

## Interlanguage Cluster Production of L2 English by L1 Saudi Arabic Speakers

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### Abstract:

This study aimed to provides an in-depth phonological analysis of the utterance of L2 coda clusters by Saudi Arabic second language (L2) English learners. Research in the domain of L2 phonetics and phonology show that L2 learners encounter difficulties in producing coda clusters. These studies investigated L2 learners whose native language disallowed codas or have restricted phonological construction for the coda. Therefore, the present study takes a step forward and conducts a controlled phonological investigation. It is divided into four sections, introduction to the subject of the study, literature, methodology, and finally results and discussion. It focuses on Saudi learners whose L1 Arabic allows complex codas. The research data came from 15 ESL students at an intermediate proficiency level. The task was to read pseudowords with controlled sonority distance between the targeted consonants. The results show some L1 transfer coda constraints; specifically, even though Arabic allows complex coda clusters, the subject had difficulties in producing some English codas. Yet, overall, there was no effect of markedness according to the sonority scale. The subjects' phonological proficiency develops in L2, and their L2 phonological constraints are re-ranked towards L2-like production.

**Keywords:** L2 Phonology, Pseudowords, Markedness, Phonological Category, Phonological constraints.

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التداخل اللغوي في نطق الساكنين في اللغة الإنجليزية من قبل متحدثي اللغة العربية السعوديين

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ملخص:

يهدف هذا البحث إلى تقديم تحليل صوتي عميق لنطق الساكنين للغة الثانية من قبل العرب السعوديين المتعلمين للغة الإنجليزية؛ بوصفها لغةً ثانيةً. ولأنّ البحوث في مجال الصوتيات قد أظهرت أن المتعلمين للغة الثانية يواجهون صعوبات في نطق الساكنين في آخر مقطع الكلمة فإن هذا البحث يتخذ خطوة إلى الأمام ويقوم بإجراء فحص لغوي صوتي محكم البناء لهذه الإشكالية، من خلال 15 طالبًا في اللغة الإنجليزية، وآلية جمع بيانات التحليل كانت عن طريق قراءة أشباه الكلمات ذات المواصفات الصوتية المحكمة بين الأصوات الساكنة المستهدفة. وقد تم تقسيمه إلى أربعة أقسام، على النحو الآتي: مقدمة، ودراسات ونظريات علمية، ومنهج البحث، والنتائج والمناقشة. وقد أظهرت النتائج بعض الآثار اللغوية من جهة اللغة الأم (العربية) للترتيب الصوتي للساكنين، ومع أن اللغة العربية تسمح بالتقاء الساكنين في آخر المقطع الصوتي فقد واجه الطلاب صعوبة في نطق الساكنين في آخر المقطع للغة الإنجليزية. ومع ذلك لم يكن هناك أثر لنظرية الماركديس (markedness) فيما يخص الميزان الصوتي. ووجد الباحث أن التطور الصوتي للمستوى اللغوي للطلاب قد ارتقى وبُني بشكل مشابه لما يجب أن يكون عليه في اللغة الثانية.

الكلمات المفتاحية: صوتيات اللغة الثانية، أشباه الكلمات، ماركديس (markdness)، التصنيف الصوتي، التصاعد الصوتي.

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## 1. Introduction

Variation regarding the difficulties in producing L2 coda clusters has been very well-investigated as an issue in L2 phonological acquisition. For example, among intermediate and higher intermediate learners of the English language, it is possible to hear an L2 learner says “I approved my English” with an epenthesis on the word *approved* /ə'pru:ved/. At other times, L2 learners might say “I have strength” with a deletion on the word *strength* /streθ/. Research in the field had provided different justification regarding the variation in producing L2 English coda clusters, Some of them has attributed it to the insufficient acquisition of the L2 phonological system <sup>(1)</sup>, while others have stressed the role of quality of input regarding phonological knowledge<sup>(2)</sup>.

However, there is a scarce effort in illustrating the causes behind such phonological phenomena in L2 under the notion of L2 phonological category development and interphonology. Therefore, the present paper aims to examine the role of sonority and markedness on the utterance of L2 English coda clusters by learners of L2. One way to tackle this is to find out how L2 learners interact with L2 coda clusters consisting of two consonants. This will help to understand how phonological constraints, specifically markedness based on the distance of sonority, affect the production of L2 coda clusters.

The importance of the findings of the present paper stems from the fact that it gives in-depth insight on how L2 learners, inside their underline phonological system, goes against phonological constraints in dealing with L2 consonant clusters. It is hoped that this paper will add to the existing literature related to L2 phonology. The following section presents some of the literature and backgrounds that are relevant to the scope of study and serves as a theoretical framework against which the data is analyzed.

