Regional features and the Jewish ethnolinguistic repertoire in Chicago

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Studies of sociophonetic variation among Jewish Americans have found Jewish speakers around the country, especially Orthodox speakers [3], to be associated with the use of New York City (NYC) regional features, such as a raised /ɔ/ vowel [1,2]. This is attributed to ideological ties between Jewish identity and NYC. Less is known about how these ideological links between Jewish English and NYC features interface with the social meanings of regional features common to the particular communities in which these Jewish speakers live. This study uses evidence from production and perception to explore how Jewish Chicagoans' vocalic systems integrate NYC- and Chicago-linked features. Contrary to predictions that directly link NYC features to Jewish English, results show that listener background influences sociolinguistic perception for those features which are socially meaningful in production in Chicago more broadly, rather than for Jewish speakers specifically.

In wordlist productions comparing a subset of perception task participants (N=21) with Catholic Chicagoans (N=46), /æ/ and /ɑ/ show apparent-time reversal of the typical Chicago vocalic system (all $p<0.05$) for both groups, while /ɔ/ shows no significant apparent-time change. Controlling for age, only /ɑ/ differs between these groups: /ɑ/ is significantly higher and backer (less NCS-like) for Jewish speakers (all $p<0.01$). While a backer /ɑ/ is consistent with an analysis of more NYC-like Jewish vowel spaces, /ɔ/ shows no significant patterning, despite its traditional associations with Jewish speakers and NYC.

Auditory stimuli produced by a female American English speaker were resynthesized along nine-step /æ/ - /ɑ/ and /ɑ/ - /ɔ/ continua. In a phoneme categorization task, 60 Jewish Chicagoans were grouped into four conditions based on the social information they were told about the speaker they would hear: a Jewish Chicagoan, Jewish New Yorker, Catholic Chicagoan, or Catholic New Yorker. If Jewish identity is ideologically linked to NYC features, higher/backer boundaries would be expected for both continua when the speaker was perceived to be from NYC *and* when the speaker was perceived to be Jewish, regardless of region. However, neither the speaker's perceived location nor ethnoreligious identity significantly predicted categorization. Rather, listener background significantly predicts categorization: controlling for condition, Orthodox listeners placed a fronter boundary for /æ/ - /ɑ/ ($p=0.004$) than non-Orthodox listeners, indicating that they expected /ɑ/-fronting, a NCS feature. No listener background differences predicted /ɑ/ - /ɔ/ boundaries, indicating that this factor did not lead to expectations of NYC-linked /ɔ/-raising.

Chicago has an established, sizeable Jewish community and its own place-based linguistic features. These data suggest that speakers do not need to rely on NYC features to express Jewish identity in this context. In this sample, /ɑ/-fronting, but not /ɔ/-raising, shows socially meaningful variation in Chicagoans' wordlist productions, differentiating Jewish from Catholic speakers. It is precisely this feature which varies among Orthodox and non-Orthodox listeners in perception, and between Jewish and Catholic speakers in production. More generally, these results suggest the pre-existing sociolinguistic landscape in a particular region can influence the use of features which are associated cross-regionally with particular groups of speakers.

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Assessing Rhotic Production in Heritage Speakers of Spanish

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Heritage speakers, or individuals who are "raised in a home where a non-English language is spoken… and [who are], to some degree, bilingual in English and the heritage language", show an advantage in their pronunciation of the heritage language when compared to their morphosyntax in this same language (Au et al., 2002, 2008; Knightly et al., 2003; Valdés, 2005). While it was once assumed that heritage speakers sounded native-like in both of their languages, recent research suggests that their production lies somewhere between that of a native speaker and a second language learner (Ahn et al., 2017; Benmamoun et al., 2010; Chang, 2016; Chang et al., 2008; Chang et al., 2011; Rao & Ronquest, 2015). Previous studies have examined the phonology of heritage speakers of Spanish in the Midwest. Henriksen (2015), for example, assessed the production of Spanish alveolar taps and trills in heritage speakers of Spanish in the Chicagoland area and determined that their production was not significantly different from that of native Spanish speakers. However, Henriksen limited his analysis to the tap and trill in contrastive position (ex/ pero – perro). Thus, the current study aimed to determine the production of Spanish alveolar taps and trills in heritage speakers of Spanish from the Chicagoland area when appearing in four contexts: variable position (ex/ cuarto), only tap position (ex/ nariz), only trill position (ex/ rana), and contrastive position (ex/ pero – perro).

