"*Substrate and Apparent-time Evidence of Decreasing Positive VOT of Voiceless Oral Stops in Michigan's UP English*"

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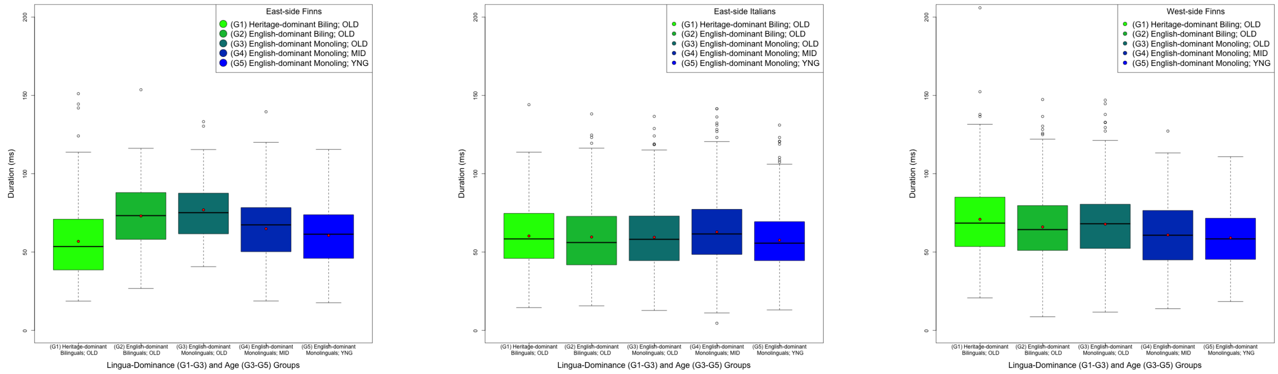
Michigan's Upper Peninsula English (UP English) is an ideal American English variety to examine substrate and sociolinguistic factors affecting positive voice onset time (VOT) of word-initial voiceless oral stops. Michigan's Marquette county is largely monolingual and rurally-based with a vibrant ethnic-heritage presence but an aging bilingual population. The Finnish and Italian languages were widely spoken in public domains longer and by more people than any other immigrant-heritage group. In terms of these languages, positive VOT for word-initial /p t k/ is relatively short at 10-40ms in Finnish (Lahti, 1981; Suomi, 1980) and Italian (Bassetti and Atkinson, 2015; Vagges et al., 1978); in comparison, English tends to have longer positive VOT at 70-90ms (Flege et al., 1995). The present study examines positive VOT to determine if any lingering substrate effects from Finnish or Italian is still present among the older bilingual and monolingual substrate of this sampled population. Furthermore, this study examines apparent-time evidence of monolinguals' positive VOT to determine if substrate or other sociolinguistic trends are observed.

The present study examines a 132-speaker bilingual and monolingual corpus of Finnish- and Italian-heritage American English speakers from Marquette County in Michigan's Upper Peninsula. This corpus is stratified by five sociolinguistic variables: LINGUA-DOMINANCE (heritage-dominant bilinguals, English-dominant bilinguals, English-dominant monolinguals, HERITAGE-LOCATION (EAST-side Finns, EAST-side Italians, WEST-side Finns), AGE (older-, middle-, younger-aged), SEX (female, male), and CLASS (working- and middle-class). The duration of positive voice onset times of word-initial /p t k/ were determined manually in Praat (Boersma, 2001). All statistical tests (e.g., t-test, anova, manova), tables, and figures were completed in the programming language R (Team, 2013).

Figure 1 plots the distribution of duration for positive VOT of word-initial voiceless oral stops as a three-way interaction of LINGUA-DOMINANCE, HERITAGE-LOCATION, and AGE.[1] There are a few main observations to note in Figure 1 below. First, among the monolingual UP English speakers, the younger generation tends to produce the lowest duration, which suggests a decline of positive VOT in the apparent-time data (VOT mean $<$ 60ms). Second, while the EAST-side Italians and the WEST-side Finns lingua-dominance groups exhibit little significant difference in positive VOT, EAST-side Finns' heritage-dominant group (mean = 56.8ms) and English-dominant group (mean = 73.1ms) do report a statistical difference; $t(111.8)=-5.261$, $p=6.978e\text{-}07$. In addition to the observations drawn from Figure 1, other important sociophonetic trends should also be noted regarding other analyses. A correlation between SEX and AGE exists for all voiceless oral stops whereby older-aged women have significantly longer positive VOT than men; however, the same is not true for the women and men of the younger generation. Another correlation also exists between SEX, CLASS, and AGE, whereby the sex difference reported above is shown to be more robust among middle-class than the working-class. In other words, monolingual middle- and younger-aged men and women are converging toward similar norms for word-initial voiceless oral stops, i.e., weak positive VOT (40-60ms); this sociolinguistic trend seems to indicate a change-in-progress. Furthermore, women are decreasing their duration of positive VOT to meet their male counterparts who are also decreasing their positive VOT. This convergence may indicate the direction of this change as one being from below in this UP English community (Labov, 2001).

[1]Voiceless oral stops are collapsed in multi-way analyses of these sociolinguistic variables because, while differences exist in the duration of positive VOT between /p t k/, subsequent analysis of each linguistics variable revealed limit differences in their sociolinguistic patterns.



(a) EAST-side Finns (b) EAST-side Italians (c) WEST-side Finns

Figure 1: Duration of positive VOT of voiceless oral stops
as a three-way interaction of LINGUA-DOMINANCE, HERITAGE-LOCATION, and AGE

References

Bassetti, B. and N. Atkinson (2015). Effects of orthographic forms on pronunciation in experienced instructed second language learners. *Applied Psycholinguistics 36*(1), 67–91.

Boersma, P. (2001). Praat, a system for doing phonetics by computer. *Glot International 5*(9/10), 341–345.

Flege, J., M. Munro, and I. MacKay (1995). Effects of second-language learning on the production of English consonants. *Speech Communication 16*, 1–26.

Labov, W. (2001). *Principles of Linguistic Change, Social Factors.* Language in Society. Wiley.

Lahti, L.-L. (1981). On Finnish Plosives. *Lund University Linguistics - Phonetics Working Papers 21*, 89–93.

Suomi, K. (1980). *Voicing in English and Finnish stops: A typological comparison with an interlanguage study of the two languages in contact*, Volume 10. Turun yliopiston suomalaisen.

Team, R. C. (2013). R: A language and environment for statistical computing. `http://www.R-project.org`.

Vagges, K., F. Ferrero, E. Magno Caldognetto, and C. Lavagnoli (1978). Some acoustic characteristics of Italian consonants. *Journal of Italian Linguistics 3*, 69–85.

The articulatory-acoustic characteristics of harmonic and disharmonic laterals in Turkish

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Turkish laterals have been described as having two surface realizations: one similar to a dark [ɫ], and a second similar to a light [l][1–6]. The alternation between these two realizations interacts with vowel harmony. For example, in word root final position, if the preceding sound is a front vowel (/i, y, e, œ/) then the lateral will be a light [l] followed by front suffix vowels (e.g. [el-de] 'hand-LOC'); if it is preceded by a back vowel (/ɨ, u, a, o/), then it will be a dark [ɫ] and followed by back suffix vowels (e.g. [aɫ-da]). However, word roots with /l/ that are borrowed from languages like Arabic and French do not alternate. Instead, they are always light [l], despite the presence of a preceding back vowel, and are followed by front suffix vowels (e.g. [hal-de]).

