past tense. Examples of test sentences are shown below in sentences 1 and 2 (for the complete list, refer to appendix A).

(1) John _____ (stop) his speech
(2) Bill and Mary _____ (use) her exam

A total of 26 regular past tense verbs were tested. The selected verbs targeted certain types of codas formed (Obs + /t/ or /d/) and (Obs + /əd/). They were either an obstruent plus the allomorph /t/ or /d/ or an obstruent plus the allomorph /əd/. The selected verbs either matched in manner such as stop + /t,d/ or it did not, such as fricative + /t,d/. Table 1 below shows a complete list of the targeted past tense verbs and the clusters formed. Each participant was audio-recorded using a digital recorder in a soundproof lab, and each recording was transcribed by the experimenter.

Table 1. *Past tense verbs used in the production task divided by allomorph*

Past tense morpheme	*Verb*	*Cluster*
[t]	stopped, dropped,	[pt]
	locked, baked	[kt]
	kissed, missed	[st]
	laughed, bluffed	[ft]
	washed, crashed	[ʃt]
	watched	[tʃt]
[d]	described, bribed	[bd]
	mugged, hugged	[gd]
	advise, use	[zd]
	clothe, bathe	[ðd]
	judge, damage	[dʒd]
[əd]	knit, land, head	No cluster

Table 1 shows that the addition of the English past tense morpheme results in either stop + stop cluster 'sto[pt]' or fricative + stop clusters ki[st]. An important note here is that all the participants in the study speak Hijazi Arabic. This dialect allows word-final clusters of stop + stop and fricative + stop. Hijazi Arabic has words like kata[pt] 'I wrote', ra[pt] 'to tie', ge[st] 'I tried on'. Some that are morphological and others are not. Table 2 shows the syllable structure in Standard Arabic.

Table 2. *Standard Arabic syllable structure*

Syllable type	*Arabic example*	*Gloss*	*Notes*
CV	[la]	no	The most common syllable structure in Arabic
CVV	[leɪ.sa]	not	
CVC	[ka.tab]	He wrote	
CVVC	[kaf.taan]	A type of material	They are considered heavy syllables and are restricted to word-final positions
CVCC	[ka.tapt]	I wrote - past	

Based on this fact, one can expects that Saudi second language learners of English will transfer the syllable structure from their L1 to the L2 regardless of proficiency level.

3.2 Results

The production task elicited a total of 572 tokens of regular past tense verb productions from the L2 participants. 176 tokens were stop + /t,d/ clusters, 330 tokens were fricative + /t,d/ clusters and 66 were [əd] allomorph. Table 3 shows the classification of the cluster types analyzed in the study.

Table 3. *Classification of cluster types*

	Definition	*Example*
Type A Stop + stop	The addition of the regular past tense will result in a cluster of stop + stop	sto[pt] bri[bd]
Type B Fricative + stop	The addition of the regular past tense will result in a cluster of fricative + stop	ki[st] mo[vd]
Type C Syllabic	The addition of the regular past tense will result in no cluster, but an addition of a syllable	lan[dəd] hea[dəd]

The analysis in this paper does not include type C verbs. The addition of the morpheme in type C does not result in a cluster. The scope of this paper is only the production of past tense verbs that result in a word-final coda cluster. The results were coded according to learners' production to see whether they produced the correct form or repaired the cluster (epenthesis or deletion). However, the analysis only included where the participants showed deletion. The reason why the analysis only included deletion and not epenthesis is that only four tokens were epenthesized so they were discarded from the analysis. In addition, the analysis included the effect of proficiency level and cluster type (where the cluster formed matches in manner or not) on their production. Table 4 summarizes the percentage of deletion by proficiency level and cluster type.

Table 4. *Percentage of deletion by proficiency level and cluster type*

	Low	*Intermediate*	*High*	*Native*
a= stop+/t,d/	57.14	40.27	22.91	0
b= fricative+/t,/d	25.71	6.6	11.11	0
C=syllabic	28.57	18.51	11.11	0

A more detailed analysis into the data shows that overall deletion across the three different verb groups is highest in low proficiency speakers (35%). Deletion decreases when the proficiency level is higher (intermediate= 18.37%, high = 14.74%). Finally, the native control group showed 0% deletion. Figure 1 below summarizes the percentage of overall deletion by proficiency level.

