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Variation in Loanword Adaptations in the Lebanese-Brazilian Community of Sao Paulo, Brazil

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I. INTRODUCTION

When analyzing loanword adaptations, many recent studies assume an integrated model taking into consideration how external factors affect perception and production. In one approach, perceptual similarity integrates the production grammar where loan processes tend to maximize the perceptual similarity between the adapted form and the foreign output (Miao 2005). Other research relates word frequency to the perception of non-native phonotactics in loanword adaptations (Davidson 2007). The role of phonetic knowledge in phonological patterning has also been applied to examine external factors that have been noted to bias studies not taking these factors into consideration (Zuraw 2007). An exemplar model of phonology assumes that predictable and redundant phonetic properties are specified in the lexical representation while each contextual variant of a phoneme forms a separate phonetic category (Kang 2008). While the present study assumes an integrated model, closest to the one implemented by Kang, it also takes into account features from the aforementioned theorists. While acknowledging that in some cases speakers do have access to the original pronunciation of loanwords; the study posits that factors such as perception and relative frequency affect variation in using phonological elements that are specific to the native or non-native language.

In this research, variation in spoken Brazilian Portuguese and specifically phonological adjustments of loanwords of Arabic origin are studied in a community of Lebanese-Brazilians in São Paulo, Brazil. The production of loanwords of Arabic origin is compared to words that are not of Arabic origin yet share similar phonological

environments. The goal of this research is to quantify how phonological aspects from both the borrowing and lending languages are incorporated into loanword adaptations, and to relate this variation to sociological and linguistic factors.

2. METHODOLOGY: ARABIC AND PORTUGUESE LANGUAGE CONTACT

Some of the same sociological variables that are cited as bringing about language contact such as politics, economics, education, religion (Thomason 2001) are reflected categorically in the type of loanwords that are borrowed from one language into another. Illustrated in table 1.1, is an example of loanwords reflecting these sociological categories. In all cases, the pronunciation of the lending language is different from that of the borrowing one.

TABLE 1.1 Arabic Loanwords in Brazilian Portuguese

Portuguese Word	Arabic Transcription (lending language)	Brazilian Portuguese Transcription (borrowing language)	Gloss	Sociological Category
<i>taifa</i>	['t̪ai. fə]	['tai. fə]	ruler	political
<i>dinar</i>	[di 'nar]	[dʒi 'nar]	currency	economic
<i>algoritmo</i>	[al. go. 'ri. ti. mo]	[aw. go. 'xi. tʃi. mu]	mathematics	educational
<i>mufti</i>	['muf. ti]	['mu. fi. tʃi]	cleric	religious

The borrowing of words from one language into another is one of the most common effects of language contact and reflects such linguistic adjustments triggered by sociological factors (Higa 1979). In addition, linguistic areas such as phonology, morphology, syntax and semantics play a variable role in the way that loanwords are produced. The following section addresses how sociological and linguistic factors contribute to variability in the perception and production of loanword adaptations.

While sociological factors affect variability in the production of language, speaker experience may also affect perception and influence production (Bybee 2006). Also, linguistic differences across languages may further trigger language change and impact variability in production. When the borrowing language does not possess a sound that the lending language contains, a speaker may modify his speech in some

way that most approaches what is familiar. This is demonstrated in table 1.2 with an example provided by a native Lebanese Arabic speaker in Brazil (Fralha 2007). This data indicates that in the production of the Brazilian Portuguese word, *primo*, the speaker makes a phonological adjustment. Since /p/ is not part of the sound inventory in the speaker's native language, Arabic; /b/, which is another bilabial stop existing in the phonology of his native language, is substituted since it most approximates the target sound in both place and manner.

TABLE 1.2 Phonological Adjustment- Segmental

Portuguese Word	Arabic Transcription	Portuguese Transcription	Gloss
<i>primo</i>	['bri.mo]	['pri.mu]	cousin

Phonological conflict may also result when two languages come into contact due to differences in phonotactics, the allowable combination of sound clusters in a given language. In the following example (Nabhan 1989) found in table 1.3, a speaker whose native language is Lebanese Arabic adjusts the pronunciation of Brazilian Portuguese by making a phonotactic adjustment. In Arabic, the consonantal cluster /bl/ is not naturally occurring nor is it frequent. When a speaker of Lebanese origin was faced with emitting the sound /bl/ in the word *blusa*, in an effort to maintain the phonotactic properties of the native language, Arabic, the epenthetic /a/ vowel was inserted to break this cluster.