Some phonologists have explained this phenomenon with feature geometry and (under)specificity[1–5]. In essence, there is one lateral phoneme, but the lateral is underspecified for the V-place feature [±back] (as with suffix vowels), while, in borrowed words, it is fully specified as [-back]. The underspecified lateral gains the V-place feature value from the preceding vowel and allows harmony to continue to the following sounds in the word. The non-alternating lateral blocks incoming back vowel harmony and instantiates front vowel harmony in the following vowels. Alternatively, other phonologists have explained these observations with a two-lateral inventory[6]. One of the lateral members alternates between a front and back surface realization that is dependent on the vowel context, while the other is always produced with a front realization and never alternates. The phoneme status of the Turkish lateral system is still unclear and is in need of more research.

Whereas multiple phonological explanations have been offered in the previous literature, most if not all of the conclusions are based on impressionistic observations. There are no articulatory or acoustic descriptions of Turkish laterals. The present study aims to fill this gap.

We investigate the acoustic and articulatory characteristics of the harmonic and disharmonic laterals in Turkish using a combination of 3D/4D ultrasound, 3D palate images, and simultaneously recorded acoustic signals. The stimuli were comprised of real words that had harmonic and disharmonic laterals. These words were displayed in the carrier phrase *Mustafa bana* ____ *dedi* 'Mustafa said ____ to me' on a screen from which the participants read. The ultrasound images in conjunction with the palate images were used to determine the tongue surface shape in contraposition to the palate. Formant positions and formant trajectories were measured from the acoustic recordings. The methods used in this study are similar to those described in previous work done on laterals in Brazilian Portuguese[7,8] and Korean[9].

The results show that the light harmonic and light disharmonic laterals have a high average F2 and an anterior secondary articulation, while the dark harmonic lateral has a low average F2 and a posterior secondary articulation. In addition, out of the 6 participants, 5 exhibit a harmonic lateral that, as expected, alternates between dark and light with vowel harmony and a disharmonic light lateral that does not alternate with vowel harmony. Only one of the participants who is from Eastern Turkey—a dialectal region that is affected by Kurdish, a non-Turkic language that does not have a disharmonic lateral—does not exhibit this phenomenon. While there is an alternating alveolar lateral in Turkish, the non-alternating light [l] does not appear to be a requirement for all speakers. More detailed acoustic and articulatory analyses are needed to further understand the Turkish lateral system and lateral speech sounds in general.

1. Clements, G. N. & Sezer, E. Vowel and consonant disharmony in Turkish. in *The Structure of Phonological Representations Part 2* (eds. van der Hulst, H. & Smith, N.) 213–255 (Foris Publications, 1982).
2. Aktürk-Drake, M. Phonological and sociolinguistic factors in the integration of /l/ in Turkish in borrowings from Arabic and Swedish. *Turkic Lang.* **14**, 153–191 (2010).
3. Topbaş, S. Turkish Speech Acquisition. in *International Guide to Speech Acquisition* (ed. McLeod, S.) 566–579 (Thompson Delmar Learning, 2007). doi:10.1007/978-1-4614-4310-0
4. Yavaş, M. & Topbaş, S. Liquid development in Turkish: salience vs. frequency. *J. Multiling. Commun. Disord.* **2**, 110–123 (2004).
5. Göksel, A. & Kerslake, C. *Turkish: A Comprehensive Grammar*. (Routledge, 2005). doi:10.4324/9780203340769
6. Levi, S. Glides, Laterals, and Turkish Vowel Harmony. in *Proceedings from the 37th Meeting of the Chicago Linguistics Society* 379–394 (2001).
7. Charles, S. & Lulich, S. M. Case Study of Brazilian Portuguese Laterals using a Novel Articulatory-Acoustic Methodology with 3D/4D Ultrasound. *Speech Commun.* **103**, 37–48 (2018).
8. Charles, S. & Lulich, S. M. Articulatory-acoustic relations in the production of alveolar and palatal lateral sounds in Brazilian Portuguese. *J. Acoust. Soc. Am.* **145**, 3269–3288 (2019).
9. Hwang, Y., Charles, S. & Lulich, S. M. Articulatory characteristics and variation of Korean laterals. *Phonetics Speech Sci.* **11**, 19–27 (2019).

Prosodic Features of Speech in Children with Autism

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Abstract

This study aims to assess differences in pitch, intensity, and durational acoustic features in the speech of a child with autism, compared to the speech of a typically-developing child in four expressive prosody tasks. The study also attempts to investigate if listeners with non-clinical background can recognize atypical features exhibited in the speech of the child with autism. The participants of the study were one child diagnosed with autism (ASD) and one typically (TD) developing child (control) who were age-matched (6 years old). Both participants took the PEPS-C test, which is a normative test designed to test prosodic features in a number of subtests. This study employed four expressive subtests (affect, turn-end type, chunking, and focus subtest). The ASD participant was less successful in employing acoustic features to signal stress and question-type utterances than the TD participant. However, he was successful in indicating pleasantness in speech, and in creating clear boundaries when chunking words in phrases. Listeners with no clinical background were able to identify differences between the speech of the ASD participant and the TD participant. The results suggest that the use of acoustic cues vary in the speech of the child with autism according to the type of prosodic characteristics conveyed. Also, lack of clinical background does not limit the ability to recognize differences in the speech of children with autism in comparison to TD children.

Is Japanese vowel devoicing a gradual or targetless? Acoustic and articulatory evidence

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The Japanese vowel system is comprised of the vowels /a, e, i, o u/ (Labrune, 2012) plus their phonemically longer counterparts. In Tokyo Japanese, phonemically short /i/ and /u/ might be devoiced when they are located in a mora that does not bear pitch accent and adjacent to voiceless obstruents. For instance, vowel devoicing is observed in *s[i̥]ka* 'deer' but not in *S[i]ga* 'Siga prefecture'. There has been a plethora of studies on the articulatory and acoustic correlates of Japanese vowel devoicing. Kondo (1997, 2005), for instance, argues that the phonetic implementation of Japanese devoiced vowels is gradual, in the sense that both partially and fully devoiced vowels are observed in the acoustic signal. She argues that partially devoiced vowels are shorter, present lower intensity, shorter duration than their voiced counterparts. Shaw and Kawahara (2018), on the other hand, argue that in Tokyo Japanese vowel devoicing is obligatory when the vowel is in a position where devoicing can occur. They used data from an electromagnetic articulographic analysis of the vowel /u/. This study also argues that Japanese devoiced vowels are targetless. The concept of targetless vowel as first introduced by Browman and Goldstein (1992). According to them, the schwa in English is targetless because the tongue movements during its production do not reach a specific target. Shaw and Kahawara then argue that Japanese devoiced /u/ shares similarities with the targetless schwa in English.

In their analyses of Japanese devoiced vowels, Kondo used solely acoustic data and Kawahara and Shaw used solely articulatory data and only the vowel /u/ was considered. Thus, the motivation of the present research is to fill the gap of previous research by providing both acoustic and ultrasound articulatory data, and by considering both the devoicing of /i/ and /u/. This study intends to answer the following research questions: is Japanese vowel devoicing a gradual phenomenon, as reported by Kondo (1995, 2005), or obligatory and targetless, as reported by Shaw and Kawahara (2018)? If the gradualness hypothesis is supported, different degrees of vowel devoicing will be observed in the acoustic signal and in the ultrasound images. On the other hand, if the targetlessness hypothesis is observed, acoustic and ultrasound data will indicate no traces of the devoiced vowels.