Three heritage speakers of Spanish from the Chicagoland area and three native speakers of Spanish were recorded in a sound-proof booth while describing the picture book, *Frog, Where Are You?*, by Mercer Mayer. The participants' recordings were analyzed in Praat according to the duration of the rhotic sound and number of apical occlusions (Boersma & Weenink, 2019). The results of the analysis showed that both participant groups perform similarly when the tap-trill contrast was in a variable position, when only the tap was expected, and when the tap was in contrastive position. In the position where only the trill was expected, the heritage speakers produced more occlusions than the native Spanish speakers. In the position where the trill was in contrastive position, all participants showed a similar duration, but the heritage speakers produced more occlusions than the native Spanish speakers. These results support previous research, which suggests that heritage speakers of Spanish develop a unique phonological system that does not match that of native speakers.

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Production and perception of English vowel length by Korean learners of English

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A vowel followed by a voiced consonant is consistently longer than that followed by a voiceless consonant in native English productions (Flege & Hillenbrand, 1986; de Jong, 2004). Previous studies of ESL learners indicate that learners from various language backgrounds do not show English-like patterns in these vowel duration differences. Complicating the durational effects of voicing, some studies of second language learners demonstrate that learners from languages that have no tense/lax distinction have been shown to have problems with the English tense/lax pair, in which part of the phonemic identity has a strong durational component (Ingram & Park, 1997; Kim, 2010). These studies suggest that ESL learners might have transferred the phonetic difference from their L1 to L2 English performance.

This paper investigates how L2 Korean learners of English produce and perceive English vowel duration associated with different voicing contexts and quality differences (tense vs. lax). Korean has no coda consonant voicing contrast in final position, but does preserve the voicing contrast in medial position. Also, Korean does not have a tense/lax contrast. Due to this language difference, it is expected that Korean speakers will show different patterns from those of English native speakers.

The stimuli included nonce words of /bVC/ and /bVCa/ containing /i, ɪ, u, ʊ, e, ɛ/ preceding (/p, b/, /t, d/, /k, g/), which were spoken by two American Midwest speakers. 8 Korean participants were recruited from universities in Korea and had less than 6 months of exposure to an English speaking country. The other 8 Korean participants were recruited from a university in the U.S. and had more than three years of exposure to English speaking environment. In the production task, the participants were asked to read the target words in a carrier sentence, “say_soon” once. Each subject was recorded digitally on a laptop in a sound-dampened room, individually. In an ABX discrimination task, the subjects were asked to identify the different words from among minimal triples. The target words were excised from the carrier sentences and they were presented to subjects aurally. First two tokens were spoken by one speaker and the third token was spoken by another speaker.

For the production task, preceding vowel duration was measured using Praat and the vowel length was submitted to an ANOVA in which the amount of L2 exposure to English speaking country (more experienced group vs. less experienced group) was a between-subjects factor and final consonant voicing (voiced vs. voiceless) and prosodic structure (monosyllabic vs. disyllabic) were within-subjects factors. A series of independent t-tests was run on tense/lax vowel duration for each group, respectively. For the perception task, accuracy was calculated, and a regression was run to test for a correlation across participant between vowel length differences in production and perception scores.

According to the results, speakers did not exhibit different patterns in monosyllabic and disyllabic structures in productions or perceptions. All speaker groups did exhibit durational correlates to the voicing contrast, and to the tense-lax distinction. Formant frequency differences were found for both voicing and the tense-lax distinction. More specifically, in productions Korean speakers showed more English-like patterns in vowel duration differences in the tense-lax distinction than in the voicing contrast whereas better performance was conducted in the voicing contrast than in the tense-lax distinction in perceptions. The effect of L2 English experience was expected, but there was no statistical difference between the two Korean groups regarding productions and perceptions. Overall, there was no correlation between vowel length differences in production and perception scores. This study suggests that there are different degrees of L1 transfer effects on productions and perceptions and there is no obvious link between them.

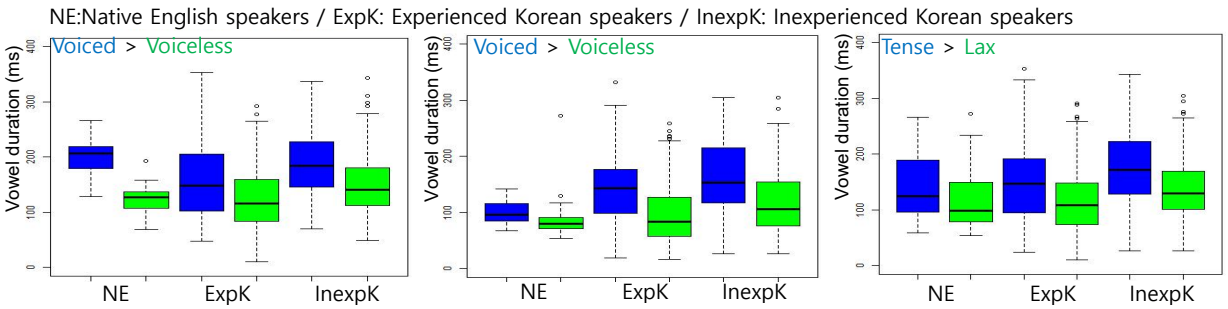

Fig.1 Vowel duration depending on the following consonant voicing in the monosyllabic structure