TABLE 1.3 Phonological Adjustment- Phonotactic

Portuguese Word	Arabic Transcription	Portuguese Transcription	Gloss
<i>blusa</i>	[ba. 'lu.za]	['blu.zə]	blouse

Phonological issues affecting languages in contact, and specifically loanwords, are not limited to segmental items such as consonants and vowels as mentioned in the previous examples. Non-segmental, prosodic material such as intensity, intonation, and accentuation may also differ across languages and be transferred in loanwords. In the same way that restrictions may exist for the production of certain sound combinations in a given language, prosodic material is also subject to conflict and variability when languages come into contact. The following examples illustrate how placement of primary stress varies between the lending and borrowing language and produces change. In the Arabic pronunciation of the word *álgebra*, primary stress occurs in the penultimate syllable while in Portuguese; primary stress in this Arabic loanword occurs in the antepenultimate syllable.

TABLE 1.4 Phonological Adjustment- Prosodic

Portuguese Word	Arabic Transcription	Portuguese Transcription	Gloss
álgebra	[al 'ʒa. bɪr]	['aw. ʒe. brɐ]	algebra

Both segmental and non-segmental factors affect production when languages come into contact. Additionally, dialectal variation in either the lending or borrowing language can influence the way the word is produced and perceived. The following example in table 1.5 shows how multiple possibilities exist for the production of an Arabic loanword in Brazilian Portuguese because of dialectal variation.

TABLE 1.5 Phonological Adjustment- Segmental, Prosodic and Phonotactic

Portuguese Word	Arabic Transcription	Portuguese Transcription	Gloss
<i>mufti</i>	['muf. tɪ]	['muf. tɪ] ['muf. tʃɪ] ['mu. fi. tʃɪ]	Islamic cleric

In some dialects of Brazilian Portuguese, including the variety spoken in the capital of the state of São Paulo, alveolar stops are variably palatalized before high front vowels because of lexical diffusion (Cristóforo and Oliveira 2008). In table 1.6, the difference between palatalization and non-palatalization in voiced and unvoiced alveolar stops is introduced.

TABLE 1.6 Palatalization of Alveolar Stops

Alveolar Stop	Alveolar Stop Preceding /ɪ/	Palatalization
/d/	/'dɪ/	/'dʒɪ/
/t/	/'tɪ/	/'tʃɪ/

One aim of this research is to provide further evidence that lexical categories can be susceptible to phonological variability. Specifically, a loanword may forego assimilation by a speaker if the word is perceived to be of a certain origin or certain category. Furthermore, if the speaker possesses knowledge that the type of assimilation in question does not occur in the language from which the loanword originates, then the speaker may in turn choose not to assimilate. The hypothesis is that perception, in the form of linguistic knowledge, affects production.

If a Brazilian Portuguese speaker has knowledge of the Arabic language but is not a native speaker of Arabic, he or she may use

this linguistic knowledge to affect his or her production of a word of Arabic origin. This hypothesis implies that the speaker may maintain elements of the original pronunciation in Arabic and in doing so may not assimilate as he or she would as in all other speech, because the word is of Arabic origin. When producing a word such as *mufti*, as a consequence of access to Arabic phonology, a speaker may not assimilate, and in this case, palatalize the /t/.

In the example of the loanword *mufti*, aside from possible variation in the production of palatalization, phonotactic differences across languages may also influence inconsistent production of sound patterns. In Brazilian Portuguese, the consonantal cluster /ft/ is not common. When infrequent consonantal clusters occur, an epenthetic vowel is often inserted in an effort to break the cluster (Simões 2008) as exemplified in table 1.7.