In order to answer this research question, 10 native speakers of Tokyo Japanese were recorded in a sound attenuating booth with an ultrasound probe attached to their chin in order to capture tongue imaging. Participants read a total of 22 tokens in the following carrier sentence: *okkee, ___ to ittte* "okay, please say ____" in a total of 12 repetitions. From these 22 tokens, 6 were minimal pairs containing the vowel /i/ followed by a voiceless obstruent (where devoicing is observed) vs. /i/ followed by a voiced obstruent (where devoicing is not observed). The remaining stimuli was comprised of 5 minimal pairs containing /u/ the two aforementioned enviroments. The vowel of all of the minimal pairs but 2 were followed by either /s/ or /z/. The analysis of this study is still on-going. Preliminary acoustic data from 2 participants was conducted. It was decided to measure duration of the mora containing the devoicing vowel and its center of gravity (CoG). Kondo (1995, 2005) has reported that duration plays an important role in vowel devoicing. CoG s the average frequency in a spectrum weighted by the amplitude and the higher it is, the higher the movement of the tongue is considered to be (Gordon et al., 2002). Preliminary results showed that duration means of the devoiced vowels is very similar to the one of the voiced ones (0.13 m.s. vs. 0.12 m.s., respectively), as well of CoG (4892.8 vs. 5081.057, respectively). Since the acoustic measures of the devoiced vowels showed to be similar to the voiced ones, this seems not to support the targetlessness hypothesis. Moving forward with the analysis, it is intended to use the software EdgeTrak (Li et al., 2005) in order to track the tongue splines for the devoiced vowels and use Generative Additive Models in R (R Core Team, 2018) in order to test statistical significance and to complete the analysis of the acoustic data and to run statistical analysis on it.

References

Browman, C. P., & Goldstein, L. (1992). Targetless" schwa: an articulatory analysis. Papers in laboratory phonology II: Gesture, segment, prosody, 26-56.

Gordon, M., Barthmaier, P., & Sands, K. (2002). *A cross-linguistic acoustic study of voiceless fricatives*. Journal of the International Phonetic Association, 32(2), 141-174.

Labrune, L. (2012). *The phonology of Japanese*. Oxford University Press.

Li, M., Kambhamettu, C., & Stone, M. (2005). Automatic contour tracking in ultrasound images. *Clinical linguistics & phonetics*, 19, 545–554.

Kondo, M. (2005). Syllable structure and its acoustic effects on vowels in devoicing environments. *Voicing in Japanese*, 84, 229.

Kondo, M. (1997). *Mechanisms of vowel devoicing in Japanese*. PhD thesis, The University of Edinburgh, Edinburgh, UK.

R Core Team (2018). R: *A language and environment for statistical computing. R Foundation for Statistical Computing*, Vienna, Austria. URL https://www.R-project.org/

Shaw, J. A., & Kawahara, S. (2018). *The lingual articulation of devoiced /u /in Tokyo Japanese*. Journal of Phonetics, 66, 100-119.

The effect of proficiency in the production of L2 English vowel-pairs in FL adult learners

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The production of L2 sound categories is known to be a difficult task for learners due to a strong influence from the L1 and a sharp decline in phonetic sensitivity that occurs in infancy ([3][4][5][7]). In the case of Spanish and English, L1 Spanish learners face a comparatively larger English vowel inventory in which the phonetic distance between L2 categories is much smaller than the distance between Spanish categories, causing the overlap of multiple L2 sound categories with a single L1 category ([2][6]). This overlap may lead learners to pronounce different L2 vowel pairs as one vowel. Previous research conducted by the author showed that certain vowel pairs pose different levels of difficulty in perceptual differentiation (easier to perceive - /i/-/ɪ/ > /u/-/ʊ/ > /ʌ/-/ɔ/ - more difficult).

In this study, we contribute to research on the nature of L2 English vowel production by focusing on the phonetic distance of each vowel pair. We also focus on the effect of general proficiency in L2 vowel production, as few studies have looked into the effect of general proficiency in this aspect ([1]). We report on the production of the aforementioned American English vowel pairs by L2 English foreign learners from Irun, Gipuzkoa, Spain, divided by general proficiency (20 beginner, 13 intermediate and 15 advanced learners). Participants were asked to complete a delayed repetition task, a sentence-creation task and a word-reading task. 13 Midwestern American English speakers were recorded to elicit the target stimuli and used as a native baseline.

Data analysis (in progress) will be conducted with a generalized additive model (GAM) to allow for the fit of the F1 and F2 formant values of the entire vocalic segments. By analyzing the production of L2 English vowels as compared to L1 American English speakers, this study aims to see a) whether more proficient L2 learners of English have more native-like vowel values than less proficient L2 learners, and b) whether those vowel pairs they find more easy to differentiate are also easier to differentiate in oral production.

References

[1] Baker-Smemoe, W., Dewey, D. P., Bown, J. & Martinsen, R. A. (2014). Does measuring L2 utterance fluency equal measuring overall L2 proficiency? Evidence from five languages. *Foreign Language Annals, 47*(4), 707-728.

[2] Best, C. T. (1995). A direct realist view of cross-language speech perception. In W. Strange (Ed), *Speech perception and linguistic experience: Issues in cross language research*. *171-204.* Timonium, MD: York Press.

[3] Bradlow, A. R. (1995). A comparative acoustic study of English and Spanish vowels. *The Journal of the Acoustical Society of America, 97*(3), 1916-1924.

[4] Cenoz, J., & García Lecumberri, M. L. (1999). The effect of training on the discrimination of English vowels. *IRAL, International Review of Applied Linguistics in Language Teaching, 37*(4), 261.

[5] Escudero, P., & Boersma, P. (2004). Bridging the gap between L2 speech perception research and phonological theory. *Studies in Second Language Acquisition, 26*(4), 551-585.

[6] Flege, J. E. (1995). Second language speech learning: Theory, findings, and problems. In W. Strange (Ed), *Speech perception and linguistic experience: Issues in cross language research*. *233-277.* Timonium, MD: York Press.

[7] García Lecumberri, M. L., & Cenoz Iragui, J. (1997). L2 perception of english vowels: Testing the validity of Kuhl's prototypes. *Revista Alicantina De Estudios Ingleses, 10*, 55-68.

Syllable quantity and contrastive feet: a metrical analysis of light-initial tone sandhi in Suzhou

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The issue. Based on a first-time acoustic analysis of the checked-tone sandhi patterns in Suzhou (Northern Wu; author's fieldwork), this paper addresses a key debate in prosodic typology, viz. the interaction of tone, syllable quantity, and metrical structure (Kehrein et al. 2018 for overview). This study ties phonetic evidence with a phonological argument; I argue that the tone sandhi patterns in Suzhou can best be accounted for using two types of trochaic feet, syllabic and moraic trochees (based on Kager 1993). My main claims are two-fold:

(i). So-called 'checked tones', traditionally assumed to be glottalized and bimoraic, are synchronically plain short vowels in monomoraic syllables – they have very short vowels, and there is no phonetic evidence of glottalization.

(ii). Counter to previous descriptions, the second syllable can play a role in sandhi patterns, but *only* following monomoraic/light syllables – I refer to this as 'light-initial sandhi'. I argue that this pattern calls for a revision of the metrical system of Suzhou, where two types of trochaic feet are needed depending on syllable quantity.

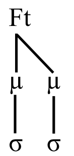
Background. Traditional metrical analyses of tone sandhi in Northern Wu languages (Duanmu 1999, Shi & Jiang 2013, among others) assume a left-aligned disyllabic trochaic foot as the relevant tone sandhi domain. In a disyllabic trochaic foot, the strong (initial) syllable retains all tonal material and the weak (second) syllable deletes its tone. Consequently, *only* the initial syllable determines the sandhi output of phonological words.

Data. The light-initial sandhi patterns in my data present a counterexample to the generalization that only initial syllables are relevant. An example is given in (1) (subscript 'μ': moras; T: any tone). In (1a), the second syllable is irrelevant in determining the sandhi outcome, as the outcome is always $[H_{\mu\mu}.L_{\mu\mu}]$. In (1b), the sandhi outcome depends on what tone the second syllable has.