Fig.2 Vowel duration depending on the following consonant voicing in the disyllabic structure

Fig.3 Vowel duration depending on tense/lax

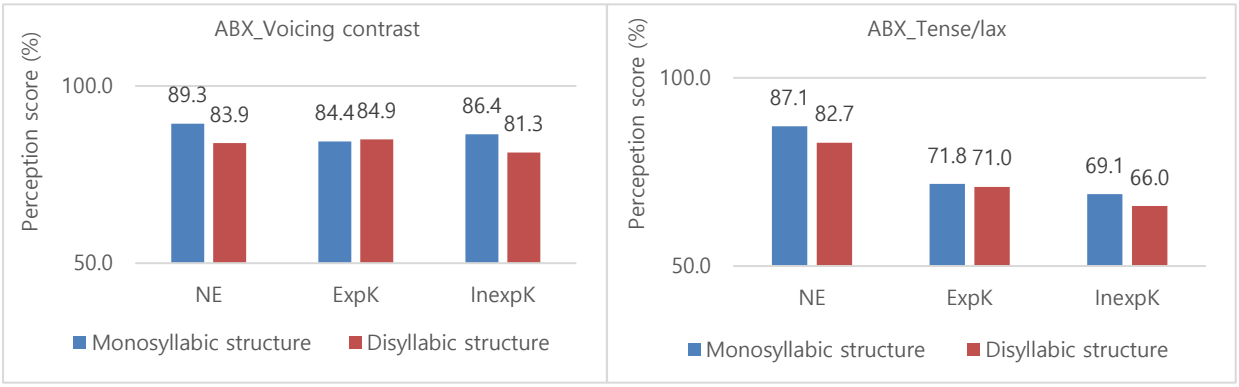

Fig.4 Scores of ABX task of discriminating vowel duration depending on the following consonant voicing in the first session

Fig.5 Scores of ABX task of discriminating tense/lax vowel in the first session

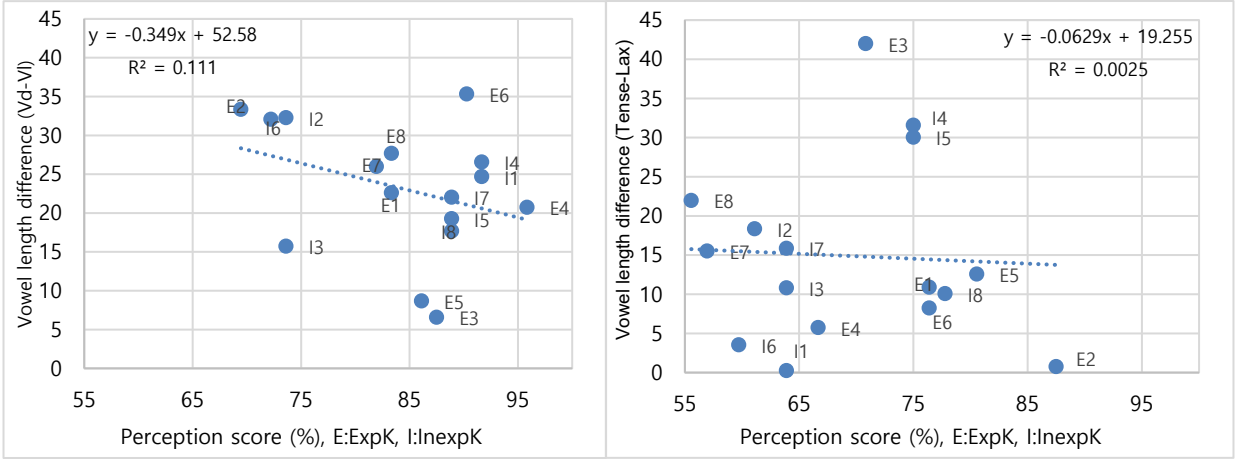

Fig 6. Correlation between vowel length differences (Vd-Vl) in production and perception scores