## 2. Literature review

A quite number of studies have been interested in investigating L2 interphonological production for coda consonant clusters<sup>(3)</sup>. The observed outcome's structure varied and goes around simplifying the production of clusters by using deletion, epenthesis, or assimilation. The performed sounds' acoustic characteristics were generally attributed to different factors such as graphophonetic- phonological transfer, language input, perception, and degree of L2 language use. Yet, the phonological similarity is a core factor that could be considered and has been proved by Eckman (1977)<sup>(4)</sup>, through his Markedness Differential Hypothesis (MDH).

The MDH simply states that phonological features that are uncommon across languages are referred to as marked, meaning that it is hard to acquire, while those that are common across languages are unmarked, and therefore would be easy to acquire for L2 speech production. This was clearly observed in the production in L2 consonant clusters when a link was established between the degree of L2 features that were less marked than L1 and therefore were easier to produce by L2 learners<sup>(5)</sup>. Evidence for the theory was later provided by Benson, (1988)<sup>(6)</sup>. The hypothesis comes in line with the earlier theory conceptualized by Lado (1957)<sup>(7)</sup> regarding the potential degree of L2 speech difficulties, which depends on the degree of phonological features markedness between the native language and target language.

According to Lado (1957), the Contrastive Analysis Hypothesis (CAH) simply states that the L2 phonological point of difficulties is easy to be indicated by comparing L1 native language phonological system with L2 targeted language. Looking at the

differences and similarities between the native language and targeted language, a phonological interference would take place and results in negative transfer, where errors are, or positive interference with no errors in L2 speech. However, even if the two languages share the same phonetic sound systems, the different phonological specific features, such as sonority, could cast a difficulty for the learner in producing L2 consonant clusters.

Ladefoged and Johnson (1993)<sup>(8)</sup>, have defined sonority as the loudness of a phonetic segment. Others have described it as the resonance of uttered phonemes when it interacts with other uttered sounds<sup>(9)</sup>. Within the syllable structure the sonority of the sounds are governed by the sonority scale sequence, or Sonority Scale Principle (SSP), which ranks the sounds in all world phonological system from least sonorous, on syllable margins, to most sonorous as the peak of the syllable. The proposed sonority hierarchy by Nathan (2008)<sup>(10)</sup> came as follows; vowels as highly sonorous followed by glides then liquids then nasals then fricatives and finally stops as least sonorous. This hierarchy helps to understand the syllabification of medial consonants, and so by viewing this through markedness scope, clusters with tight sonority distance, e.g., /lm/, are marked for learners to produce than clusters with far off sonority distance, e.g., /lp/, that are less marked.

### 3. Methodology

The aim of this investigation is to look at L2 Saudi Arabic learners' production of English in coda position. The investigation includes the role of markedness according to the sonority scale principle. For this reason, the following research questions have been formulated:

A- Do Saudi ESL learners simplify mark coda clusters more than less marked ones, and what are their strategies?

B- Dose the sonority slope has a role on learners' production of English coda clusters?

### 3.1 Subjects

The subjects were 15 Saudi ESL learners, with a mean age of 28, age ranging from 23 to 30. The subjects were recruited through a word of mouth from an ESL institution at US university. The reported length of stay was from 12 months to 14 months long, and their English language proficiency level was higher intermediate level.

### 3.2 Instrument and Procedure

The subjects went through a reading of a list of words that contains English-like pseudo-words. The number of the words was 25 that were acoustically controlled, taking into account the distance of the sonority between the targeted consonants inside the clusters structure according to the following scale of sonority: A- vowels B- glides C- liquids D- nasals E- fricatives F- Stops, see Table 1. In the instrument, the syllable structure only (CVCC) and clusters in the coda position were designed to have from zero step to two steps of sonority distance. Since the production of the subjects needed to be analyzed acoustically, each subject was recorded individually. The subjects were asked to get familiar with the words for five minutes, then, when they are ready, they should start to read each word more than two times.

Table 1. Pseudo-words with targeted clusters

Sonority scale	2	1	0
	pseudo-words	pseudo-words	pseudo-words
	Tarb /Ib/	Kaln /ln/	Tast /st/
	Zord /Id/	Garn /In/	Tarl /I/
	Parg /Ig/	Damf /mf/	
	Zarp /Ip/	Kank /nk/	
	Tart /It/	Tand /nd/	
	Kark /Ik/	Parm /Im/	
	Shalb /lb/	Gant /nt/	
	Glad /ld/	Shalm /lm/	
	Kalp /lp/	Samp /mp/	
	Talt /lt/		
	Galk /lk/		
	Garf /If/		
	Palf /lf/		
	Talv /lv/		

#### 4. Results and discussion

After analyzing the subjects' utterances for targeted coda clusters it has been found that there were difficulties in their production that lead to phonological modification with an error rate of 78%, specifically, Epenthesis 71%, deletion 5%, and assimilation 2%. The majority of the subjects chose to either break the clusters through vowel insertion between the consonants or delete one of them. The modification was not limited to only clusters but also was on the syllable level as a whole by changing it to

smaller syllable structure e.g., CVC or CV instead of CVCC. The most commonly used vowels in this process were /ə/ or /ɪ/ the followed strategy has some trace of the effect of subjects' native language Arabic<sup>(11)</sup>.