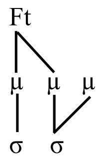
(1a). $/H/_{\mu\mu} + /T/_{\mu\mu} = [H_{\mu\mu}.L_{\mu\mu}]$
(1b). $/H/_{\mu} + /HL/_{\mu\mu} = [H_{\mu}.\mathbf{H_{\mu}L_{\mu}}]$ but $/H/_{\mu} + /LH/_{\mu\mu} = [H_{\mu}.\mathbf{L_{\mu\mu}}]$

Analysis. I argue that left-aligned, binary trochaic feet built on *moras* rather than syllables (based on Kager 1993, Kager & Martínez-Paricio 2018) account for the novel data on light-initial sandhi:

(2a). A light-light disyllabic word.

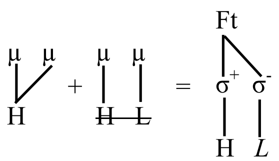


(2b). A light-heavy disyllabic word; the third mora is unfooted.

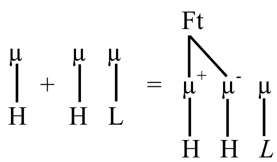


Essentially, (2b) violates Syllable Integrity (that syllables cannot be divided by feet; I follow Kager & Martínez-Paricio 2018 in assuming that the principle is violable). In doing so it obeys a more important wellformedness constraint, Head-Dependent Asymmetry (Dresher & van der Hulst 1998): Head syllables in metrical feet cannot be lighter in quantity than dependent syllables. In line with the framework in Kager & Martínez-Paricio (2018), tone deletion only targets syllabic but not moraic foot dependents. (3) shows the different output of disyllabic and bimoraic sandhi domains (phonologically toneless moras and unfooted moras always surface as *L*). In (3a), the weak syllable(σ^{-}) loses its tone. In (3b), both H tones are preserved.

(3a). $/H/_{\mu\mu} + /HL/_{\mu\mu} = [H_{\mu\mu}.\ L_{\mu\mu}]$ (disyllabic trochee)



(3b). $/H/_{\mu} + /HL/_{\mu\mu} = [H_{\mu}.H_{\mu}L_{\mu}]$ (bimoraic trochee)



Appendix 1: All seven lexical tones in Suzhou (five bimoraic, two monomoraic).

/H/$_{\mu\mu}$	/LH/$_{\mu\mu}$	/HL/$_{\mu\mu}$	/HLH/$_{\mu\mu}$	/LHL/$_{\mu\mu}$	/H/$_{\mu}$	/LH/$_{\mu}$

Appendix 2: All light-initial sandhi patterns. Rows: initial tone; Columns: second tone.

<table>
<tr><td></td><td>/H/$_{\mu\mu}$</td><td>/LH/$_{\mu\mu}$</td><td>/HL/$_{\mu\mu}$</td><td>/HLH/$_{\mu\mu}$</td><td>/LHL/$_{\mu\mu}$</td><td>/H/$_{\mu}$</td><td>/LH/$_{\mu}$</td></tr>
<tr><td>/H/$_{\mu}$</td><td colspan="2">[H$_{\mu}$.L$_{\mu\mu}$]</td><td colspan="2">[H$_{\mu}$.H$_{\mu}$L$_{\mu}$]</td><td>[H$_{\mu}$.L$_{\mu\mu}$]</td><td colspan="2">[H$_{\mu}$.H$_{\mu}$]</td></tr>
<tr><td>/LH/$_{\mu}$</td><td colspan="5">[L$_{\mu}$.H$_{\mu}$L$_{\mu}$]</td><td colspan="2">[L$_{\mu}$.H$_{\mu}$]</td></tr>
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References

Dresher, Elan, and van der Hulst, Harry. 1995. Head-dependent asymmetries in phonology: complexity and visibility. *Phonology* 15: 317-52.

Duanmu, San. 1999. Metrical structure and Tone: Evidence from Mandarin and Shanghai. *Journal of East Asian Linguistics* 8.1: 1-38.

Kehrein, Wolfgang., Köhnlein, Björn., Boersma, Paul., and van Oostendorp, Marc. (Eds.) 2018. *Segmental Structure and Tone*. (Linguistische Arbeiten; Vol. 552). Berlin: De Gruyter.

Kager, René. 1993. Shapes of the generalized trochee. In J. Mead (Ed.), *The Proceedings of the Eleventh West Coast Conference on Formal Linguistics*, 298–312. Stanford: CSLI.

Kager, R.W.J., and Martínez-Paricio, Violeta. 2018. Mora and syllable accentuation – Typology and representation. In Rob Goedemans, Jeffrey Heinz & Harry van der Hulst (Eds.), *The Study of Word Stress and Accent – Theories, methods and data*, 147-86. Cambridge, UK: Cambridge University Press.

Shi, Xinyuan., and Jiang, Ping. 2013. A prosodic account of tone sandhi in Suzhou Chinese. Paper presented at the 25th North American Conference on Chinese Linguistics (NACCL-25), June, University of Michigan, USA.

Yip, Moria. 2002. *Tone*. New York: Cambridge University Press.

Post-Lexical Tone 3 Sandhi Domain-Building in Huai'an Mandarin:
Multiple Domain Types and Flexible Directionality

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By examining the Tone 3 (T3 hereafter) sandhi patterns of the Huai'an Dialect of Jianghuai Mandarin (Huai'an hereafter) at the syntactic level, this paper (i) argues for the existence of both disyllabic and trisyllabic tone sandhi domains in Huai'an, (ii) demonstrates that both types of domains can be built in either direction, which results in multiple possible surface representations in some cases, and (iii) shows that a sentential subject can optionally participate in the domain-building process.

Tone sandhi data and analysis In Huai'an, a trisyllabic domain can appear at sentence-initial, sentence-middle and sentence-final positions, and has an equal status as a disyllabic domain. This behavior differs from that in Standard Mandarin in that the trisyllabic domain in Huai'an is not formed by combining a disyllabic domain and an unparsed syllable at the edge of a phrase or sentence. For example, for a sentence with each syllable forming a separate word, the first three syllables in (1a), the last three syllables in (1a) and a trisyllabic sequence starting with the third syllable in (1b) can form a trisyllabic domain:

(1) a.

	tsuŋ	kæ̃	ɕiæ̃	li	tɕiəɯ
	always	dare	grab	you	wine

"Someone always dares to grab you of wine."

	X	X	X	X	X
UR	T3	T3	T3	T3	T3
SR1	(T2	T2	T3)(	T2	T3)
SR2	(T2	T3)(	T2	T2	T3)

b.

	li	tsuŋ	kæ̃	ɕiæ̃	ɕiæ̃	o	tɕiəɯ
	you	always	dare	want	grab	me	wine

"You always dares to want to grab me of wine."

	X	X	X	X	X	X	X
UR	T3	T3	T3	T3	T3	T3	T3
SR	(T2	T3)(	T2	T2	T3)(	T2	T3)

X: syllable; UR: underlying representation; SR: surface representation; Bracket: sandhi domain

The disyllabic and trisyllabic domains can be built freely either from left to right or from right to left. Moreover, parsing a sentential monosyllabic subject is optional, leading to multiple SRs for the same UR in some sentences. For example, for a 7-syllable sentence with each syllable being a separate word and all being T3 underlyingly, if the subject is parsed, three patterns are possible, namely (X X X)(X X)(X X), (X X)(X X X)(X X) and (X X)(X X)(X X X); if the subject is not parsed, two patterns are possible, namely (X X X)(X X X) and (X X)(X X)(X X). These five patterns are all attested as shown in (2):

(2)

	li	tsuŋ	kæ̃	ɕiæ̃	ɕiæ̃	o	tɕiəɯ
	you	always	dare	want	grab	me	wine

"You always dares to want to grab me of wine."