Fig 7. Correlation between vowel length differences (Tense-Lax) in production and perception scores

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Spectral Change Applied to Anticipatory Coarticulation

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The highly variable nature of vowel formant structure is influenced by many sources, including adjacent and non-adjacent speech sounds (Öhmann 1966). Listeners are exceptionally sensitive to the anticipatory effects of upcoming gestures and make use of this systematic variability for early lexical activation (Salverda *et al.* 2014). Cole *et al.* (2010) accordingly tested the power of spectral variation present in the first vowel of $V_1C\#V_2$ sequences for predicting the identity of upcoming segments. Instantaneous formant measurements taken at V_1 midpoint were used as predictors in a multinomial logistic regression model, which after accounting for effects of speaker and consonant, was able to predict V_2 with better than chance accuracy. However, recent research utilizing the visual world paradigm (Cooper 1974) has shown that listeners continuously integrate incoming information in the acoustic signal to update lexical predictions, suggesting that the time course of perception closely parallels that of unfolding gestural information encoded in the signal (Beddor *et al.* 2013, McMurray *et al.* 2008). The current study builds on the methodology introduced in Cole *et al.* (2010) by testing the power of various approaches to capturing spectral change over the course of V_1 for predicting V_2.

Discriminant analysis of American English vowel phonemes has been shown to be improved by including measures of spectral change, such as formant measurements at 20% and 80% of the duration of the vowel (Hillenbrand *et al.* 1995). Hillenbrand *et al.* (2001) also fit polynomials and discrete cosine transforms to whole formant trajectories, and used the estimated coefficients of these parametric curves as predictors of vowel class. Although these whole-formant approaches did not outperform simpler onset + offset models in vowel classification, finer-grained parameterizations of spectral change have proven highly effective in forensic speaker identification (McDougall 2006, McDougall & Nolan 2007), and ethnolectal classification (Risdal and Kohn 2014). Because anticipatory effects steadily increase as they approach their objective, it is predicted that models trained on these types of fine-grained dynamic representations will make more accurate predictions.

27 speakers of English from Indiana produced nonce target-context word sequences containing permutations of $V_1C\#hV_2$, in which $V_1 = \{\varepsilon\}$, $C = \{\theta\ f\}$, and $V_2 = \{i\ \varepsilon\ \alpha\ u\}$, e.g. *death-heating*, *deaf-hocking*. [h] was chosen for context word onset, as it has no intrinsic supralaryngeal articulation and is restricted to foot-initial position, ensuring a consistent prosodic boundary between target and context words. Participants provided five repetitions of each target-context permutation, and timing and prosody were kept consistent across speakers by entraining the syllable rate of the carrier phrase to a metronome. The first two formants were measured at the edges of 20 intervals along V_1 to approximate continuous trajectories. Instantaneous measures at 20%, 50%, and 80% were isolated and mean formant values were taken across the duration of the vowel (see Figure 1a). In addition, coefficients were extracted from three degrees of polynomials fit to the continuous formant trajectories: linear (Figure 1b), quadratic (1c), and cubic (1d)). Spectral variation in V_1 was used to predict the identity of V_2 in a mixed-effects multinomial regression model controlling for speaker and preceding consonant. The performance of the classifier was greater when trained on dynamic representations of spectral variation, and models trained on quadratic and cubic coefficients achieved the greatest accuracy, with more than 10 percentage points over midpoint alone. High resolution models of spectral change can therefore capture more potentially disambiguating information available in the acoustic signal.

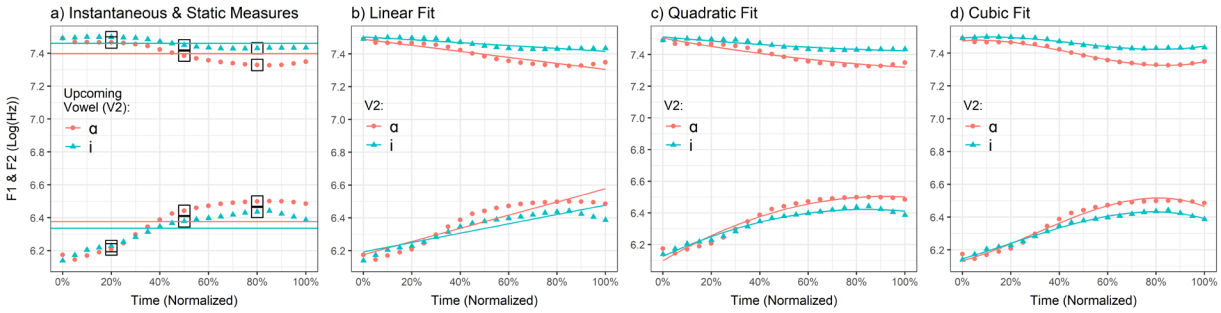

Figure 1. F1and F2 contours of [ɛ] produced by a male talker in one token each of *death-hocking* and *death-heating*, with several approaches to capturing spectral variation superimposed.