TABLE 1.7 Epenthesis in Brazilian Portuguese

Portuguese Word	IPA Transcription	Epenthetic Vowel	Gloss
afta	['af. tə]	['a. fɪ. tə]	acid
naftalina	[naf. ta. 'li. nə]	[na. fɪ. 'ta. li. nə]	mothball

In the example of *mufti*, it is questionable whether the insertion of an epenthetic vowel to break a non-frequent consonantal cluster or assimilation, such as palatalization of /t/, would occur since neither phenomenon is native to Arabic phonology. In the word *mufti* and other loanwords of Arabic origin that contain segments capable of undergoing assimilation in Brazilian Portuguese, awareness of word origin could affect the way language contact, change and conflict occurs. In this specific case, perception of word origin may be hindered by multiple phonological changes that occur in Portuguese but not in Arabic, such as palatalization, the addition of a new syllable and shift of primary stress from the penultimate to the antepenultimate syllable.

While sociological factors are cited to affect variation in the production of sounds in isolation as well as in patterns, it is possible in the examples given to relate linguistic knowledge to the relationship between perception and production. In speakers who have experience in the language from which the loanword originates, morphological, syntactic and semantic meaning retained from the lending language can be associated with certain sounds and recognized by a speaker, resulting in further phonological variability.

Non-lexical, morphological material is often carried over from one language to another when loanwords are borrowed. For a speaker who has no experience with the lending language from which the loanword originates, there may be no meaning associated with this material. However, if a speaker does have experience in the language from which the loanword originates, morphological meaning could be retained. This meaning in turn could be reflected in the way this loanword is produced in the borrowing language, as suggested by grammaticalization (Hopper and Traugott 2003, Bliss 2006). Table 1.8 illustrates this concept.

TABLE 1.8 Morphological Redundancy in Language Contact

Arabic-IPA Transcription	al. 'ʒa.biɾ	'sʔb.
Gloss	The algebra	difficult
Portuguese-IPA Transcription	a 'al.ʒə.brə	'ɛ di.fi.'siw
Gloss	<i>The algebra</i>	<i>is difficult</i>

In this example, perception of morphological redundancy is suggested to influence production of a loanword in a non-native language in this example. In the noun phrase, *a álgebra*, the Portuguese feminine definite article *a* precedes *álgebra*. The loanword *álgebra* contains the prefix *al-*, which in Arabic is one of the ways to represent the definite article. In this case, phonologically similar and morphologically identical material from two languages adjacently appears in the same noun clause. One hypothesis is that a speaker with knowledge of both Arabic and Portuguese may adjust the way in which this noun phrase is produced by omitting the Portuguese definite article or adjusting production of the segment *al-* in an effort to avoid redundancy of definiteness.

Another point illustrated in this example is that in the case of the loanword *álgebra*, the gender of this word in the borrowing language is different from that of the lending language. In Arabic, *al-jabr* appears as a masculine noun, however in Brazilian Portuguese, *álgebra* ends in /a/, which is the default feminine morpheme in this language. For a speaker who has experience with the Arabic language, morphological redundancy may affect production of the final syllable of this word in Portuguese. Since the sound /a/ signifies feminine morpheme in Arabic, a speaker with Arabic and Portuguese experience may be conflicted in the way to produce the last syllable of this word because of redundancy of gender.

Syntax can be defined as the structure of sentences. While a relationship has been established between phonological and morphological changes yielding to morpho-phonological changes in language contact, a similar one has been observed between morphology and syntax (Lightfoot 2002), resulting in a subfield of linguistics called morphosyntax. In the contact between Lebanese Arabic and Brazilian Portuguese, especially in the case of complex borrowings, pronunciation of loanwords may be variable based upon whether or not a morphosyntactic meaning from Arabic is retained by the speaker. Since syntactic structure from the mother language or substratum is retained in the following loanword, phonological variation is possible due to conflict in morphosyntactic elements across languages.

TABLE 1.9 Grammaticalization and NNL Phonology

Language	IPA Transcription	Gloss
Portuguese	['ʃe. kɪ ma. tʃɪ]	'checkmate'
Arabic	['ʃek. mat]	'the king is captured'

This loanword is an illustration of how multiple language contacts can be a factor affecting variability in loanword production. In the loanword *xequemate*, syntactic structure and semantic meaning is retained from Arabic and Persian, (Moghadam 1938) where the word is said to have originated. This loanword, an example of an independent clause in Persian, maintains its original sentence structure in the complex borrowing in Arabic and this structure is transferred when the word is borrowed from Arabic into Portuguese. In Portuguese, the word is lexically categorized as a noun. Since the original syntax of the phrase is preserved in the loanword, phonological adjustments in Brazilian Portuguese may affect how the word is perceived or produced by a speaker who has knowledge of Arabic if this word is produced in a sentence.