Subject Parsed

	X	X	X	X	X	X	X
UR	T3	T3	T3	T3	T3	T3	T3
SR1	(T2	T2	T3)(	T2	T3)(	T2	T3)
SR2	(T2	T3)(	T2	T2	T3)(	T2	T3)
SR3	(T2	T3)(	T2	T3)(	T2	T2	T3)

Subject NOT Parsed

	X	X	X	X	X	X	X
UR	T3	T3	T3	T3	T3	T3	T3
SR4	T3	(T2	T2	T3)(	T2	T2	T3)
SR5	T3	(T2	T3)(	T2	T3)(	T2	T3)

Conclusion Tone 3 sandhi of Mandarin Chinese has been argued to involve both lexical and post-lexical processes. By investigating the patterns only at the post-lexical level (syntactic level) in Huai'an, this paper shows that, unlike previous analyses of Standard Mandarin tone 3 sandhi, both disyllabic and trisyllabic domains are used freely in Huai'an, and the domain-building process is not unidirectional, with optional parsing of a monosyllabic sentential subject.

Tone 4 Sandhi in Heze Chinese

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We present an acoustic study on base tones and Tone 4 sandhi in Heze Chinese. Mandarin Chinese comprises a large number of regionally-local varieties, each with very divergent tone systems. Most of the previous acoustic studies of Chinese tone patterns, focused on Standard Chinese (SC) and several representative Mandarin dialects, like Beijing dialect, Tianjin Dialect and Chengdu Dialect (Chen, 2000; Lin, 2006; Zhang and Liu, 2011). Heze Chinese is spoken by more than 8 million speakers in Shandong Province, China. It has four tones like Standard Chinese, but the tonal markers for each tonal lexical class are totally different and tone sandhi patterns are considerably more complex (Yang, 2015; Jiang, 2016).

By conducting three experiments, we determined the four base tones in Heze Chinese and Tone 4 sandhi patterns. The first experiment used isolated monosyllabic tokens to establish the basic tone pattern. The second experiment used disyllabic tokens and the third used sentences to establish the sandhi rules surrounding tone four. We conducted our experiments in two different groups. The first group consisted of ten students, aged 19 to 22, with an average age of 20. The second group consisted of four middle-aged subjects, with an average age of 54. The middle-aged group was used as the control group to investigate the influence of Standard Mandarin.

For basic tones, our experiment results show similar characteristics to previous studies, the basic tones are T1: 323, T2: 342, T3: 33, and T4: 423, and we also find that Tone 2 in Heze Chinese has a short rising f_0 before a long falling f_0 instead of a straight falling f_0. In terms of differences between our young and middle-aged subjects, the contour of Tone 1 was more pronounced in young subjects while the contour of Tone 4 was more pronounced in middle-aged subjects.

As for Tone 4 sandhi, we argue that Tone 4 sandhi in Heze Chinese has two patterns. The Tone 4 contour changes to falling when it is followed by Tone 1 and Tone 3. When it is followed by an additional Tone 4, the contour happens earlier and turns less steep (see Figure 1). The contour stays when it is followed by Tone 2. Tone 4 sandhi findings equate to 42 before Tone 1 and Tone 3, and 323 before Tone 4. When examining the sandhi in the context of sentences, the same pattern was observed but the tones were noticeably lower-pitched in object position than in subject position.

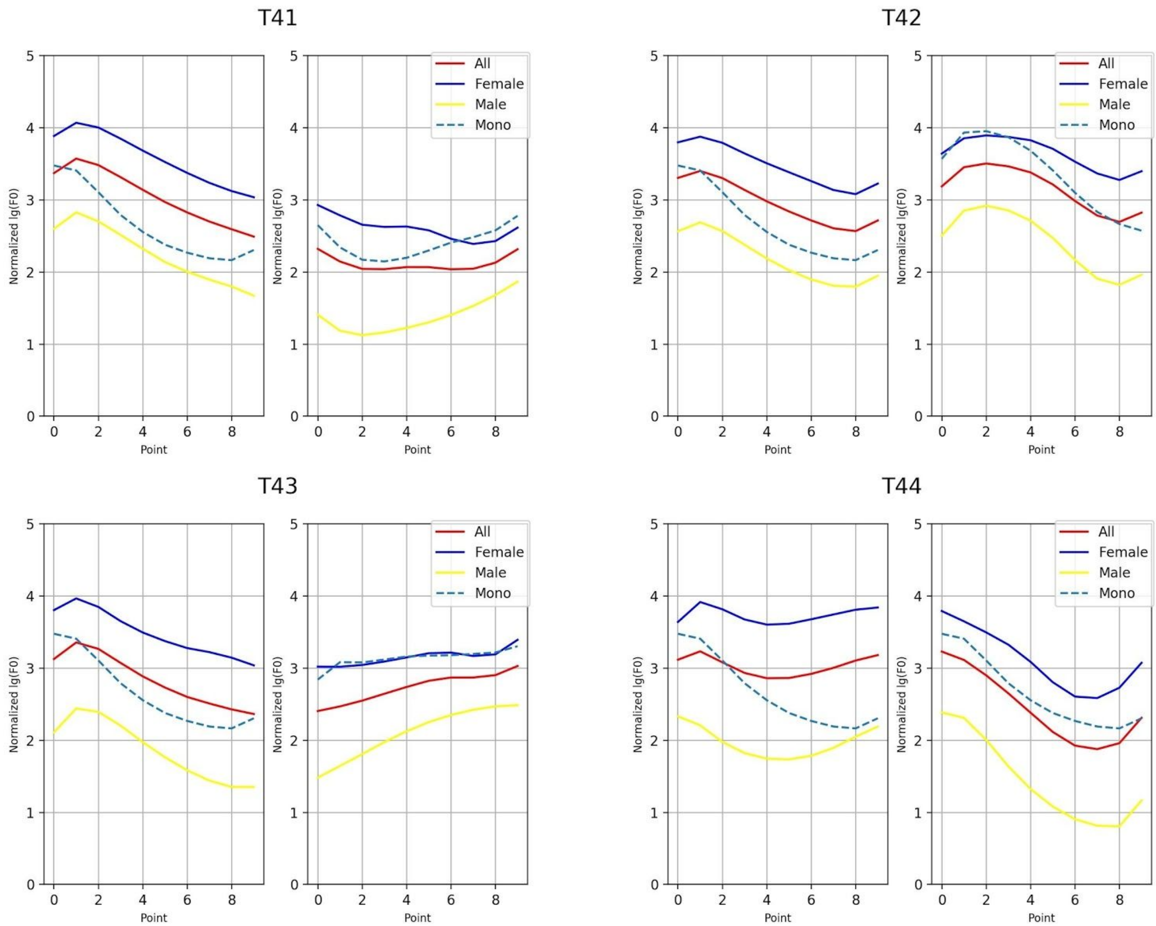

Figure 1: blue line indicates average f_0 over 6 female speakers; yellow line indicates average f_0 over 4 male speakers; red line indicates average f_0 over 10 speakers. Dash line indicates average f_0 of monosyllable stimuli.

References

Chen, M. Y. (2000). *Tone sandhi: Patterns across Chinese dialects* (Vol. 92). Cambridge University Press.

Lin, H. S. (2006). Directionality in Chengdu tone sandhi. *Concentric: Studies in Linguistics*, *32*(1), 31-67.