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Liquid polarization theory and Austrian l-rounding

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This paper has two primary objectives: (1) to provide an explanation for the mandatory occurrence of rounded vowels before laterals in certain dialects of Austrian German and (2) to couch this explanation in the cross-linguistic literature on liquid inventories (liquid polarization theory).

In the dialects of Austrian German spoken in southeastern Austria (Carinthia, Styria and Burgenland), all vowels before laterals must be **rounded**. This can be observed in the following data set.

(1) Rounding before laterals in Austrian German

a. *Spiel* 'game' [ʃpy̯l]	*[ʃpi̯l]
b. *Feld* 'field' [fø̯lt]	*[felt]
c. *Kohl* 'coal' [ko̯l]	*[kʏ̯l]

Unlike Standard German, only the front rounded vowels [y ø] and not the front unrounded vowels [i e] may appear before a lateral, a process that I refer to as *l-rounding*. L-rounding is interesting, since it is not immediately obvious why a lateral and only a lateral should cause a rounding of a preceding vowel. The justification for this rounding comes from the fact that the lateral in postvocalic context is **retroflex**. The retroflex nature of the Austrian laterals has been established by data collected with 17 speakers of Austrian German over the course of 2017-2018. From these data, I find that the laterals of Austrian German have a low value for both F3 and F4. Tabain et al (2016) in their study of Australian languages have similarly found retroflex laterals to have lower F3 and F4 values than other coronal laterals. Although the link between retroflexion and rounding might seem unclear from an articulatory perspective, the phonological link between the two has been observed at least as far back as Ohala (1985).

Yet, it is not immediately apparent why retroflex laterals should occur in Austrian German to begin with, especially in light of the fact that retroflex sounds are often characterized as an areal phenomenon of a few limited areas (cf. Bhat 1973). However, the motivation for retroflexion in Austrian German becomes clearer under the light of *liquid polarization theory*, developed in Carter and Local (2007) and McDougall and Jones (2011). Using data from Australian English, in the latter case, and Newcastle and Leeds English, in the former case, those authors conclude that laterals and rhotics tend to disperse themselves such that a lateral with a low F2 value tends to be paired with a rhotic with a high F2 value and vice versa. Taking F3 into consideration as well, I find that the retroflex lateral in Austrian German, which has a high F2 value and a low F3 value, is opposed by a vocalized rhotic, [ɐ̯], which has a lower F2 value and a higher F3 value. Thus, the retroflex articulation of the lateral was attained in order to better facilitate the contrast with the rhotic.

I therefore conclude that laterals and rhotics tend to differentiate themselves from one another as maximally possible and that this property can have a serious impact on the phonology of a language.

Factors Affecting Perception of English Vowels by Native Chinese Learners

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Previous studies have indicated that native speakers of Chinese have difficulty perceiving differences in English vowels, but there is little data to indicate what factors affect their perception. In this study, we investigated two of those factors. We examined first the effect of the presence of the target English vowels in Chinese, and second the effect of vowel tenseness on the overall accuracy of perception and the rate of improvement over time. Data was collected from eight native Chinese learners of English who were asked to identify a target word after listening to a sentence. Each sentence contained one of three vowel pairs (/i/-/ɪ/, /ɛ/-/ae/, /ɑ/-/ʌ /) that were contrasted (ex. "He said bit, not beat") as recorded by a native English speaker. This procedure was repeated over three sessions, where the six vowels were played 80 times, for a total of 480 tokens recorded per session. We predicted that the English vowel that also exists in Chinese (/i/) would be perceived accurately more often than the other vowels. Our data followed that pattern; the vowel /i/ was perceived correctly the most often, with an overall accuracy of 91%, and showed little variation over the three sessions. The other vowels had an overall accuracy only of 74% and showed improvement over the three sessions. The vowel /ɪ/, which was paired with /i/, was the most correct of the other vowels, starting at 80% and increasing to 90%. The other vowels showed lower rates that were similar to each other, with accuracy rates ranging from 57% to 73% over the course of data collection. Second, it was predicted that tense vowels would be perceived more accurately, and that pattern was also reflected in the data. The two tense vowels, /i/ and /ɑ/, had an accuracy rate of 81%, while the lax vowels' accuracy rate was 70%. These findings suggest that when teaching English to native Chinese speakers, it is more helpful to emphasize the differences between vowels that do not exist in Chinese. Furthermore, it may also be helpful to learners to place a stronger emphasis on practicing perception of lax English vowels in general.