Also, another observed strategy is the deletion of one of the coda consonants either C1 or C2 especially with /ɪl/, /ɪg/, /lv/, /mf/, /ɪd/, /ln/, /ld/ and /lm/ cluster. This was done by breaking the syllable CVCC to CVC through deleting the C2 and leaving C, or vice versa, and make it adjacent to the vowel. during this process, it has been noticed that sonority has a role, in which the most sonorant consonant won't be deleted, unlike the less sonorant consonant. This comes in line with Gierut, (2007)<sup>(12)</sup> and Steve (2012)<sup>(13)</sup> that more sonorant consonants are most likely and preferably to exist in the coda, unlike less sonorant consonants that are preferably to exist in onset.

Furthermore, it has been noticed that there were sound assimilation in the production of targeted coda clusters e.g. the voiced labiodental fricative /v/ was mostly produced as voiceless labiodental fricative /f/ which accord with findings in Alotaibi (2013)<sup>(14)</sup> and provide support regarding the markedness of voiced labiodental fricative for Saudi learners of English. It seems that subjects' underlying phonological representation was processing L2 English through L1 phonological system. Due to this process, targeted consonants will be substituted to closet match in L1 Arabic sound. A similar thing has been observed for the approximate /ɪ/ and velar nasal /ŋ/.

However, the modifications varied according to the sonority distance scale, within targeted coda clusters. It has been found that subjects tend to modify liquid sounds followed by obstruent sounds, liquid sounds with nasals, and interestingly liquid with similar liquid sounds more than obstruent sounds with obstruent or obstruent-nasal. This was very interesting because what was considered as marked had less error



compared to the unmarked ones. As early mentioned in the literature clusters with tight sonority distance, e.g., /lm/ are marked than those with wide sonority distance, e.g., /ld/. Starting with rhotic-obstruent clusters the errors in the subjects' utterances were found to be high, specifically over 60% as can be seen in Table 2. Although there was a slight far distance between the targeted consonants in the clusters, subjects did not seemed bothered in their production for them and instead, they tend to change the cluster through two strategies either epenthesis or deletion.

Table 2. Error rate for rhotic-obstruent clusters and type of modification.

Cluster type	Error rate	Epenthesis	Deletion
/lk/	62%	61%	1%
/lf/	67%	67%	0%
/lg/	80%	74%	6%
/lp/	82%	82%	0%
/lt/	80%	80%	0%
/ld/	75%	71%	4%
/lb/	85%	83%	2%

In the case of uttering lateral-obstruent clusters a similar performed strategy in simplifying the utterance employed. The modifications on lateral-obstruent clusters were either to use deletion or epenthesis and the error rate was also high. However, the deletion unlike epenthesis was less and limited to two clusters out of seven, namely /lf/ and /lv/. See Table 3 for detailed error rate.

Table 3. Error rate for lateral-obstruent clusters and type of modification.

Cluster type	Error rate	Epenthesis	Deletion
/lt/	63%	63%	0%
/lv/	64%	58%	6%
/lf/	59%	55%	4%
/lk/	73%	73%	0%
/lp/	82%	82%	0%
/ld/	74%	74%	0%
/lb/	77%	77%	0%

For nasal-obstruent clusters data shows an interesting drop in the error rates. The subjects' error rate was below 50% in producing nasal-obstruent clusters. Out of five targeted clusters, the subjects generally tend to delete one, which is /mf/. The other four was modified using an epenthesis strategy. Table 4 below demonstrates error rate for nasal-obstruent clusters.

Table 4. Error rate for nasal-obstruent clusters and type of modification.

Cluster type	Error rate	Epenthesis	Deletion
/mf/	49%	44%	5%
/ŋk/	38%	38%	0%
/nd/	30%	30%	0%
/nt/	42%	42%	0%
/mp/	31%	31%	0%

Similar to subjects' performance in nasal-obstruent cluster, the liquid-nasal cluster utterance was easy to the subjects to produce with low error rate. Although nasal-obstruent cluster error rate was lower than liquid-nasal cluster it was quite interesting to see improvement on the subjects' production with cluster that has close sonority distance. In both cases the sonority distance did not seem to have a substantial effect, and had very limited effect on subjects' phonological processing, see Table 5.