Another possible scenario is that the word *xequemate* could undergo phonotactic adjustments such as epenthesis, where the obstruent in syllable final position is followed by a high vowel [ʃe. 'kɪ ma. 'tʃɪ]. A speaker with Arabic language experience may internalize meaning due to this change since /ɪ/ at the end of a noun in Arabic indicates possession. In the event that grammaticalization occurs, a speaker with Arabic language experience may vary production of this word and refrain from the Brazilian Portuguese phenomenon of epenthesis and palatalization in an effort not to relay morphological meaning from Arabic.

These two loanwords exemplify how the non-native language (NNL) phonology can be affected by implied meaning in the native language (L1). The examples of *álgebra* and *xeque-mate* serve as a hypothesis of how perception and production of loanwords may be variable in a person that has knowledge of Arabic and Portuguese. In the case of the word *álgebra*, morphological material from Arabic in the prefix *al-* is carried over into Portuguese and could be grammaticalized. While vocalization, the process of the phoneme /l/ becoming /w/ following a vowel, is common throughout all of Brazilian Portuguese, it is questionable whether a person with Arabic language experience would vocalize /l/ in this loanword and others given that the sound may have implied linguistic value in the lending language.

In the case of *xeque-mate*, while the same prefix *al-* is not carried over in the loanword when incepted into Portuguese from Arabic, interpretation of definiteness is possible because of its syntactic structure. Both assimilation and epenthesis could have an impact on perception of definiteness because of meaning that the epenthetic sound implies in Arabic. As a result, this knowledge could affect how someone with Arabic language experience produces the final syllable of this word in Portuguese.

3. DISCUSSION: LANGUAGE CONTACT

Sociological and linguistic factors have been shown to affect phonological variability in loanword adaptations. Three types of assimilation occurring in Brazilian Portuguese include palatalization, vocalization and velarization. The production of loanwords of Arabic origin by a speaker possessing language experience in both Arabic and Portuguese may vary. Portuguese is a language with a high preponderance of Arabic loanwords, most of which were incepted diachronically. Synchronically, there has been a sustained contact between Brazilian Portuguese and Lebanese Arabic in São Paulo, where varying degrees of Arabic language usage exist. While Arabic language transfer may be expected to affect the production of Brazilian Portuguese among native speakers of Arabic, varying degrees of Arabic language experience could influence the perception and production of words of Arabic origin in Portuguese by speakers who are not originally from Lebanon yet have family members from there.

4. RESULTS: THE PERCEPTION AND PRODUCTION OF ARABIC LOANWORDS

When examining variation in the perception and production of Arabic loanword, the question arises whether perception of the origin of Arabic loanwords varies within a community and whether perception affects variability in production. To address this question an experiment was designed to examine variability in loanword perception and the effect of perception on production.

In the first task, over sixty Lebanese-Brazilians were asked to identify Arabic loanwords integrated in a Portuguese text. Results indicate that the number and type of loanwords correctly identified ranged from 77% to 8%. Variation in these results suggests that there are factors that affect the perception of these types of words. The effect of generational membership and correct loanword identification is explored in table 1.10.

TABLE 1.10 Loanword Identification and Generation

Generation	Mean
1	32%
2	35%
3	22%

Results indicate that being a first-generation (born in Lebanon), second-generation (child of Lebanese) or third-generation (grandchild of Lebanese) Lebanese-Brazilian was not a significant factor in correct loanword identification, $F(2, 37) = 1.78$, *n.s.*, with 31% being the average of percent correctly identified. While there was no significant difference between the percent correct in first and second generation loanword identification, what is striking on these results is that members of the second generation performed better than the first generation in the task. High performers in this task that had no experience with Arabic were those that were college educated. Low performance in the third generation in all tasks has been consistent in the participants surveyed in this population.

