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THE ROLE OF CROSS-LINGUISTIC STRESS PATTERN FREQUENCY AND WORD SIMILARITY ON THE ACQUISITION OF ENGLISH STRESS PATTERN BY NATIVE SPEAKERS OF BRAZILIAN PORTUGUESE

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RESUMO: Este é um estudo preliminary dedicado à investigação da aquisição do acento de palavra do inglês como segunda língua (L2) por falantes de português brasileiro como primeira língua (L1). Neste artigo trazemos os resultados de um teste de percepção em que falantes nativos de inglês americano (AmE) e outro grupo de falantes nativos de holandês julgaram a produção de palavras paroxítonas cognatas (ingles/portugues) e não-cognatas do ingles produzidas tanto por falantes nativos de AmE quanto por brasileiros. Os resultados mostram que juízes americanos e holandeses foram bastante unânimes e que a atribuição do acento de palavra do inglês tanto por americanos quanto por brasileiros mostram variação com relação à forma canônica. Porém, a variação observada no grupo de falantes nativos do inglês aponta a influência de outros padrões prosódicos do inglês, enquanto a varição observada na produção de acento por brasileiros indica a influência dos padrões do português, especialmente em palavras cognatas, que ativam as representações prosodicas das palavras na L1 que se assemelham quanto a forma.

PALAVRAS-CHAVE: Aquisição de segunda língua, acento de palavra, interface inglês-holandês-português brasileiro, percepção em L1 e L2.

ABSTRACT: This is a preliminary study in which we investigate the acquisition of English as a second language (L2) word stress by native speakers of Brazilian Portuguese (BP, L1).[1,2] We present results of a

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1. L2 stands for second language, foreign language, target language.
2. L1 stands for first language, mother tongue, source language.

multiple- choice –forced choice perception test in which native speakers of American English and native speakers of Dutch judged the production of English words bearing pre-final stress that were either cognate and non-cognate with BP words. The tokens were produced by native speakers of American English and by Brazilians who speak English as a second language. The results show that American and Dutch listeners were consistent in their judgments on native and non-native stress productions. Both American and Brazilian speakers produced errors, i.e. deviations from the canonical stress pattern of English. However, the errors produced by English native speakers mirror the predominant stress patterns of English and the errors found in non-native English mirror the regularities of Portuguese stress patterns. Such pattern of errors in BP English were found especially in cognate words whose forms activate similar words (neighbours) in the L1.

KEYWORDS: Second Language Acquisition, word stress, English-Dutch-Brazilian Portuguese interface, L1 and L2 perception.

1. Introduction

Several factors are implicated in L2 word stress realization. Some of the most relevant are the rhythmic differences between languages (i.e. Wenk 1985, Caspers 2010, Kyak, 2009), frequency of occurrence of word stress in both languages (e.g. Guion 2001, Post 2010, 2011), lexical frequency (i.e. van Leyden & van Heuven 1996), word similarity rates (Schepens et al. 2012), neighborhood density of similar words in L1 (Smits et al. 2009).

The main objective of our first set of experiments is to test the effect of two of the factors listed above on L2 word stress production: (i) the effect of the predominant word stress pattern in Portuguese (L1) and English (L2), i.e. pre-final stress, on the phonetic and phonological productions in non-native English and (ii) word similarity - cognate words (that share form similarities between L1 and L2). We would like to observe if word similarity and dominant word stress pattern would lead to inaccurate location of word stress (learners will produce final stress) as well as inaccurate realization (they will produce the acoustic correlates of stress according to the phonetic code of the native language) of the pre-final word stress.

Our first hypothesis is that BP learners of English will incorrectly stress the final syllable, especially in cognate words whose stress is morphologically maintained on the same syllable but is thereby shifted from the prefinal syllable in BP to the final syllable in English, as in the word pairs *proNOme* (BP) – *proNOUN* (English) and *detesTAdo* (BP) – *detesTED* (English). We expect BP native speakers will be affected, in such cases, by conspiracy effects from both orthographic and the phonological representa-

tions (Taraban & McClelland 1987) on word stress productions that will tend to be on the final syllable, if there is transfer from the L1 system.

Based on the hypothesis discussed above, the first production experiment tests whether the similarity in the assignment of word stress in English and Brazilian Portuguese will cause learners to incorrectly apply the same phonetic cues for stress as they do in their native language. We assume that phonetic-phonologically similar words, such as cognates, would be more difficult to be produced by learners in terms of prosody, since the acoustic patterns from the L2 would be categorized according to the L1.