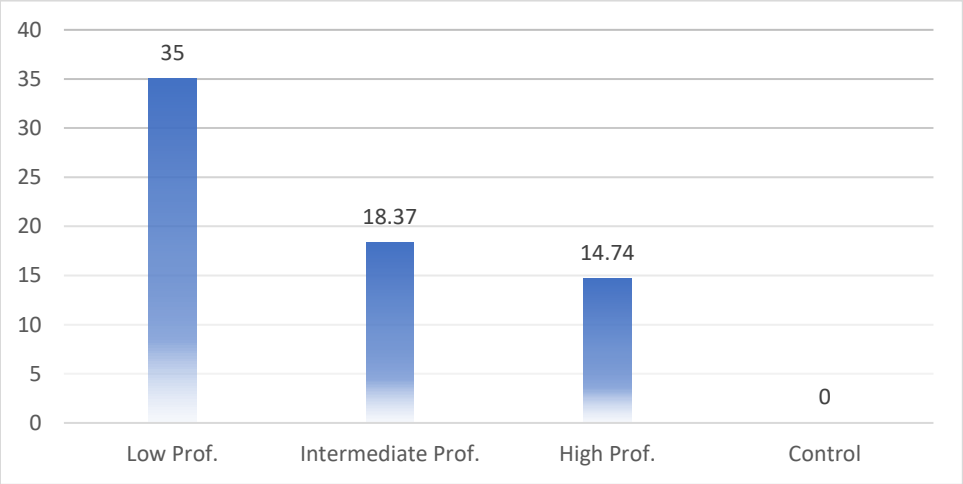

Figure 1. Percentage of deletion by proficiency level

In addition to the proficiency level, the type of cluster affects the percent of deletion. Type A clusters (stops + /t,d/) show a higher percentage of deletion than Type B cluster (fricatives + /t,d/). Figure 2 shows the percentage of deletion in each cluster type.

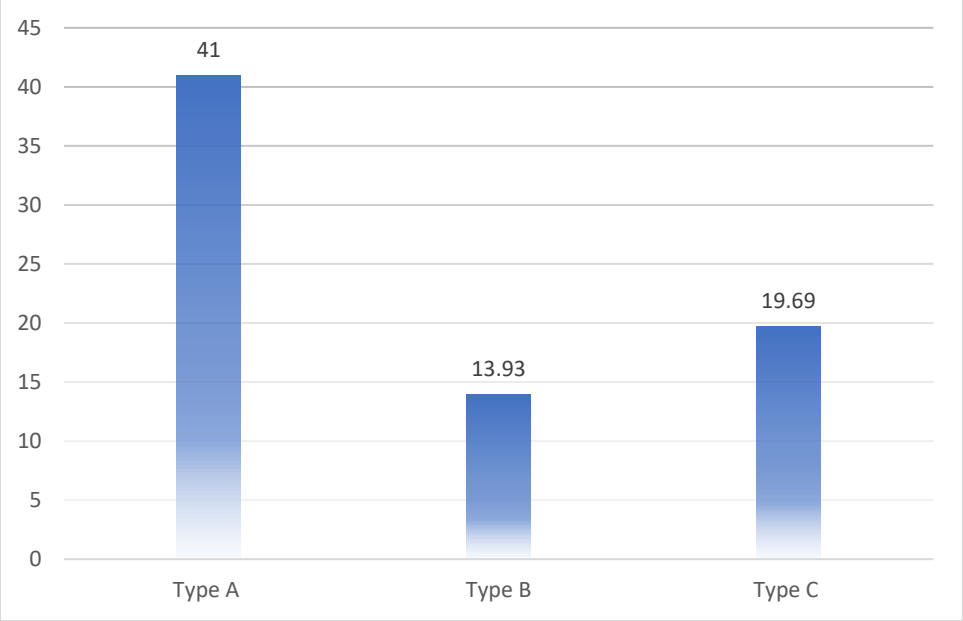

Figure 2. *Percentage of cluster repair by cluster type*

A look at the results in figure 2 indicates that there is an overall tendency to repair clusters from type A (stop + /t,d/) than types B (fricative + /t,d/) and C (syllabic) regardless of proficiency level. In addition, low proficiency learners tend to repair clusters at a higher rate than the intermediate and high groups.