Variability in correct loanword identification may indicate that there is some relationship between being a member of a specific generation and performing well on this task. Language experience may be a factor that contributes to perception of loanword origin. Other factors however might contribute to variation in this perception task,

since the first and second generations performed almost the same, but had different language experiences with Arabic. While there is not a significant relationship between being a member of a generational group and correctly identifying the words, language experience does serve as a contributing factor in being successful in this task. Results from the T-test shown below indicate that there is a relationship between speaking Arabic and being successful in loanword identification as $p < .05$.

Since the ability to speak Arabic does contribute to a person's ability to identify loanwords correctly from Arabic, the question arises why second-generation speakers performed better on this task than first-generation participants, leading to inquiries of what other factors affect variation in the perception and production of Arabic loanwords. Prior knowledge and some experience with the Arabic language are other factors that could influence how a subject perceives Arabic loanwords. Formal education, especially formal linguistic training in Portuguese, may have aided participants in successfully identifying Arabic loanwords. Using a Spearman Correlation, Spearman $r = 0.45$, $p < .01$, education is shown indeed to be related to correct loanword identification. Data contained in table 1.11 illustrate that with more education, the percentage of correct identifications increased in most cases.

TABLE 1.11 The Effect of Education on Loanword Identification

Education Level	% Correct
Less than eighth grade	19%
Finished high school	12%
Some college	26%
College graduate	35%
Graduate school	40%

While the second generation may not have the language ability of the first generation, they do have experience with the language, which affects perception of these words as being of Arabic origin. A possible explanation for second generation performing better than the first generation on this task is that Arabic loanwords may have important cultural value for the second generation since the language may not be very accessible to some. In addition, members of the second generation were more educated in this study than members of the first generation. Subjects with more education overall tended to perform better in the task involving the identification of words of Arabic origin. Education and experience with the language are two sociological factors confirmed

to attribute to variation in the perception of loanwords of Arabic origin in all members of the study that were surveyed.

Another factor affecting loanword perception is the presence of non-lexical material from Arabic appearing in the loanword. When collecting data in the perception task, the principal researcher reported that on more than one occasion subjects mentioned that words beginning with the sequence al- must be of Arabic origin. In order to explore whether the presence of the Arabic definite article affects perception, the Arabic loanwords used in the text are divided into three categories, those beginning with al-, a-, and those that do not begin with al- or a-. The first column of table 1.12 provides a range indicating the number of first, second and third generation Lebanese-Brazilians that correctly identified the loanword, in order to indicate the relationship of relative frequency in this population to correct loanword identification.

TABLE 1.12 Distribution of Correctly Identified Loanwords

Frequency	al-	a-	No al-or a-	Frequency	al-	a-	No al- or a-
35+			haqim haji haxixe mufti	15-19	alambique alfandaga alfinete álgebra almôndega	azeite azeitona	elixir emir
30-34			ramadā quibe	10-14	alcaparra alcunha aldeia alecrim algodão	acelga azogue	masmorra xequemate
25-29			Hasan hena Mecca	5-9		açogue adobe anil arraial arroba atum azar	caravana fulano mameluco mascate talco tambor tarifa xadrez xarope
20-24	alfombra		jasmin mesquita sura	1-4		aval	balde enxaqueca girafa guitarra marfim nuca rogue quintal tarefa

Initially, it seems that morphological influence from Arabic, namely the presence of *a-* or *al-*, does not influence the selection of loanwords. The most selected words, which were identified by 25 or more speakers, do not appear to contain this morphological trace of the definite article from Arabic. While the most selected words do not contain morphological material, semantic categories may be established after closer examination of these words. The most correctly identified Arabic loanwords were associated with popular culture as well as religion. In the middle tier of words identified, correctly identified by between 10 and 20 speakers, the majority of words are not only associated with Arab culture, but also contain the prefix *al-*. In the bottom tier of words, correctly identified between 1 and 9 times, none of the words contained the prefix *al-*. However in the words correctly identified by between 5 and 9 speakers, there is a grouping of words that contains *a-*. The words that were least likely to be identified as Arabic loanwords do not have the prefix *al-* and are words that are not associated with religion.