In BP, the pitch curve in narrow focus position is marked by a dipping pattern with a peak on the pre-tonic syllable followed by a steep fall on the stressed syllable (Moraes 1999; Romano, 2004).[3] In English, words in narrow focus position are marked by a rising tone that culminates in a peak F0 on the stressed syllable. Besides contour differences, the F0 change is generally more prominent in English than in BP, constituting a much more reliable cue for stress in English than it is in BP. Thus, we expect that it will be difficult for BP native speakers to identify and produce pitch according to the L2. Also, duration differences in English at the segmental and syllabic levels will not be processed by L2 English speakers as cues for stress, since BP does not have significant vowel reduction (in contradistinction to stress-timed languages such as English and Dutch).

We expect also that the pre-final stress, which is highly frequent in both L1 and L2, will be over-generalized in L2 speech and there will be fossilization of its acquisition. We believe that both form similarity and pre-final stress frequency in BP and English are responsible for an L1 filter effect that will block the perception/production of acoustic realizations that are not used as cues for stress in the L1 system.

2. Stress patterns in English, Dutch and Brazilian Portuguese

With respect to the acquisition of the stress pattern of L1 Brazilian Portuguese and L2 English, we know that pre-final stress is the most frequent pattern in both languages (Post 2011). The study by Post (2010) shows that pre-final stress is well produced by Brazilian intermediate learners of English (ca. 80% correctness in a reading-aloud words task containing monomorphemic and suffixed words of English), but pre-final stress is also the most frequent error pattern in BP-English tokens that deviate from the target. Incorrect application of pre-final stress in BP English occurs in approximately 50% of the stress errors.

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3. Some authors argue that duration is the most important correlate of stress in BP (Fernandes, 1976; Major, 1985; Massini, 1991).

In this study, the frequency distribution data of English word stress patterns is based on Clopper (2002). The word frequencies were calculated based on the lexical frequency data provided by the Hoosier Mental Lexicon (HML), which is an online version of Webster's Pocket Dictionary that includes 20,000 word types with token frequencies based on the Brown University database. Table 1 shows these lexical frequencies broken down by word length and by stress position; frequencies have been collapsed over monomorphemic and polymorphemic multisyllabic words.

Word Length (syllable count)	Position of primary stress in (monomorphemic+polymorphemic) words (Absolute and relative numbers)				
	Pre-a.	Antep.	Pre-final	Final	Total
2			67,693 77%	19.881 23%	87.574 59%
3		24,558 60%	15,278 37%	1,398 3%	41,234 28%
4	97 0.5%	9,014 46.5%	6,831 35%	3,549 18%	19,491 13%
Total	97 00.05%	33,572 22.50%	89,802 60.50%	24,828 16.95%	148,299 100%

Table 1: Absolute and relative sum frequency of English words broken down by word length and stress position. Frequencies are based on the Hoosier Mental Lexicon (further see text, after Clopper 2002).

From table 1, we infer that 2- and 3-syllable words are more frequent in the English lexicon and that there is a tendency for the first syllable to be stressed, since the most frequent stress pattern of 2-syllable words is pre-final and the most frequent stress pattern in 3-syllable words is antepenultimate. The 4-syllable words are stressed mostly on the antepenultimate syllable. In 3- and 4- syllable words pre-final stress is the second most frequent, but, as 2-syllable words are substantially more frequent in the English lexicon, pre-final stress is the most frequent overall.

As for Dutch, the second source language of interface in this study, table 2 presents the frequency distribution of stress based on the study by van Heuven & Hagman (1988). The following statistical analysis is based on the CELEX word list and includes monomorphemic and polymorphemic words of Dutch:

Word Length (syllable count)	Position of primary stress in (monomorphemic+polymorphemic) words (Absolute and relative numbers)				
	Pre-a.	Antep.	Pre-final	Final	Total
2			15,758 85%	2,726 15%	15758 51%
3		18,020 67%	6,370 24%	2,606 9%	2439 8%
4	6,436 45%	3,365 24%	3,065 21%	1,278 10%	12866 41%
Total	6436 21%	5167 16%	19460 62%	6610 21%	31063 100%

Table 2: Absolute and relative (row percentage) lexical frequency of Dutch words broken down by word length and stress position. Frequencies are based on occurrence in the CELEX word list (after Van Heuven & Hagman 1988).