Yulin Jiang. (2016). Shandong Heze shi yuyin fangyan yanjiu(the phonetic research on Shandong Heze’s dialects). Master’s thesis, Shandong University

Jie Yang. (2015). Shandong Heze fangyan lianxu biandiao de youxuanlun fenxi(optimality theory’s study on the disyllabic tone sandhis of Shandong Heze dialect). *Journal of Shandong Institute of Commerce and Technology*, 15(4):93–97.

Jie Zhang and Jiang Liu. (2011). Tone sandhi and tonal coarticulation in Tianjin Chinese. *Phonetica*, 68(3):161–191.

An AX experiment exploring perceptual fidelity in vowels

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Vowel inherent spectral change research has demonstrated that 2-target models of vowels are optimal for explaining vowel identification performance – static-target models are meaningfully worse, but 3-target models are not meaningfully better (Hillenbrand et al. 1995). Recent dialectology work on production data, however, presents findings based on three time points (Farrington et al. 2018; Stanley & Renwick 2019) or five (Holt & Ellis 2018). These studies argue that such subtle acoustics might help listeners distinguish between dialects. The present study tests whether the small but measurable differences between 2-target and 3-target models are detectable at all (cf. Hillenbrand & Nearey 1999, which tested differences between 1-target and continuous models).

The stimuli were generated using the Berkeley Phonetics Machine, an implementation of the Klatt synthesizer. Stimuli consisted of lone vowels. F1 and F2 values were from Jacewicz et al. (2011), consisting of representative formant specifications at 20%, 35%, 50%, 65%, and 80% of vowel duration. Wisconsin data were used for the vowels /i, ɪ, e, ɛ, æ, u, ʊ, o, ɔ, ɑ/. Three stimuli were created for each vowel, differing in fidelity to this data (see Figure 1).

- 3-target: 20%, 50%, and 80% specifications (contour of two piecewise linear segments)
- 2-target: 20% and 80% specifications (contour of one linear segment)
- 1-target: 50% specification (static contour)

A roving AX paradigm was used for this experiment. Three comparisons were done for each vowel: (i) comparing 1-target stimuli to 2-target stimuli, (ii) comparing 1 to 3, and (iii) comparing 2 to 3. The interstimulus interval was 250 ms to ensure acoustic processing rather than less-sensitive phonological processing (Werker & Logan 1985). The experiment length was 240 trials (10 vowels x 3 comparisons x 2 orders of AX & XA x 2 repetitions = 120 *different* trials; plus 120 *same* trials). The nonparametric sensitivity index A' (Donaldson 1992) was calculated for each comparison for each vowel, where 0.5 indicates chance performance and 1.0 indicates perfect discriminability.

Participants are born-and-raised Wisconsinites. Preliminary results (N = 4) are given in Table 1. The poor discrimination of /i/ in all comparisons is explained by its nearly static contour in Jacewicz et al. (2011), though the reason for the discrimination of /ɪ/ is less clear. Averaging across vowels, 1-target stimuli are equally discriminable from 2-target stimuli (A' = 0.79) and 3-target stimuli (A' = 0.78), but 2-target stimuli and 3-target stimuli are not discriminable from each other (A' = 0.48). This suggests that, when there are differences in production that are measurable in 3-target models of vowels but not 2-target models, those differences may not be detectable by listeners.

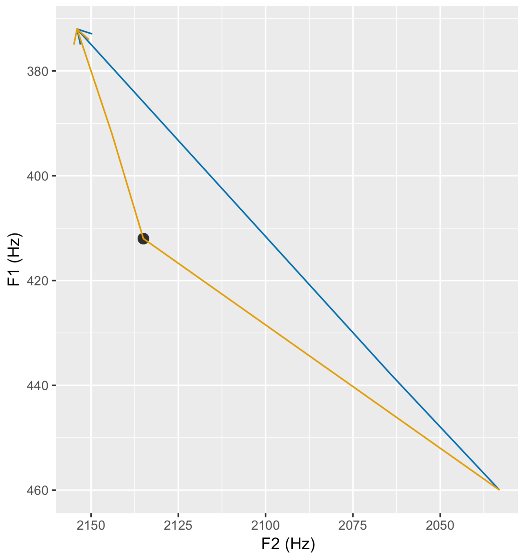

Figure 1. Three synthetized stimuli of /e/ with different fidelities (tan = 3, blue = 2, black = 1)

Table 1. Participant-averaged A' rates for first 4 participants

	Fidelities compared		
Vowel	**1 vs. 2**	**1 vs. 3**	**2 vs. 3**
/i/	0.58	0.50	0.40
/ɪ/	0.56	0.56	0.50
/e/	0.69	0.86	0.44
/ɛ/	0.79	0.66	0.20
/æ/	0.84	0.79	0.26
/ɑ/	0.88	0.84	0.81
/ɔ/	0.97	0.92	0.56
/o/	0.93	0.94	0.66
/ʊ/	0.86	0.94	0.36
/u/	0.79	0.79	0.50
Mean	**0.79**	**0.78**	**0.47**

References

Donaldson, Wayne. 1992. Measuring recognition memory. *Journal of Experimental Psychology: General*, 121. 275–277

Farrington, Charlie, Tyler Kendall & Valerie Fridland. 2018. Vowel dynamics in the Southern Vowel Shift. *American Speech* 93. 186–222.

Hillenbrand, James M., Laura A. Getty, Michael J. Clark & Kimberlee Wheeler. 1995. Acoustic characteristics of American English vowels. *Journal of the Acoustical Society of America* 97. 3099–3111.

Hillenbrand, James M. & Terrance M. Nearey. 1999. Identification of resynthesized /hVd/ syllables: Effects of formant contour. *Journal of the Acoustical Society of America* 105. 3509–3523.

Holt, Yolanda Feimster & Charles Ellis, Jr. 2018. African American women's speech: Vowel inherent spectral change. *Acoustical Science & Technology* 39. 160–162.

Jacewicz, Ewa, Robert Fox & Joseph Salmons. 2011. Cross-generational vowel change in American English. *Language Variation and Change* 23. 45–86.

Stanley, Joseph A. & Margaret E.L. Renwick. 2019. Social factors in Southern US speech: Acoustic analysis of a large-scale legacy corpus. Poster presented at 94th Annual Meeting of Linguistic Society of America, New York City.

Werker, Janet F. & John S. Logan. 1985. Cross-language evidence for three factors in speech perception. *Perception & Psychophysics* 37. 35–44.

Vowel Epenthesis of /s C(C)/ Onsets in Persian/English Inter-phonology (A Longitudinal Case Study)

