The redeployment of Persian coda structure in the acquisition of English sC onset clusters: production/perception asymmetries in illusory vowels

John Archibald & Marziyeh Yousefi
Department of Linguistics

Research Question: Why do Persian L1 subjects, whose L1 lacks onset clusters, show highly accurate perception of L2 English onset clusters, yet epenthesize so frequently in production tasks?

It is well-documented that L*X*ers evidence epenthetic repair strategies in production tasks of strings which are ungrammatical in the L1.

I espeak Espanish

However, it is also clear the this is not the result of a late production routine. Epenthetic vowels also emerge in perception tasks.

Japanese L1ers (Dupoux et al. 1999) when presented with acoustic input of [ebzo] actually *hear* [ebɯzo] because of the phonotactics of Japanese.

Illusory Vowels

L1	Perception Errors
Japanese (Dupoux et al., 1999)	72%
Thai (Imsri, 1999)	60%
Brazilian Portuguese (Cardoso et al., 2007)	50%

Figure 1. Percentage illusory vowels in perception.

Our Subjects

Fifteen native speakers of Persian.

Our Tasks

(1)Identification
10 [st]; 10 [est]
10 [sn]; 10 [esn]
10 [sl]; 10 [esl]

"Does the item you will hear begin with a vowel or a consonant?"

Dependent measure: Accuracy

(2) *Discrimination*
An ABX discrimination task with 800ms ISI.
10 [st]; 10 [sn]; 10 [sl]

"Is the 3rd sound you hear more like the 1st or the 2nd?"

Dependent measure: Accuracy

A comparison of the two tasks showed they did not behave significantly differently (p=.232) so the scores were combined.

	N	Minimum	Maximum	Mean	Std. Deviation
/sl/* total perception	15	6.00	20.00	15.6000	4.04969
/sn/ total perception	15	9.00	20.00	17.5333	3.54293
/st/ total perception	15	11.00	20.00	17.1333	3.13657
Valid N (listwise)	15				

83% Accuracy

Figure 2. Perception errors by Persian L1 subjects.

University of Victoria

High Perceptual Accuracy

The subjects were *very* accurate on their perception. Why?.

Persian Syllables: Onsets & Codas

Persian does not allow branching onsets but *does allow* branching codas; undeniably, a marked grammar.

E.g. [mærd] = 'man'
[senf] = 'corporation'

Persian Syllables: Marked Codas

Furthermore, Persian allows branching codas with *rising sonority*.

E.g. [xatm] 'funeral'
[qabr] 'grave'

These are Monosyllables

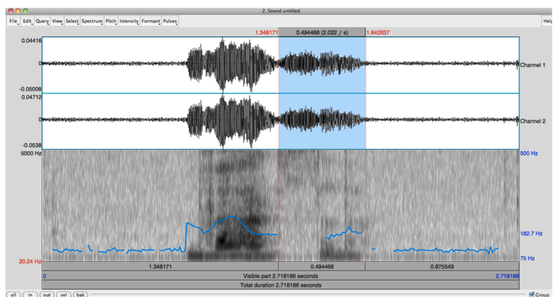

Figure 3. Spectrogram and waveform of [vasl] 'connect'.

Comparing the L1s

L1	Branching Onsets	sC onsets	Branching codas	Errors
Japanese	No	No	No	72%
Thai	No	No	No	60%
Brazilian Portuguese	Yes	No	No	50%
Persian	**No**	**No**	**Yes**	**17%**

Figure 4. Structural properties and perception error rates.

Minimal Sonority Distance (MSD)

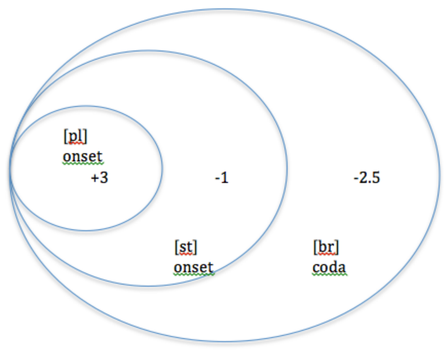

Figure 5. Subset relations of MSD values.