Table 2 shows that 23,996 (77%) out of the 31,063 Dutch words shorter than five syllables have stress placed on the first syllable. The predominance of primary stress on the first syllable decreases as the number of possibilities of stress placement increases, that is, 2-syllable words present a higher percentage of pre-final stress than 3-syllable words have antepenultimate stress, so that we have 85% of 2-syllable words bearing pre-final stress, 67% of 3-syllable words bearing antepenultimate stress and 45% of the 4-syllable words bearing pre-antepenultimate stress. Stress is distributed more equally in other positions within words as word size increases.

The third language of interface in this study is the Brazilian variety of Portuguese and our data will be based on studies on frequency distributions, more specifically, on the database FrePOP (Frequency of Phonological Objects in Portuguese), which includes words of European, African and Brazilian Portuguese by Frota, Vigario & Martins (2010).

Word Length	Position of primary stress in (monomorphemic + polymorphemic) words of Portuguese (absolute and relative numbers)			
	Antepenult.	Pre-final	Final	Total
2		456,450 (74%)	157,580 (26%)	614,030 (53%)
3	20,716 (6%)	256,166 (75%)	66,831 (19%)	343,713 (30%)
≥4	16,250 (8%)	143,628 (72%)	38,835 (20%)	198,713 (17%)

Table 3: Absolute and relative (row percentage) token frequencies of Portuguese words crosstabulated by length (number of syllables) and by stress position.

In Portuguese, primary stress is assigned within the trisyllabic window, that is, stress is either on the final, pre-final or antepenultimate syllables. It is interesting to observe from table 3 that pre-final stress is highly frequent in the linguistic system (74%) and that 2-syllable words are the most frequent in the lexicon (ca. 50%). On the other hand, antepenultimate stress is extremely infrequent (ca. 3%) and 4-syllable words and longer ads up to less than 20% in Portuguese. Independently of word length, pre-final stress is present in almost 75% of the word types.

If we compare the data for the three languages we are taking into account in this study, we observe that Portuguese and English share similar frequency percentages regarding word length: 2-syllable word types are considerably more frequent in the lexicon, followed by 3-syllable word types and 4-syllable (or longer) word types as the least frequent pattern. English and Dutch share similarities concerning stressing the first syllable of words. This may lead Dutch speakers of English to stress the first syllable regardless of the pattern that words bear in the English lexicon. However, Dutch stress is considerably more distributed over the different possible positions within words, showing a preference for pre-final stress in relation to antepenultimate stress only 6% higher than the antepenultimate stress in the lexicon. Consequently, It Dutch speakers may be more guided by the acoustic cues in order to produce/perceive stress in their own language as well as in a foreign language such as English, Cooper et al. (2002), whose correlates for stress are similar to Dutch (pitch peaks associated with the stressed syllable, for instance).

Based on the above, two main factors related to stress pattern frequency in English will affect native speakers of BP and Dutch differently: i) pre-final stress as the highly frequent stress pattern in BP and in English will have a positive as well as a negative influence on BP English stress production, since pre-final stress will be correctly placed, but its use may be overgeneralized; and ii) the tendency of stressing the first syllable of words in Dutch and in English will lead Dutch native speakers to stress the first syllable of words in English.

3.Materials and methods

3.1. Production experiment

The production experiment includes four word types:

COG2: 2-syllable cognate words,

COG3: 3-syllable cognate words,

NCOG2: 2-syllable non-cognate words,

NCOG3: 3-syllable non-cognate words.

English word types (examples and phonotactic structure)	
COG2	colleague (CV.CVC) artist (VC. CVCC) pronoun (CCV.CVVC)
COG3	detested (CV.CVC.CVC) evoking (V.CV.CVC) impulsive (VC.CVC.CVC)
NCOG2	childhood (CVCC.CVC) kinship (CVC.CVC) likewise (CVC.VVVC)
NCOG3	unduly (VC.CV.CV) mistaking (CVC.CV.CVC) unsuited (VC.CV.CVC)

Table 5. English words bearing pre-final included in the first experiment with their respective phonotactics and divided in to 4 different word types according to their form similarity with words in the L1 (cognates or non-cognates) and with their length (2- or 3-syllables)[4].