4. Analysis of the data

This section focuses on the analysis of the data within an OT framework. Before attempting to do so, an analysis of Arabic's coda constraints are presented. Arabic allows a coda consisting of CC in a word-final position such as the word 'kata[pt] – I wrote'. The cluster [pt] is morphological, and it is in the past tense. Based on this, I can propose the following constraints for word-final codas in Arabic:

***ComplexCoda:** Complex codas prohibited
OCP[cont]: No adjacent consonants that agree in continuancy
Align[R,stem]: the right edge of the stem must align with the right edge of the word
***Max:** every segment of the input has a correspondent in the output (no phonological deletion).

Based on what Arabic allows, the constraint Max is highly ranked. Therefore, deletion is not allowed. The constraint *ComplexCoda is ranked low to allow coda clusters. The constraint ALIGN(R,stem) is also ranked low, but this constraint determines which segment is deleted if deletion occurs. Finally, OCP[cont] disallows adjacent sounds that match in continuancy. However, there is no evidence of the ranking between OCP[cont] and *ComplexCoda. Tableau (1) below shows how these constraints interact in native Arabic for the verb 'kata[pt]'.

Tableau (1)

kata/pt/	MAX	OCP[cont]	*COMPLEXCODA	ALIGN(R, stem)
a kata[p]	*!			
b kata[t]	*!			*
c ☞ kata[pt]		*	*	*

Based on Tableau (1), the following constraint ranking is purposed for Arabic:

MAX >> OCP[cont] , *ComplexCoda >> ALIGN(R,stem)

Looking at the native Arabic constraint ranking, Arabic second language learners of English should simply transfer their native constraints to English. They should have no trouble producing coda clusters in the target language. Yet, when looking at the results of the study, this is not the case. The analysis begins by looking at low proficiency learners and the production of stop+stop and fricative+stop clusters. The verbs 'stop' and 'bribe' are used to represent all voiceless and voiced word-final coda clusters containing of a stop + stop. The verbs 'kiss' and 'move' are used to represent all the voiceless and voiced word-final coda clusters containing of a fricative + stop.

4.1 Low Proficiency Learners Analysis

Looking at the production of this group, we find that these learners delete the [t] or [d] that results from the clusters. An example of their production of stop+stop clusters: sto[pt] is produced as sto[p] and bri[bd] is produced as bri[bd]. Therefore, the initial ranking of the constraints cannot be their native language ranking. Tableaus (2) and (3) show how they rank their constraints.

Tableau (2)

sto/pt/	OCP[cont]	*COMPLEXCODA	MAX	ALIGN(R, stem)
a ☞sto[p]			*	
b sto[t]			*	*!
c sto[pt]	*!	*		*

Tableau (3)

bri/bd/	OCP[cont]	*COMPLEXCODA	MAX	ALIGN(R, stem)
a ☞bri[b]			*	
b bri[d]			*	*!
c bri[bd]	*!	*		*

In order for bri[b] and sto[p] to be the optimal output, the learners rank OCP[cont] and *ComplexCoda the highest. They demote the constraint MAX so deletion is permitted. The constraint ALIGN(R,stem) is ranked similar to Arabic. The function of this constraint is to guarantee that learners will not delete a segment that is part of the root. They will only delete the morphology to repair the cluster. The same phenomenon can be observed with fricative+stop clusters. The actual productions from these learners for ki[st] and mo[vd] is ki[s] and mo[v] (represented in tables (3) and (4). Learners delete the morphology to repair the clusters.

Tableau (4)

ki/st/	OCP[cont]	*COMPLEXCODA	MAX	ALIGN(R, stem)
a ☞ ki[s]			*	
b ki[t]			*	*!
c ki[st]		*!		*

ISSN: 2229-9327

Tableau (5)

mo/vd/	OCP[cont]	*COMPLEXCODA	MAX	ALIGN(R, stem)
a ☞ mo[v]			*	
b mo[d]			*	*!
c mo[vd]		*!		*

Tableaus 2 – 5 above show that these learners at this level treat all clusters similarly where they delete the morphology. It is clear that the markedness constraints dominate the ranking and faithfulness constraints are demoted. In summary, the constraint ranking for low proficiency learners is:
OCP[cont], *ComplexCoda >> MAX >> ALIGN(R,stem)

4.2 Intermediate Proficiency Learners Analysis

The production of intermediate proficiency speakers for stop+stop clusters is similar to low proficiency learners. The tableaus below show that markedness constraints are highly ranked. They prefer to delete than be faithful to the input.