The Redeployment Hypothesis

Archibald (2005), Lardiere (2009) demonstratethat L*X*ers can use L1 building blocks to assemble new L*X* structures. The Persian L1ers can redeploy their L1 coda MSD knowledge to the L2 onsets where *all* English onset sequences will be licensed. Redeployment would predict high accuracy but no differences between strings.

Different Clusters

Contrary to the Redeployment Hypothesis, [sl] clusters were significantly less accurate than [sn] and [st]. P= .001(GLMM) and Odds Ratios over 2.0. There was no difference between the accuracy of [st] and [sn].

•Maybe this is merely a power issue that will disappear with more subjects.

•Maybe the subjects are actually treating these string as *codas*, and (following Kaye (1992), Goad (2016), and Enochson (2014) assigning the [s] to the coda of an empty-headed syllable. [s.l] is the worst syllable contact (Vennemann, 1987).

Underlying Representations

The illusory vowel data present challenges for models which assume that the underlying representation is always a mirror of the input and that the output is the locus of critical data.

Production

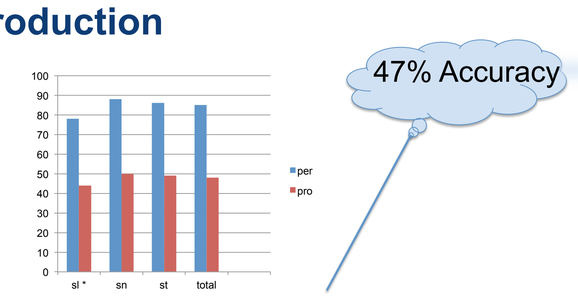

Figure 6. Perception versus production accuracy.

The production data show frequent epenthesis even in light of accurate perception. This is consistent with recent work on language switching (Blanco-Elorrieta, E., & L. Pylkännen, 2016) which shows that production is mediated more by domain-general executive control than domain-specific grammatical representation. The Advanced subjects were at 90% accuracy.

Conclusion

Persian L1 subjects are more accurate in the perception of English L2 onset clusters than other L1ers who lack sC onsets because L1 Persian can transfer the L1 coda MSD which licenses the L2 onsets. The production/perception asymmetries argue for representational realism.

References

•Archibald, J. (2005). Second language phonology as redeploymen of phonological knowledge. *Canadian Journal of Linguistics* 50 (1/2/3/4). Pp 285-314.
•Blanco-Elorrieta, E., & L. Pylkännen (2016). Bilingual language control in perception versus action: MEG reveals comprehension control mechanisms in anterior cingulate cortex and domain – general control of production in dorsolateral prefrontal cortex. *The Journal of Neuroscience* 36(2): 290-301.
•Cardoso, W., P. John, & L. French (2007).The variable perception of /s/+Coronal onset clusters in Brazilian Portuguese English. In *Proceedings of New Sounds 2007*. Pp. 86-106
•Dupoux, E., K. Kakehi, Y. Hirose, C. Pallier, & J. Mehler (1999). Epenthetic vowels in Japanese: a perceptual illusion? *Journal of Experimental Psychology: Human Perception and Performance* 25: 1568-1578
•Enochson, K. (2014).L2 production of English onset sC and CC clusters. Concordia Working Papers in Applied Linguistics; Proceedings of New Sounds 2013. Pp. 171-184.
•Goad, H. (2016). Phonotactic evidence from typology and acquisition for a coda +onset analysis of initial sC clusters. Proceedings of WCCFL 33: 17-28.
•Imsri, P. (1999). Thai speakers' perception and production of English onset clusters /sC-/. Unpublished manuscript. University of Delaware.
•Kaye, J. (1992). Do you believe in magic? The story of s+C sequences. *SOAS Working Papers in Linguistics & Phonetics: 293-313.*
•Matthews, J. & C. Brown. (2004). When language intake exceeds input: language specific perceptual illusions induced by L1 prosodic constraints. *International Journal of Bilingualism* 8(1): 5-27.

GASLA 2017; Southampton

johnarch@uvic.ca