Twelve Brazilian Portuguese advanced ESL[5] speakers and six native speakers of American English produced 36 target words in a fixed carrier sentence *Say … happily* which provides a syntactic context in which the target word is in focus position. In English a word in focus condition has phrasal accent marked by a pitch peak on its stressed syllable. The sentences were presented in random order.. Each speaker produced 36 English target words, totaling 432 L2 BP-ESL tokens.

Two control groups/conditions were included in the experiment, as follows:

(1) A group of 6 native speakers of American English each produced the same 36 sentences as the ESL speakers produced, totaling 216 native tokens of English.

(2) The BP native speakers who produced the sentences in English in this experiment were also the control group for Brazilian Portuguese. They were asked to produce 16 sentences in Portuguese which included the BP words that were the cognate counterparts of the English words. These words were embedded in the carrier sentence *Diga… rápido*, which provide the same syntactic context in which the target word is in focus. The difference is that, in citation forms, BP speakers tend to produce a dipping F0 contour, which actually differs from the English pitch pattern.

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4. The full list of 36 targets is is found in appendix 1 (page 16).
5. ESL stands for English as Second Language.

The speakers were digitally recorded (44,1 kHz, 16 bits) in a sound attenuating booth in the Phonetics Laboratory of Leiden University using a Sennheiser MKH 416 unidirectional condenser microphone. The stimuli were presented through E-Prime 2.0. Later, the data was analyzed in Praat (Boersma. & Weenink. 2001) and SPSS 1.8.

3.2. Perception experiment

Concerning the multiple-choice forced-choice perception experiment, native and non-native English tokens were judged by three native speakers of Dutch, a stress-timed language, as well as three-eAmerican English native speakers.

The words had been digitally excised from the carrier sentences in order to have their word stress judged out of the phrasal prosodic context. The judges used an answer sheet in which the words were identified by numbers only (from 1 to 36 for each speaker) syllable positions were also identified by numbers (from 1 to 3, counting from the left to right). Listeners had to decide which syllable position carried the stress. Tokens were blocked by speaker; the order of speakers was randomized over judges. All 648 word tokens were judged by 6 judges, totaling 3,888 judgments. A perception study with Dutch and English listeners showed that Dutch listeners locate English stress at least as precisely as native English listeners do (Cooper, Cutler & Wales, 2002). The three Dutch listeners are experts in Phonetics. One of the American native listeners is an expert in linguistics. The other two American participants are naïve listeners.

4. Results and analysis

Our first observation is that the overall agreement between the judges' responses was considerable. The Dutch judges perceived pre-final syllable stress in approximately 95% of the tokens both in native and non-native English. And the American English judges showed agreement of ca. 90% on the pre-final syllable.

The overall agreement between Dutch and American English native listeners on the L2 English tokens is high, ca. 70%.

Comparing the results on Dutch and American English judges in relation to the four different word types we obtained the following results in tables 6 and 7 for non-native English word stress productions, respectively.

Count and percentage of judgments on word stress patterns per word type Non-native English – Dutch judges (Ant. = antepenultimate syllable stress; PF=pre-final syllable stress; F=final syllable stress)								
	Judges/ syllable judged as stressed							
	VH			JC			DV		
Words	ANT.	PF	F	ANT.	PF	F	ANT.	PF	F
COG2		(75) 89.3%	(9) 10.7%		(74) 88.1%	(10) 11.9%		(77) 91.7%	(7) 8.3%
COG3	-	(103) 98.1%	(2) 1.9%	(2) 1.9%	(104) 97.2%	(1) 0.9%	-	(98) 91.6%	(9) 8.4%
NCOG2		(113) 94.2%	(7) 5.8%		(117) 97.5%	(3) 2.5%		(118) 98.3%	(2) 1.7%
NCOG3	(2) 1.7%	(117) 97.5%	(1) 0.8%	(8) 6.7%	(111) 92.5%	(1) 0.8%	(2) 1.7%	(117) 97.3%	(1) 0.8%
TOTAL	(2) 0.4%	(408) **94.8%**	(19) 4.8%	(10) 2.2%	(406) **93.8%**	(15) 4.0%	(2) 0.4%	(410) **94.8%**	(19) 4.8%

Table 6. Judgments of non-native English word stress - word type vs. stress pattern (count and percentage) by native speakers of Dutch.