Neural correlates to lexical tone alternation: regularity and exception

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This event-related potential (ERP) study examines the neural correlates to regular and exceptional patterns of lexical tones alternation. Alternation, i.e. how phones systematically alternate in complementarily distributed phonological environments, is one essential property of phonology. Theoretical works have proposed different underlying representation (UR) models of alternation, each of which have critical implications for the nature of the phonological grammar. Despite vigorous theoretical discussions, their neurocognitive bases remain under-explored. Most neurolinguistic studies on alternation have focused on segmental alternations in European languages. These studies mostly support a unifying **underspecification** framework, which posits that phonological features that contrast the alternants are underspecified in a shared UR, while the grammar fills in the features of surface representations. Other few studies on suprasegmental alternation were largely inconclusive. The current study aims to partly address this research gap by investigating the neural processing of lexical tone alternations found in Mandarin and Cantonese. The two types of alternation share a similar pattern, i.e. when two lowest register tones (dipping tone in Mandarin; low-falling tone in Cantonese) are affixed together, the first low tone is realized as a rising tone. This type of alternation, known as tone sandhi in Mandarin, appears *regularly* across the language [e.g. *xiao*$^{/\text{dipping}/}$+*li*$^{/\text{dipping}/}$ →*xiao*$^{\textbf{[rising]}}$+*li*$^{[\text{dipping}]}$ "DIMUNITIVE+Li (a surname) "]. Contrastively, this alternation pattern in Cantonese, known as *pinjam*, are only *exceptions* that only apply in specific classes of lexical items [e.g. wong$^{/\text{low-falling}/}$+soe$^{/\text{low-falling}/}$ →wong$^{\textbf{[rising]}}$+soe$^{[\text{low-falling}]}$ "*Wong* (a surname)+male teacher"]. ERPs associated with the processing of tone alternation violations (e.g. **xiao*$^{\textbf{[dipping]}}$+*li*$^{[\text{dipping}]}$; *wong$^{\textbf{[low-falling]}}$ +soe$^{[\text{low-falling}]}$) relative to plain violations (e.g. **xiao*$^{\textbf{\textit{[high]}}}$+*li*$^{[\text{dipping}]}$; *wong$^{\textbf{\textit{[high]}}}$+soe$^{[\text{low-falling}]}$) of sandhi and *pinjam* were elicited in separate experiments with a priming-based paradigm, wherein participants judged the phonological well-formedness of the auditory target primed by its orthographic forms. In the Mandarin experiment, results (n=16, Mandarin natives) show that alternation violations elicited a larger Late Positive Complex, an ERP component indexing task-relevant mental load, relative to the plain violation condition. Instead of underspecification, we interpret these results as indicative to **listed allomorphy**, which postulates that each alternant is listed in the same UR while the grammar elects the most phonologically well-formed one to surface given the morphological context. The co-activation among allomorphs (i.e. dipping and rising tones) have likely increased the mental load in phonological judgments of alternation violations. Contrastively, results in the Cantonese experiment (n=16, Cantonese natives) show that alternation and plain violations elicited N400 responses, an ERP component indexing lexical abnormalities, of comparable magnitude. We posit that *pinjam* items, whose violation were processed no differently from plain violations, are stored as exceptional cases separate from the stem. Together, ERP results on regular and exceptional patterns of tone alternation suggest that the UR architecture to alternation is unlikely to be one-dimensional. It is possible that the lexicon can be structured multi-dimensionally (e.g. underspecification, listed allomorphy, and lexical exceptions) when different patterns of alternation are encountered in language acquisition. Consequentially, we posit that the phonological grammar is also versatile, with the ability not only to specify empty features in the UR, but also to evaluate allomorph combinations in grammatical derivation.