To summarize the results gathered from the Arabic loanword perception task, sociological and linguistic factors influence the perception of loanwords in this population. While certain groups performed better on this task, being a native speaker of Arabic from Lebanon was not the determining factor for having the best performance of this task. Education had more of an effect on the perception of Arabic loanwords in this population. Subjects with higher levels of education were more successful in this task than members that did not have as much education, regardless of membership in a particular generational group. In addition, the results show that semantic and morphological factors also affect perception of Arabic loanwords in members of all generational groups.

To examine possible variation in the production of loanwords, each of the participants of the study was recorded while reading a standardized text that contained loanwords of Arabic origin in order to test for variation in a population that has Arabic language experience. To specifically test for differences in loanwords production, assimilation in the form of palatalization, vocalization and velarization were examined. Also included in the results is the reintroduction of Arabic phonology in the production of Arabic loanwords occurring both segmentally and non-segmentally.

In Arabic, there are no restrictions for the types of sound that may appear in syllable final (coda) position. However in Portuguese, the phonemes /b/ /k/ /d/ /f/ /g/ /p/ /t/ and /v/ are not commonly occurring as a coda and typically an epenthetic vowel is added if a word ends in one of these sounds. Many words originating from Arabic have been incepted into Portuguese and have adjusted to phonological needs of the borrowing language orthographically. Often times, this has involved adding a vowel to follow the consonant. In examining the production of Arabic loanwords by speakers with Arabic language experience, primarily it is first-generation speakers that made adjustments to these words, by maintaining original Arabic segmental phonology by not pronouncing this epenthetic sound. In the following examples, Arabic loanwords ending in /ɪ/ were shown to be renativized by the speakers.

TABLE 1.13 Segmental Renativization of Arabic Loanwords- Apocape

Speaker ID	Apocape-Word Final	Portuguese	Gloss
SP10	a.lã.'bik	<i>alambique</i>	recipient
SP10	a.l.fi.'net	<i>alfinete</i>	safety pin
SP10	a.'zeɪt	<i>azeite</i>	oil
SP10	ʃa.'r p	<i>xarope</i>	syrup
SP10	'ʃε.k.'ma.tɪ	<i>xeque-mate</i>	check mate
SP10	xa.'ʃiʃ	<i>haxixe</i>	hash
SP10	a.'sug	<i>açougue</i>	butcher shop
SP47	a.'dub	<i>adobe</i>	adobe
SP49	'xaʒ	<i>haji</i>	pilgrimage
SP37	a.lã.'bik	<i>alambique</i>	recipient
SP3	a.'zeɪt	<i>azeite</i>	oil

Results from these data show that variability exists in both the same speaker and word. In the case of SP10, this speaker had a tendency in the word final position not to produce the /ɪ/. In the case of the word 'ʃε.k.'ma.tɪ, this phenomenon only occurs variably in one syllable but not the other. In the examples of *azeite* and *alambique*, more than one speaker does not produce the epenthetic /ɪ/, thereby restoring it to the original Arabic phonology.

In addition, non-segmental adjustments occurred in loanwords by Lebanese Brazilians. This is also cited at the individual and word level in various stressed positions. In table 1.14, a shift from penultimate

to antepenultimate syllable while in table 1.15, a shift from antepenultimate to penultimate syllable is apparent.

TABLE 1.14 Non-segmental Renativization of Arabic Loanwords-I

Speaker ID	IPA Transcription	Portuguese Word	Gloss
SP7	aɫ. 'ka.pa.xə	alcaparra	caper
SP7	'ʒi.xa.fə	girafa	giraffe
SP47	'al.fom.brə	alfombra	red
SP2	ma'ma.lu.ku	mameluco	servant