Observing the results in table 6, we notice the judgments differ for COG2 words. When we observe the agreement per item (appendix, table A) it is clear that the difference it presents in relation to the other word types is due to the judgments on the word *pronoun*, in ca. 50% of the judgments for this word. Judge DV presents similar answer percentages for COG3 and in COG2. This percentage is lower in relation to the two other judges, which suggests that for DV cognate words were more likely to be judged as finally stressed. There were judgments on the 3-syllabic words on the antepenultimate and final, but they are not considered relevant, since the pre-final stress was perceived in more than 95% of the cases. Overall, the pre-final stress was perceived in 94% of the non-native tokens. COG2 (2-syllable cognate words) was less accurately produced and the deviant judgments tended to be on the final syllable.

Fleiss kappa values for inter-judge response agreement showed to be very high: DV vs. JC vs. VH: $\kappa(643) = .877$ (p < .001).

In relation to the American English native speakers' judgments, there is a clear difference in their responses, as it can be observed in the following table:

Count and percentage of judgments on word stress patterns per word type Non-native English – American English judges (Ant. = antepenultimate syllable stress; PF=pre-final syllable stress; F=final syllable stress)									
	Judges/ syllable judged as stressed								
	LB			HT			AV		
Words	ANT.	PF	F	ANT.	PF	F	ANT.	PF	F
COG2		115 95.8%	9 10.7%		72 85.7%	12 14,3%		75 89,3%	9 10,7%
COG3	17 15.7%	90 83.3%	5 4.2%	5 4,6%	102 94,4%	0	13 12,0%	94 87,0%	0
NCOG2		75 89.3%	0		116 96,7%	4 3,3%		116 96,7%	4 3,3%
NCOG3	24 20.0%	95 79.2%	1 0.8%	6 5,0%	112 93,3%	1 0,8%	15 12,5%	105 87,5%	0
TOTAL	41 9%	375 **87%**	15 4%	11 2,4%	402 **92.5%**	17 4,6%	28 6%	390 **89.8%**	13 4%
Missing cases	1 0.2%			2 0.5%			1 0.2%		

Table 2. Judgments of non-native English word stress - word type vs. stress pattern (count and percentage) by native speakers of American English.

The average of judgments of stress on the pre-final syllable per judge is respectively, 87%, 93% and 90%, which is again very high, which shows that typically American native speakers perceive Brazilian Portuguese advanced learners productions in English correctly stressed, at least in which concerns the pre-final stress pattern. Inter-judge agreement was substantial: LB vs. AV vs. HT: $\kappa(645) = .821$.

The pattern of deviant productions differ from the Dutch judges, since there is a clear tendency from the American English judges to perceive the antepenultimate syllable as stressed in 3-syllable words of non-native English, which rarely occurs in Dutch judgments. The 2-syllable cognate words were judged on average 10 times more as stressed on the final syllable than the 2-syllable non-cognate words.. These results are supported by a very similar ratio on the Dutch judgments: ca. 3% final stress for 2-syllable non-cognates and ca. 10% final stress for 2-syllable cognates in non-native English. This latter result would support our hypothesis on L1 transfer to L2 word stress production if this judgment pattern differs from native English judgments.

In relation to the results for native English, we observe that the deviant judgments indeed follow a different pattern than in non-native English, as shown in table 8, which displays the judgment results of Dutch native speakers.

Count and percentage of judgments on word stress patterns per word type native English – Dutch judges (Ant. = antepenultimate syllable stress; PF=pre-final syllable stress; F=final syllable stress)								
Judges/ syllable judged as stressed								
	VH			JC			DV		
Word types	ANT.	PF	F	ANT.	PF	F	ANT.	PF	F
COG2		(84) 100 %	-		(82) 96.7 %	(2) 3.3 %		(81) 96.4%	(3) 3.6%
COG3	(3) 3.6%	(81) 96.4%	-	(3) 3.6%	(81) 96.4%	-	(4) 4.8%	(80) 95.2%	-
NCOG2		(84) 100%	-		(81) 96.4%	(3) 3.6%		(82) 96.7%	(2) 3.3%
NCOG3	(3) 3.6%	(81) 96.4%	-	(5) 6.0%	(79) 94.0%	-	(6) 7.2%	(78) 92.8%	-
TOTAL	(6) 3.7%	(330) 97.3%	-	(8) 2.4%	(323) 95.8%	(5) 1.8%	(10) 3%	(323) 95.2%	(4) 1.8%

Table 8. Count and percentage of judgments on word stress patterns per word type

native English – by native speakers of Dutch.