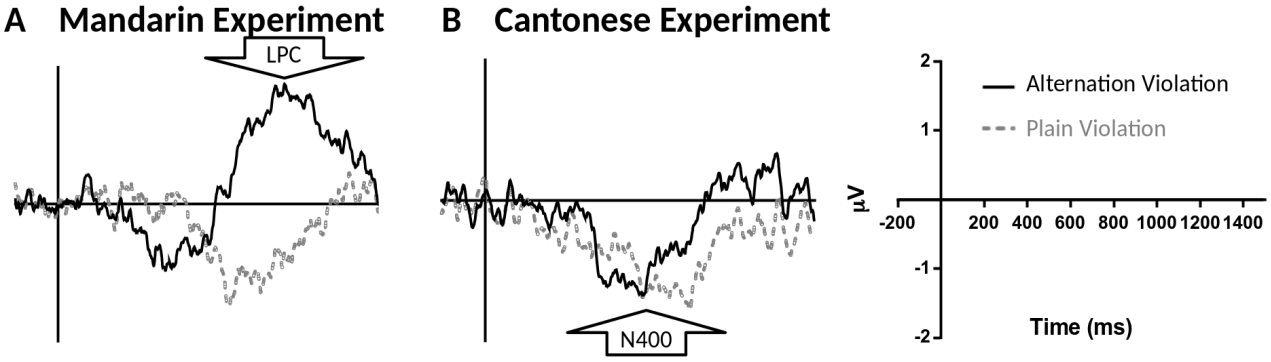

Fig.1 **Results:** ERPs (Average of P3, Pz, P4 ROI electrode channels) associated with the processing of Mandarin (Panel A) and Cantonese (Panel B) tone alternation (black solid lines) and plain (grey dotted lines) violations.

The Role of Consonants versus Vowels in English Speech Intelligibility

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In phonological theory, consonants and vowels are both classified as "phonemes", despite the fact that their articulatory and acoustic properties are distinct. Do they really play the same role? In previous work, researchers have investigated this question by presenting listeners with spoken stimuli in which consonants (or, vowels) are replaced with white noise or silence. Overall, most of these results have suggested that consonants are more important for intelligibility of isolated words, but that vowels play a bigger role for full sentences (Cole et al., 1996, Cutler et al., 2000, Fogerty et al., 2012; see Chen et al., 2013 for different results in Mandarin). A problem with these studies, however, is that the ratio of consonantal vs. vocalic information in the stimuli was not controlled. For instance, the stimuli in Fogerty et al. (2012) consisted exclusively of CVC words. As such, the information present in the consonant-only condition was effectively twice that in the vowel-only condition, rendering the conclusions of this research unclear.

In the current study, therefore, we investigated the role of consonants versus vowels in English speech intelligibility, using words and sentences in which the ratio of C to V was either balanced (e.g. for a word, CVCV) or unbalanced (e.g. for a word, CVC). We hypothesized that in the balanced condition, consonants and vowels would play equivalent roles, in accordance with their equivalent status as phonemes. In the unbalanced condition, however, consonants would play a more important role, by virtue of their disproportionate occurrence in the stimuli.

We presented twenty adult English-speaking participants with auditory stimuli (48 words, and 48 sentences). In the consonant-only condition, vowels were replaced with silence; in the vowel-only condition, consonants were replaced with silence. The participants' task was to write down what they heard. Half of the words contained a balanced CV ratio of consonants and vowels (e.g., "delicacy" /dɛləkəsi/: 4 vowels and 4 consonants) and half contained an imbalanced ratio (e.g., "trench" /trɛnʧ/: 1 vowel and 4 consonants). Likewise, half of the sentences contained a balanced ratio (e.g., 10 consonants and 10 vowels), while the other half contained an imbalanced ratio (e.g., 15 consonants and 5 vowels).

Results are shown in Tables 1 and 2. Overall, for balanced stimuli, results showed equivalent intelligibility rates for the consonant-only versus vowel-only conditions. This finding held for both individual words and complete sentences. For unbalanced stimuli, results showed higher intelligibilty rates for the consonant-only condition, compared to the vowel-only condition. Furthermore, there was a notable difference between the word and sentence conditions. A Generalized Estimating Equations (GEE) repeated-measures logistic regression model revealed that CV ratio significantly predicted intelligibility. These findings suggest that results of previous research must be reinterpreted in terms of CV ratio. When CV ratio is equal, consonants and vowels play equivalent roles in speech intelligibility, as predicted by their phonemic status. The dominant role of consonants emerges only as a by-product of their more frequent occurrence in stimulus materials.

	Balanced CV ratio	Imbalanced CV ratio
Consonant-only	53.61%	51.05%
Vowel-only	54.78%	7.08%

Table 1. Results for isolated words, in percentage of words correctly identified.

	Balanced CV ratio	Imbalanced CV ratio
Consonant-only	2.28	3.00
Vowel-only	3.76	0.96

Table 2. Results for sentences, in number of words per sentence correctly identified.