Tableau (6)

sto/pt/	OCP[cont]	*COMPLEXCODA	MAX	ALIGN(R, stem)
a ☞sto[p]			*	
b sto[t]			*	*!
c sto[pt]	*!	*		*

Tableau (7)

bri/bd/	OCP[cont]	*COMPLEXCODA	MAX	ALIGN(R, stem)
a ☞bri[b]			*	
b bri[d]			*	*!
c bri[bd]	*!	*		*

ISSN: 2229-9327

On the other hand, fricative+stop clusters are treated differently. The intermediate proficiency learners do not delete the final segment. They produce ki[st] and mo[vd] as ki[st] and mo[vd]. Therefore, learners have re-ranked the constraints at this stage. Tableaus (8) and (9) show how they re-ranked the constraints.

Tableau (8)

ki/st/	OCP[cont]	MAX	*COMPLEXCODA	ALIGN(R, stem)
a ki[s]		*!		
b ki[t]		*!		*
c ☞ki[st]			*	*

Tableau (9)

mo/vd/	OCP[cont]	MAX	*COMPLEXCODA	ALIGN(R, stem)
a mo[v]		*!		
b mo[d]		*!		*
c ☞mo[vd]			*	*

Based on the production of fricative+stop clusters, the learners at this stage have demoted *ComplexCoda below MAX. This suggests that they are already re-ranking their constraints to reach target-like constraint ranking. To reach a uniform analysis for intermediate learners in general, Tableaus (6) and (7) do not represent the correct constraint ranking. Therefore, the proposed ranking for stop+stop clusters is represented in Tableaus (10) and (11).

Tableau (10)

sto/pt/	OCP[cont]	MAX	*COMPLEXCODA	ALIGN(R, stem)
a ☞ sto[p]		*		
b sto[t]		*		*!
c sto[pt]	*!		*	*

Tableau (11)

bri/bd/	OCP[cont]	MAX	*COMPLEXCODA	ALIGN(R, stem)
a ☞ bri[b]		*		

ISSN: 2229-9327

b bri[d]		*		*!
c bri[bd]	*!		*	*

For intermediate language learners, the constraint ranking for word-final coda clusters are as follows:
OCP[cont] >> MAX >> *ComplexCoda >> ALIGN(R,stem)

4.3 High Proficiency Learners Analysis

High proficiency speakers' production is similar to target productions. They treat all clusters similarly. They do not show any deletion of a consonant from the cluster. They produce sto[pt] as sto[pt] and ki[st] as ki[st]. There is no distinction between the types of clusters. The tableaus below represent these learners' constraint ranking at this level of proficiency. Tableaus (12) and (13) represent stop+stop clusters and tableaus (14) and (15) represent fricative+stop cluster.

Tableau (12)

sto/pt/	MAX	OCP[cont]	*COMPLEXCODA	ALIGN(R, stem)
a sto[p]	*!			
b sto[t]	*!			*
c ☞ sto[pt]		*	*	*

Tableau (13)

bri/bd/	MAX	OCP[cont]	*COMPLEXCODA	ALIGN(R, stem)
a bri[b]	*!			
b bri[d]	*!			*
c ☞bri[bd]		*	*	*

Tableau (14)

ki/st/	MAX	OCP[cont]	*COMPLEXCODA	ALIGN(R, stem)
a ki[s]	*!			

ISSN: 2229-9327

b ki[t]	*!			*
c ☞ki[st]			*	*

Tableau (15)

ki/st/	MAX	OCP[cont]	*COMPLEXCODA	ALIGN(R, stem)
a ki[s]	*!			
b ki[t]	*!			*
c ☞ki[st]			*	*

Based on the ranking of constraints in the tableaus above, it is clear that high proficiency learners have demoted OCP[cont] (i.e. all markedness constraints). The highest-ranking constraint is MAX, which is similar to adult grammars where the output is faithful to the input. At this level of proficiency, learners are able to produce regular English past tense verbs in a target-like manner.