It can be seen in table 3 that English presents variability in relation to word stress location in words canonically stressed on the pre-final syllable. If stress is on the wrong syllable in these materials, it is perceived predominantly on the first syllable of the word in 3-syllable words, i.e. antepenultimate stress. Only 2-syllable words are sometimes perceived with final stress (but not by VH).

The results on the judgment of native English by native speakers of American English show similar judgments as the results found for the Dutch judges, as shown in table 9 below:

Count and percentage of judgments on word stress patterns per word type Native English – American English judges (Ant. = antepenultimate syllable stress; PF=pre-final syllable stress; F=final syllable stress)								
Judges/ syllable judged as stressed								
	LB			HT			AV		
Words	ANT.	PF	F	ANT.	PF	F	ANT.	PF	F
COG2		39 92.9%	2 4.8%		38 90,5%	3 7,1%		39 95,1%	2 4,9%
COG3	17 31.5%	37 68.5%	0	3 5,6%	51 94,4%		8 14,8%	46 85,2%	0
NCOG2		58 96.7%	2 3.3%		57 95,0%	3 5,0%		59 98,3%	1 1,7%
NCOG3	18 30.0%	42 70.0%	0	6 10,0%	54 90,0%		11 18,3%	49 81,7%	0
TOTAL	35 15.5%	176 82%	4 2%	9 4.5%	200 92.5%	6 3%	19 8%	193 90%	3 2%
Missing cases		1 0.5%			1 0.5%			0	

Table 9. Count and percentage of judgments on word stress patterns per word type

native English – by native listeners of American English.

In table 9 we observe that, as in Dutch judgments, the 3-syllable words were never perceived as stressed on the final syllable and, differently from the Dutch judges, the American listeners perceived 3-syllable words stressed on the antepenultimate syllable considerably more (ca. 10% American answers vs. 3% of Dutch answers).

In relation to 2-syllable words, they were similarly perceived as stressed on the final syllable in 1 or 2 cases in native English, which do not reach 5% of the possible answers per word type. In non--native English, the stress is judged as final in 2% of the cases in 2-syllable non-cognate words and in 11% of the cases in 2-syllable cognate words, which suggests there is a difference in stress placement in native and non-native English in relation to the latter word type, which tends to be finally stressed. These results are also supported by Dutch judgments. They show similar differences on the judgment of 2-syllable words, ca. 3% and 10% final stress in respectively non-cognate and cognate words in non--native English, while the judgment for the same word types in native English deviant cases is of ca. 3% finally stressed.

5. Conclusions

In sum, we observe that Dutch and American English native listeners reach similar results on the judgment of native and non-native English word stress. Such a level of agreement between the two linguistic groups in the current study gives more evidence to the findings of Cooper et al. (2002). Based on their answers, we observe that non-native speakers of English that have Brazilian Portuguese as their L1 have productions comparable to the native English speakers in which concerns stress productions of the pre-final word-stress, ca. 90%. It is interesting that the tokens judged as deviant follow different tendencies in English L1 and L2. In L2 English incorrect stresses, if any, are reported in the final syllable, while incorrectly stressed tokens in L1 English tended to be judged as antepenultimate stresses. This tendency was more prominently observed in native English tokens by native English judges. This may be due to the stronger tendency observed in English, when compared to Dutch, to produce stress on word-initial syllables. This tendency is reported to be stronger in words originated from Latin. However, we observed in our study that the native speakers both perceived and produced more antepenultimate stress on the 3-syllable non-cognate words. These results suggest that also a stress pattern can become productive in a language motivated by the frequency in which they are associated to a certain class of frequent words.

It is clear that words stressed on the pre-final syllable in English would be easily produced on the correct place by our non-native speakers. This high success rate is predictable, since pre-final stress

predominates in both languages (L1 and L2). Nevertheless, the results for the 2-syllable cognate words signal that occasional transfer takes place from L1 such that stress remains on the stem vowel even if the result is that the final syllable is then stressed in English – as predicted in the introduction.

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Appendix 1

Stimulus words of production and perception experiments			
COG2	COG3	NCOG2	NCOG3
artist	decoded	childhood	dislodging
colleague	detested	clockwise	mismatching
fortune	discreetly	Danish	mistaking
olive	evoking	Finnish	unbounded
passport	excessive	headship	unduly
promise	explaining	kinship	unhappy
pronoun	impulsive	likewise	unlikely
	resuming	manhood	unbounding
	superbly	shallow	unsuited
		sorrow	unwilling