Table 5. Error rate for liquid-nasal clusters and type of modification.

Cluster type	Error rate	Epenthesis	Deletion
/ln/	50%	46%	4%
/lm/	45%	45%	0%
/In/	40%	40%	0%
/Im/	43%	41%	2%

The subjects' utterance to obstruent-obstruent cluster was limited to one targeted cluster /st/ e.g. Tast. The sonority distance between /s/ and /t/ sounds is 0, and like previous clusters with close sonority distance, subjects' production was better than clusters with wide sonority distance. In this cluster only one strategy was performed, which is epenthesis, see Table 6.

Table 6. Error rate for obstruent-obstruent cluster and type of modification.

Cluster type	Error rate	Epenthesis	Deletion
/st/	47%	47%	0%

The rhotic-lateral cluster was also another targeted cluster with close sonority distance and limited to one cluster which is /rl/. likewise early cluster /st/, the subject

demonstrated narrow number of errors in producing the /st/ clusters. Their strategy was also narrowed to only epenthesis e.g. /ɪl/ in *Tarl* would be /tɑ.ɪel/, see Table 7.

Table 7. Error rate for rhotic-lateral cluster and type of modification.

Cluster type	Error rate	Epenthesis	Deletion
/ɪl/	44%	44%	0%

The obtained phonological data analysis revealed a curious result regarding the impact of markedness concerning sonority scale distance. With the absence of expected remarkable effect of sonority distance, the MDH hypothesis by Eckman (1977)<sup>15</sup> did not have support, especially with the subjects' positive performance with clusters that have narrow sonority e.g., /ɪl/, /st/, and /ɪn/ compared to clusters with high sonority distance e.g., /ɪg/ and /ɪf/. However, Lado (1957)<sup>16</sup> Lado CAH hypothesis found an evidence in this data that support it, and this could mean that subjects succeeded in developing L2 phonological system separate from L1 phonological system, but yet on acoustical level there is still interlanguage phonetic transfer between L1 and L2. This L2 phonological development seems to be underdevelopment, taking into account subjects' proficiency level. It would be very interesting to reinvestigate the same subjects in advance level to see their phonological category development.

### Conclusion :

Through in-depth phonological analysis the results provide an important outcomes regarding the production of L2 English coda clusters. Although Arabic language does have clusters, subjects demonstrated in their production to the targeted cluster an influence of their L1 Arabic languages. Some of the observed phonological features have the trace of Arabic phonology on them. These features were seen in the form of modification on the cluster through either deletion or epenthesis. Also, there

was a sound assimilation to some of the sounds that are absent in their L1 phonemic inventory. It was interesting to see a very limited effect of markedness according to the sonority scale on the subjects' utterance especially on clusters with tight sonority scale. Subjects' simplification strategy is understandable taking into account linguistics features of their L1 and their proficiency level.

### Endnotes:

- (1) Kharma & Hajjaj, *Errors of English among Arabic speakers*: 29. Knoebel, *Hmong production of word-final obstruents in English as a function of language transfer, universal tendencies, and attention paid to speech*: 48.
- (2) Piske, Mackay & Flege, *Factors affecting degree of foreign accent in an L2: A review*: 191.
- (3) Broselow, Chen & Wang, *The Emergence of the Unmarked in Second Language Phonology*: 80. Hancin-Bhatt, *Optimality In Second Language phonology: codas in Thai ESL*: 201. Jabbari & Samvachi, *Persian learners' syllabification of English consonant clusters. International Journal of English Linguistics*: 236.
- (4) Eckman, *Markedness and The contrastive Analysis Hypothesis*: 315.
- (5) Dinnsen & Eckman, *A functional explanation of some phonological typologies*: 126.
- (6) Benson, *Universal Preference for the Open Syllable as an Independent Process in Interlanguage Phonology*: 221.
- (7) Lado, *Linguistics Across Cultures: Applied Linguistics for Language Teachers*: 39.
- (8) Ladefoged & Johnson, *A course in Phonetics*: 92.
- (9) Burquest & Payne, *Phonological analysis: A functional Approach*: 18.
- (10) Nathan, *Phonology: A cognitive grammar introduction*: 46.
- (11) Al-Ani, *Arabic Phonology: An Acoustical and Phonological Investigation*: 26.
- (12) Gierut, *Phonological Complexity and Language learnability*: 8.
- (13) Steve, *The Sonority Controversy*: 25.
- (14) Alotaibi, *Pronunciation Problems in the Production of the Voiced Labiodental Fricative /v/ by Saudi speakers of English*: 45.
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