5. Discussion

Looking at the results of the data and the constraint rankings of the three profiency levels, learners do not start with their native language constraint ranking, contrary to Hancin-Bhatt (2000). There is no evidence of Full Transfer from Arabic into the target language. If that were the case, learners will always be able to produce word-final coda clusters in English. In addition, the data of low proficiency learners implies that they treat all types of clusters similarly. These learners prefer to delete a segment then produce a cluster. This suggests that learners at this stage rank markedness constraints really high on the scale. On the other hand, intermediate learners show a different pattern. They distinguish between stop+stop clusters and fricative+stop clusters. Deletion occurs when the cluster is a stop+stop, but not when it is a fricative+stop. At this stage, these learners are re-ranking their constraints; however, these rankings are not the finalized state. At this level, the interlanguage grammar is dynamic and constraint rankings will change. We have seen that intermediate learners demoted *ComplexCoda below MAX to able to produce fricative+stop clusters. OCP[cont] is still highly ranked to guarantee that the optimal candidate will not violate continuity. Since OCP[cont] is ranked highly, the candidates sto[pt] and bri[bd] will never be the optimal output. Finally, high proficiency learners have demoted OCP[cont] and *ComplexCoda below MAX in order to guarantee that the optimal output is faithful to the input. Based on the analysis above, constraint ranking, and re-ranking gives us a clear picture of these L2ers developmental stages. I suggest the following stages of coda development in L2 English from native Arabic speakers:

- Stage0: OCP[cont], *ComplexCoda >>Max>> Align (R,stem)
- Stage 1: OCP[cont], >>Max>> *ComplexCoda >> Align (R,stem)
- Stage 2: MAX >> OCP[cont] ,*ComplexCoda>>Align (R,stem)

Stage0 is the initial stage of these L2 learners of English. It suggests that these learners do not start with their native language ranking where they have already re-ranked markedness constraints higher than faithfulness constraints, similar to the patterns observed in Portuguese speakers learning English as an L2 (Alves, 2004). In addition, the participants in this study show patterns similar to Mandarin speakers acquiring English as an L2 (Browselow et al., 1998) where some patterns emerged that are neither part of the native nor the target language. Stage1 shows that learners start demoting some markedness constraints to able to reach to the final stage of development. Finally, stage2 is the final stage of development. It shows that learners have reached the proper re-ranking of constraints to produce target-like clusters in English.

6. Conclusion

The analysis in this paper has added to the sufficiency of Optimality Theory to handle morphological variability in second language acquisition. OT has been able to explain the various stages that language learners go through in order to achieve target-like productions. In addition, OT has been able to provide us with evidence that it is not always the case that second language learners begin with their native constraint ranking. In this paper, it was clear that transfer played no role at all. In addition, the analysis has shown that at a certain stage of development, not all cluster types are treated equally (stop+stop vs. fricative+stop clusters). Finally, further research is needed in monomorphemic testing words like 'past' and 'ask' to determine if they are treated differently than words with morphological endings. This comparison will determine if the process of coda modification is purely phonological or morphology plays a role.

About the Author

Baraa Rajab (PhD) is an assistant professor of linguistics at the English Language Institute, King Abdulaziz University, Jeddah, Saudi Arabia. She teaches courses at both undergraduate and postgraduate levels. Her research interests are second language acquisition of morpho-syntax, L2 phonology, L2 morphology and the acquisition of L2 gender.
ORCiD: https://orcid.org/0000-0002-4124-7283

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Appendix A: List of Test Sentences

1. John _____ (stop) his speech.
2. Mary _____ (drop) her phone.
3. Bill's grandmother _____ (describe) him.
4. He _____ (bribe) him.
5. Sally _____ (knit) her sweater.
6. Sally _____ (lock) her room.
7. She _____ (bake) her cake.
8. She _____ (land) her job.
9. I _____ (head) her way.
10. I _____ (hug) her hard.
11. They _____ (mug) him.
12. I _____ (kiss) her hand.
13. Mary _____ (miss) her.
14. Her parents _____ (advise) her.
15. Bill and Mary _____ (use) her exam.
16. She _____ (bathe) her baby.
17. She _____ (clothe) her baby.
18. They _____ (laugh) him out.
19. He _____ (bluff) his way.
20. John _____ (save) her life.
21. The movie _____ (move) her feelings.
22. He _____ (wash) his cat.
23. She _____ (crash) her car.
24. He _____ (watch) his sister.
25. He _____ (judge) his contestants.
26. He _____ (damage) his fridge.