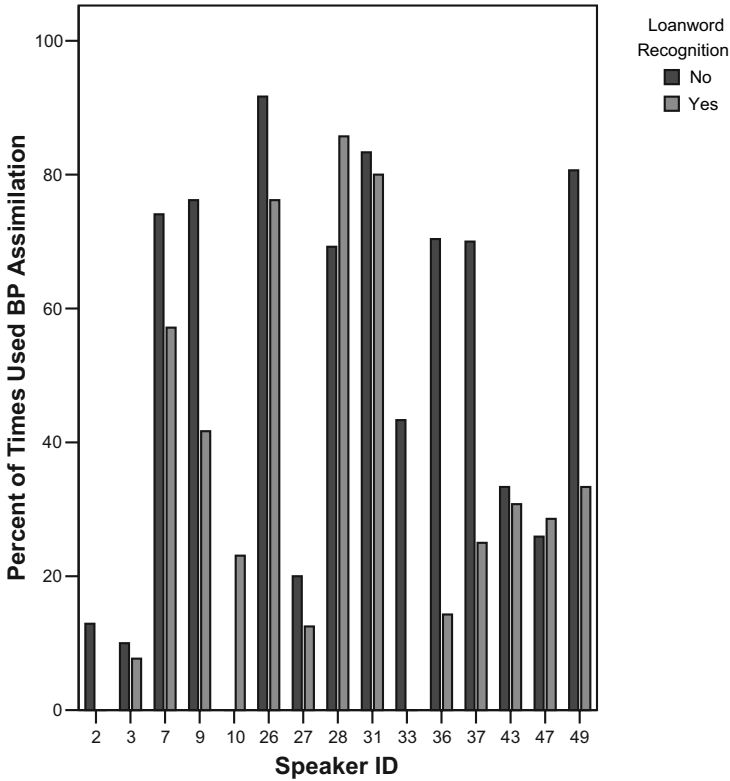
TABLE 1.15 Non-segmental Renativization of Arabic Loanwords-II

Speaker ID	IPA Transcription	Portuguese Word	Gloss
SP3	aɫ. 'ʒe.brə	álgebra	algebra
SP9	aɫ.mõ.'de.kə	almôndega	meatball

These data show that Brazilian Portuguese speakers who have experience with Arabic make both segmental and non-segmental adjustments in the production of loanwords of Arabic origin. In both spontaneous and scripted speech, phonological variation of Brazilian Portuguese included Arabic language transfer both at the segmental and non-segmental level in groups, individuals, in certain types of words and sound patterns.

The final task in examining loanword production was to investigate whether perception affected production consistently in first-generation Lebanese-Brazilians. This was done in two ways. First, all of the opportunities to assimilate with palatalization, vocalization or velarization were considered. Then overall assimilation was compared in two cases: in words that speakers identified as loanwords, and in all other words. The hypothesis was that if the loanword was perceived as being of Arabic origin, then the word would be susceptible to incorporate both elements of Lebanese Arabic and Brazilian Portuguese phonology. Data presented in figure 1.0 shows the relationship between loanword perception and production.

FIGURE 1 Assimilation- Loanword Perception and Production



1. When comparing the percentage of usage, the amount of variation in assimilation produced in an individual is measured. The overall assimilation that was analyzed which included palatalization, velarization and vocalization, varied among individuals in the first generation.
2. By looking at the high amount of variation in percentage of usage, it is evident that loanword perception has an impact on production of assimilation in Brazilian Portuguese in the first generation. In the results of all but one participant, loanword recognition affects production of assimilation.
3. By looking at the degree of variation, it is apparent that assimilation occurred more in a certain type of word, in this case Arabic loanwords and non-Arabic loanwords. Assimilation occurred more in non-loanwords than in loanwords in first-generation Lebanese Brazilians.

In an overall analysis of the data, no categorical evidence is provided about the relationship between perception and loanword production in a controlled reading. However in a closer examination, there is evidence that words of Arabic origin are produced differently from words that are not loanwords. In table 1.16 transcriptions are provided for the production of an Arabic loanword *alfinete* and word of non-Arabic origin, *presente*. These data reveal that the segment /tɪ/ is produced variably among native speakers of Arabic. While no one speaker produces the word in the same way, each individual is consistent in his or her articulation of palatalization in the same phonological environment both in a loanword and non-loanword.

TABLE 1.16 Gradualness in Palatalization

ID	presente	alfinete
SP2	pre. 'zē.tɪ	al.fi.'ne.tɪ
SP7	pre. 'zē.tʃɪ	al.fi.'ne.tʃɪ
SP10	pre. 'zēt	al.fi.'net
SP37	pre. 'zētʃ	aw.fi.'ne.tʃ

Of the three types of assimilation examined in the study, vocalization was most prevalent among all speakers. In table 1.17 exemplifies that there was less variation in vocalization than in palatalization even in the case when the word was recognized as a loanword.