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Abstract This study aims at investigating the variation and constraints in vowel epenthesis of /s C(C)/ onsets in Persian/English inter-phonology. This study is replicating Abrahamsson (1999); however, some additional aims are in this study compared with Abrahamsson's study, including a different perspective towards the sonority of the segment immediately after /s/ and its effect on the frequency of epenthesis. The following empirical questions were formulated for this research. Q1. What is the most frequent epenthesis type for Persian/English learners? Q2. What is the most frequent cluster type for epenthesis? Q3. What is the effect of preceding environment on the frequency of epenthesis? Q4. What is the relationship between the frequency of epenthesis and the degree of sonority of the segment immediately following the /s/? Q5. What would explain Persian/English learners' epenthetic patterns? Five hypotheses were also proposed. The participant of this study was a 23-year-old female native speaker of Persian from Iran (Tehran) with a beginner proficiency of English. The data included a combination of both elicited and natural spontaneous speech. In this study, 11 types of environments, including obstruents (/st/, /sp/, /sk/, /sv/), nasals (/sn/, /sm/), approximants (/sl/, /sr/) were examined that (/st/, /sp/, /sk/) appeared at the beginning of both double consonant and triple consonant clusters; however, other environments were just double consonant clusters. In addition, in this study, a distinction was considered for the prevocalic environment for the vowels /i/, /ə/, /u/, /ɔ/, and the diphthongs /ɑɪ/ and /ɔʊ/. Results supported the hypotheses and suggest that prothesis and anaptyxis rate in s C(C) clusters for Persian L2 learners are almost equal. In addition, results indicated that the type of consonant cluster in which prothesis happens more frequently is /__ Sc(c), and the type of consonant cluster in which anaptyxis happens more frequently is / Sc__c. One interesting finding was that Sv and Sr clusters are the only types of double Sc clusters in which anaptyxis occur instead of prothesis. Moreover, results revealed that the prevocalic environment has different effects, and the frequency of epenthesis was higher for pre-consonantal environment than some pre-vocalic environments but not all of them. In spite of many studies of s C(C) onsets which have reported the effect of Sonority Sequencing Principle (SSP) on the rate of epenthesis of different onsets, this study found out that interlanguage production of Persian L2 learner shows a violation of SSP, and the rate of epenthesis in participant's production of sC(C) clusters based on the cluster types was as the following: Sp< Sk< St< Sl< Sm< Sn< (Sr and Sv). Another finding of this study was that anaptyxis patterns go away sooner than prothesis patterns in the interlanguage of Persian L2 learners. The most important finding of this study is that in the acquisition of Sc(C) clusters, transfer from L1 plays an important role in interlanguage of Persian L2 learners of English, and due to the phonological constraints of L1, re-syllabification, epenthesis as a modification strategy, or both happen. The interaction of different language systems together resulted in the special patterns which did not follow either L1 or L2 phonological constraints and appeared in the production of Sc(c) clusters which showed that interlanguage is an independent system, and these patterns are independent patterns as the result of cross-linguistic effects. Besides, the occurrence of the special patterns in interlanguage which are neither L1 nor L2 patterns, but are patterns in other languages like Spanish or Moroccan Arabic might bring an evidence to the existence of multiple grammars and access to UG in interlanguage.

Reference: Abrahamsson, N. (1999). Vowel epenthesis of /sC(C)/ onsets in Spanish/Swedish interphonology: A longitudinal case study. Language Learning, 49 (3), 473-508.

The phonetics and phonology of perceptual similarity in L2 vowel perception

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Park & de Jong (PDJ; 2008, 2017) proposed a model which quantifies the phonetic similarity between two languages (Korean and English in their study). Using the model, they suggested how L2 learning can be predicted based on perceptual similarities. Later, Lee & Cho (LC; 2018) replicated PDJ study to examine how well the model can be applied to vowel tasks. PJD and LC have raised interesting questions for both phonetic and phonological perspective; however, the discussions were limited to phonetic aspects. Thereby, this paper aims to 1) re-examine the results from a phonological viewpoint, 2) observe what role the phonology play in L2 perception, and eventually 3) explore how the L1 phonological grammar affect the L2 sound perception. As an initial step, I investigate the vowel data presented in LC.

Two theoretical frameworks are adopted. First, the model of distinctive features (Avery & Idsardi 2001; Purnell & Raimy 2015) is utilized for decomposing phonemes to a featural level. This model is distinct from others in that it comprises *dimension* and *gesture* nodes. The *dimension* (e.g., tongue height, tongue thrust, labial) is the contrastive unit in the grammar which should be filled in with *gestures* (commonly acknowledged as features, e.g., high, front, round) by the *completion rules*. Second, the Featurally Underspecified Lexicon (FUL) model (Lahiri & Reetz 2002) is adopted to calculate the similarity score as in (a) by comparing matching features from the signal and the source, ranging from 0 to 1. The table below (b) illustrates the phonemes in the distinctive feature level and shows the (mis)match information.

(a) FUL score = (matching feature #)^2 / (feature # from signal) × (feature # from source)

For each possible combination (11 English vowels × 11 Korean vowels = 121 combinations), the (mis)matches of distinctive features were examined. Then, the FUL scores were calculated. The completed execution of the phonological process (i.e., the gesture level) was taken into account for computing the FUL score. Using examples from (b), the score for English /i/-Korean /i/ and English /ɛ/-Korean /e/ were $3^2 / 3 * 3 = 1$ and $2^2 / 2 * 2 = 1$, respectively; English /ɛ/-Korean /æ/ was $2^2 / 2 * 3 = 0.67$. Then, the similarity score from LC was aligned: English /i/-Korean /i/ = 0.96; English /ɛ/-Korean /e/ = 0.55; English /ɛ/-Korean /æ/ = 0.43. Higher FUL scores were expected to correlate with higher similarity score, and vice versa. The result indicated that R^2 for the correlation between the FUL scores and the reported data from LC is 0.345 which is a large effect size (Cohen 1992).

The current study shows how phonological theories can complement phonetic research. Particularly, I have drawn data from a previous study and analyzed from a different angle, yielding meaningful results that illuminates the potentials of phonological roles in L2 perception. A greater focus on the proposed approach could produce interesting findings which accounts more for perceptual similarities between L1 and L2 and provide more insights for understanding how our brain learns L2 sounds.

(b) Features of the signal and source sounds and matching information

Dimension	***Signal*** **Eng /i/** Gesture	***Source*** **Kor /i/** Gesture	/i/-/i/ Matching	***Signal*** **Eng /ɛ/** Gesture	***Source*** **Kor /e/** Gesture	/ɛ/-/e/ Matching	***Source*** **Kor /æ/** Gesture	/ɛ/-/æ/ Matching
Tongue Root	Ø	Ø	-	Ø	Ø	-	RTR	mismatch
Tongue Height	high	high	match	Ø	Ø	-	Ø	-
Tongue Thrust	front	front	match	front	front	match	front	match
Labial	Ø	Ø	-	Ø	Ø	-	Ø	-
Length	short	short	match	short	short	match	short	match

References

Avery,P., & Idsardi, B. (2001). Laryngeal dimensions, completion and enhancement. In T. A. Hall (Ed.), *Distinctive Feature Theory* (pp. 41–70). Berlin, New York: Mouton de Gruyter.

Cohen, J. (1992). A power primer. *Psychological bulltin*, *112*(1), 155-159.

Lahiri, A., & Reetz, H. (2002). Underspeficied recognition. *Laboratory phonology*, *7*, 637-675.

Lee, S, & Cho, M.-H. (2018). Predicting L2 Vowel Identification Accuracy from Cross-Language Mappings between L2 English and L1 Korean. *Language Sciences*, *66*, 183-198.

Park, H., & de Jong, K. J. (2008). Perceptual category mapping between English and Korean prevocalic obstruents: Evidence from mapping effects in second language identification skills. *Journal of Phonetics*, *36*(4), 704-723.

Purnell, T. and Raimy, E. (2015). Distinctive features, levels of representation, and historical phonology. In P. Honeybone and J. Salmons (Eds.), *The Oxford handbook of historical phonology* (pp. 522–544). Oxford: Oxford University Press.

Adaptation of English Stops in Indo-Aryan Languages: The Problem of De-aspiration

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Indo-Aryan (IA) languages are reported to have a loanword adaptation pattern whereby English aspirated stops are adapted as unaspirated, even though IA languages have phonological aspirates (Lisker & Abramson, 1964). This study uses accented speech as a proxy for loanword adaptation and shows that de-aspiration is robust and quantitatively frequent in IA loans and in Indian English (IE). This peculiar adaptation pattern can be explained if we assume that borrowing involves perceptual adaptation based on phonetic, rather than phonological cues only (Peperkamp & Dupoux, 2003). VOT for aspirated stops is higher in IA languages like Marathi and Hindi and lower in English (Lisker & Abramson, 1964). Additionally, aspiration lowers F0 in Marathi and Hindi while raising F0 in English (Dmitrieva & Dutta, 2018). These phonetic differences can explain the loanword adaptation pattern seen in IA languages and in IE.

In this study, speech samples from The Speech Accent Archive (http://accent.gmu.edu) of 114 native speakers of one of twelve IA languages that have a four-way voicing and aspiration contrast were analyzed. Each speech sample consisted of the speaker reading the same passage in English. All expected occurrences of voiceless stops and the corresponding environments in which they occurred were identified. In addition to the transcriptions available on the website, a native speaker of Marathi made auditory judgments to identify the segments produced by the subjects in the samples. These were then compared to the segments expected to be produced by native speakers of English. The ratio of de-aspiration was calculated as the ratio of the number of unaspirated voiceless stops in the IE output to the number of aspirated stops in the corresponding environments expected in native English varieties. This quantitative analysis showed that de-aspiration is a robust phenomenon across IA languages, occurring in over 90% of the tokens from the IA speakers.

To investigate the role phonetic cues play in this adaptation pattern, the VOT of the foot-initial voiceless stops from the speech samples (the word *peas*, *toy* and *kids*) was measured in Praat (Boersma, 2001) as the interval between the beginning of the release burst and the onset of quasi-periodicity for each individual speaker and compared to the average VOT measured for the same words from the speech samples of five native speakers of American English. The average VOT for [spread glottis] stops produced by IA speakers was found to be significantly lower than that for the American English speakers. The average VOT for the IA speakers for [p^h, t^h, k^h] is [20, 29, 46] ms (SD [18, 27, 46] ms) compared to [42, 80, 72] ms (SD [11, 22, 17] ms) for the English speakers. I propose that since the VOT of English word-initial voiceless stops is lower than the VOT of [spread glottis] stops in IA languages, English aspirated stops are categorically perceived as being unaspirated by IA native speakers and are therefore adapted as such. For a complete explanation of the patterns observed in this study, a model that incorporates phonetics, phonology and their interaction is required. This study shows that adaptation patterns may be rooted in perception and accented speech provides a way of looking into "live" loan adaptations with non-trivial results. When adapting English loans, IA speakers must ignore the fact that the stops are phonologically aspirated, only engaging in low-level perceptual adaptation. This does not necessarily mean that grammatical processing needs to do the same, but it is likely that some parts of loan adaptation do not involve grammar at all. This study proves that phonetics can play a role in loan adaptation and suggests that many cases where phonetics and phonology match in this process may also have an entirely phonetic explanation.

References:

Boersma, Paul. 2001. Praat, a system for doing phonetics by computer. *Glot International* 5:9/10, 341-345.

Dmitrieva, Olga, and Indranil Dutta. 2018. Acoustic correlates of the four-way laryngeal contrast in Marathi stops. *The Journal of the Acoustical Society of America* 143, 1756-1756.

Lisker, Leigh, and Arthur S. Abramson. 1964. A cross-language study of voicing in initial stops: Acoustical measurements. *Word* 20, 384-422.

Peperkamp, Sharon, and Emmanuel Dupoux. 2003. Reinterpreting loanword adaptations: the role of perception. *The 15th international congress of phonetic sciences* 367-370

The Speech Accent Archive (http://accent.gmu.edu)

Gender, Variant Frequency, and Social Evaluations of Speakers

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Listeners are sensitive to the frequency at which a speaker produces linguistic features that bear social meaning. In previous work, Labov et al. (2011) showed that as a speaker produced higher proportions of a stigmatized variant within a passage, they were rated as increasingly less professional. These results also followed a logarithmic pattern, in which lower frequencies of producing a stigmatized variant led to more drastic differences in being rated as more unprofessional, where higher frequencies led to a ceiling effect. Listeners have also been known to use top-down social information about speakers in speech perception (e.g. the speaker's perceived gender, Strand 1999). However, less is known about the ways that speaker characteristics can modulate the effect of a sociolinguistic variant's frequency on evaluations of that speaker, as shown in Labov et al. (2011). This study brings together these bodies of work to examine how a speaker's gender influences how their frequency of use of a stigmatized sociolinguistic variant is evaluated socially.

Some work has demonstrated that women use prestige-linked linguistic features more frequently than men (e.g. Labov 1972). Further, academic and popular discussion suggests that women's voices are more highly scrutinized than men's voices (e.g. Eckert & McConnell-Ginet 2003; Slobe 2018). This converges to suggest that listeners may provide more negative social evaluations of women's usage of stigmatized variants versus men's usage at the same rates of production. This study tests this prediction using the well-studied and stable sociolinguistic variable ING, as tested in Labov et al. (2011). This ING verbal ending (e.g. *running*, *going*) can be realized either with a velar [ɪŋ] or alveolar [ɪn] variant, and bears associations with degrees of education, formality, and professionalism (Campbell-Kibler 2007, 2008).

In a matched-guise task building on the design of Labov et al. (2011), 186 participants heard five men and five women speakers producing a passage of news headlines containing 10 ING tokens. Proportions of the "stigmatized" alveolar [ɪn] variant versus the "standard" velar [ɪŋ] variant in the passage were manipulated in 10 steps, resulting in 10 different [ɪn] percentages. Each participant heard every speaker and [ɪn] percentage in a randomized order, counter-balanced across participants. Participants rated each speaker on seven-point scales for professionalism, likeability, likelihood of being a real-life broadcaster, and intelligence.

Passages with greater [ɪn] percentages were rated significantly lower for professionalism, intelligence, and likelihood of being a broadcaster (all $p < 0.05$), replicating previous findings (e.g., Labov et al. 2011). However, speaker gender did not significantly predict these ratings, nor did it interact with [ɪn] percentage, failing to support the prediction that women will be more negatively evaluated for using [ɪn] than men. Instead, results illustrate qualitative differences between the individual speakers, not patterning clearly along gendered lines. Specifically, some speakers appear to show a reversed effect of [ɪn] percentage on social evaluations, with greater [ɪn] leading to *higher* professionalism, intelligence, and broadcaster ratings, in contrast with previous work.

These findings illustrate heterogeneity in how the frequency of a stigmatized variant in speech affects listeners socially evaluate speakers. This suggests that previous paradigms that utilize only one speaker for stimuli may not be generalizable to other speakers, even within the same macro-social category. Further, findings demonstrate greater variability between same-gender speakers than between gendered groups. This challenges the primacy of a binary gender distinction in sociolinguistic practice (e.g. Zimman 2017), suggesting that individual speakers complicate this effect.

References:

Campbell-Kibler, K. (2007). Accent, ING, and the social logic of listener perceptions. *American Speech* 82(1). 32-64.

Campbell-Kibler, K. (2008). I'll be the judge of that: Diversity in social perceptions of (ING). *Language in Society,* 37, 637–659.

Eckert, P., & McConnell-Ginet, S. (2013). *Language and gender.* Cambridge University Press.

Labov, W. (1972). *Sociolinguistic patterns* (No. 4). University of Pennsylvania Press.

Labov, W., Ash, S., Ravindranath, M., Weldon, T., Baranowski, M., & Nagy, N. (2011). Properties of the sociolinguistic monitor. Journal of Sociolinguistics, 15(4), 431-463.

Slobe, T. (2018). Style, stance, and social meaning in mock white girl. *Language in Society*, 47(4), 541-567.

Strand, E. A. (1999). Uncovering the role of gender stereotypes in speech perception. *Journal of Language and Social Psychology*, 18(1), 86-100.

Zimman, L. (2017). Gender as stylistic bricolage: Transmasculine voices and the relationship between fundamental frequency and /s/. *Language in Society*, 46(3), 339-370.