TABLE 1.17 Loanword Recognition and Variability- '*alfinete*'

Speaker ID	IPA Transcription
SP26	aw.fi.'ne.tɪ
SP27	aw.fai.'net
SP28	aw.fi.'ne.tʃɪ
SP31	aw.fi.'ne.tʃɪ
SP47	aw.fi.'ne.tʃɪ

In speakers who have experience with the language from which the loanword originates, both trends and inconsistencies can be noticed in groups and individuals regarding phonological variation and language transfer. While assimilation has been viewed

diachronically as a categorical process that often has sought to be rule based, synchronic analysis provides other evidence. In the word *alfinete*, two types of Brazilian Portuguese assimilation are possible, /t/ is capable of undergoing palatalization and /l/ is capable of being vocalized. Of all of the participants that perceived *alfinete* as being of Arabic origin, no one refrained from incorporating Brazilian Portuguese assimilation even though the phenomenon does not occur in Arabic phonology. This example shows that even though a speaker may have linguistic knowledge from which the language that the loanword originates, phonological elements of the non-native language may be implemented variably.

5. CONCLUSION

Results of this study relate linguistic acquisition of a NNL to maintenance of L1. In the case of language contact, there are multiple factors that affect awareness of perception yielding different rates of variability in individual production. Therefore, perceptual awareness must be considered in both languages. While sociological and linguistic factors can affect variation in one language, when languages come into contact, variability is not predictable namely because of experiences relative to the individual, which may affect perception. This concept is best reflected in a short commentary provided by SP 2, a first-generation native speaker of Arabic.

English translation:

I don't mix up Portuguese. I speak normal Arabic without mixing up the words. I am able to speak Portuguese without mixing Arabic together if it is necessary to talk. I don't mix the word one language with the other. I am able to dominate both languages without any problem.

Portuguese transcription:

Eu não misturo em português. Eu consigo falar árabe normal sem errar as palavras. Eu consigo falar em português sem misturar árabe juntos se precisa falar. Não misturo as palavra uma língua com a outra. Consigo dominar as duas sem problema nenhuma (sic).

This metalinguistic commentary is telling on several levels. First, it shows that the subject is conscious that members of her community exhibit language transfer in the form of lexical code-switching. Next,

it exemplifies that the subject identifies herself as a member of the community that is not influenced by Arabic language transfer when producing Brazilian Portuguese. Ironically, in this commentary, despite the content of her words, there is evidence for phonological, syntactic and morphological transfer of the Arabic language in this short sample of discourse from the speaker. While mixing of codes in this case is not on a lexical level, Arabic language transfer does permeate the production of Brazilian Portuguese contrary to what is believed to be linguistic awareness.

In conclusion, this research provides evidence for inconsistencies involving language change and variation synchronically while examining loanword adaptations. In a sociolinguistic study that examines language maintenance and variability of Lebanese Brazilians, non-categorical, phonological variation mirrors irregularities that can be observed in words that have been borrowed from Arabic into Portuguese diachronically. With a study that involves native speakers of Arabic and Arabic loanwords, some observations may be made with regards to production and language change by examining perception, redundancy, and frequency as possible factors that affect variation in the production of Brazilian Portuguese.

Furthermore, this study shows that language contact triggers gradual, phonological variation. In non-native speakers of Brazilian Portuguese whose first language is Lebanese Arabic, this is reflected through the acquisition of certain phonological phenomena from Portuguese as well as in the maintenance of such material from Arabic. Findings from this study reveal that through the use of a Portuguese text containing Arabic loanwords, a platform exists to examine a relationship between phonological awareness and production when two languages are in contact. Because language transfer from Arabic occurs not only in the loanword, but also in the surrounding text, there is evidence confirming the fact that perceptual similarity can be integrated into the production grammar where loan processes tend to maximize the perceptual similarity between the adapted form and the foreign output, as Miao (2005) proposed.

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