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Type and token frequencies of Arabic consonantal roots that violate OCP

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Investigations of the statistical patterns of the consonantal roots in Arabic reveal roots containing homorganic consonantal pairs are disfavored, motivating the existence of OCP-Place constraint (Obligatory Contour Principle) (McCarthy, 1988; Frisch et al, 2004). Investigations are done by calculating the frequency of consonantal pairs within roots in an Arabic lexicon, where pairs with high frequency represent the preferred pattern in the lexicon. Usage-based models of phonology, such as the network model proposed by Bybee (2001), indicate that patterns in grammar are tied to their lexical strength, and both token frequency and type frequency contribute to the lexical strength of the pattern. In this paper, I report the results of an investigation of the effect of the competing trends of frequency (type vs token) on the representation of the patterns of consonantal roots in the lexicon.

The concept of lexical strength of a linguistic form is tied to the notions of frequency and the observation that the regular patterns are those with the highest frequency in the lexicon while the irregular patterns are those with low frequency in the lexicon but high frequency for the individual item in natural language use. In the context of OCP, the consonantal patterns that occur frequently in the lexicon are those that follow OCP while the patterns with weak presence in the lexicon are those that violate OCP. Given the token frequency effect associated with irregular patterns from Bybee's model, Bybee predicts that irregular patterns, consonantal pairs that violates OCP and have low type frequency in the dictionary, should have high token frequency to make up for the weak lexical strength and resist regularization. Otherwise, if the irregular patterns have low token frequency, Bybee predicts that the pattern should have undergone regularization or be vulnerable to regularization because the level of lexical strength is too weak to resist regularization.

A subset of the Arabic Gigaword was used to test these predictions. The size of the corpus is 6 million words. Triliteral consonantal roots were extracted from the content words (nouns, verbs & adjectives) after adding the morphological annotation and converting the Arabic characters to Buckwalter transliteration system. Following Pierrehumbert (1993), the degree of representation of a type of consonantal pair in the lexicon was quantified by calculating the ratio of the observed number of occurring pairs (O) to the number that would be expected if the consonants combined at random (E). Then, for each possible combination of consonantal pairs in the triliteral root, I calculated the correlation between the ratio of observed to expected count (O/E) and the number of occurrences of the pair in actual use (Token frequency). The results revealed significant positive correlations for pairs in C1C2, $r = .27$ $p < .001$, and C2C3, $r = .24$ $p < .001$, suggesting as the degree of representation of a pair type increases, its occurrences in actual language use increases. Therefore, they are inconsistent with the predictions of the network model. The analysis of the results suggests that they may be compatible with an alternative account in line with the dual-processing model (Prasada & Pinker 1993) in which knowledge of language requires two mechanisms: lexical memory for irregular patterns and a more productive rule-based combinatorial grammar for regular forms.

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Relative Effects of Segment and Prosody in the Perception of Japanese-accented Korean

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The present study examines the relative weight of segments and prosody in the perception of foreign accented L1 speech. Specifically, seven types of manipulated Korean sentences with varying degree of Japanese-accent in terms of both segments and prosody were evaluated by native speakers of Korean. The aim was to investigate the relative role of segmental and prosodic cues on the perception of foreign accentedness as a function of speakers' L2 proficiency. The study investigates the different patterns of separate contribution of segmental and prosodic information to perceiving foreign accent in Japanese-accented Korean depending on the tasks (intelligibility, comprehensibility, accentedness) and speakers' proficiency.

A total of 10 Korean sentences with multiple types that differed in their intonational properties (e.g., declaratives, exclamatory, imperatives, etc.) were recorded by two Korean speakers, two high-proficient Japanese learners and two low-proficient Japanese learners. Sentence manipulation was carried out by combining segments from one speaker with prosody (fundamental frequency contour and duration) from another speaker, resulting in 7 versions of sentences: Native segments from Korean speaker 1 with native prosody from Korean speaker 2 (Ns+Np), Native segments from Korean speaker (1? 2? Both?) with nonnative prosody from high-proficient Japanese speaker (Ns+Hp), Nonnative segments from high-proficient Japanese speaker with native prosody from Korean speaker (Hs+Np), Nonnative segments from high-proficient Japanese speaker 1 with nonnative prosody from high-proficient speaker 2 (Hs+Hp), Native segments from Korean speaker with nonnative prosody from low-proficient Japanese speaker (Ns+Lp), Nonnative segments from low-proficient Japanese speaker with native prosody from Korean speaker (Ls+Np), and Nonnative segments from low-proficient Japanese speaker 1 with nonnative prosody from low-proficient speaker 2 (Ls+Lp).

Twenty-eight native Korean listeners were given three testing blocks to examine overall intelligibility, comprehensibility and accentedness. In the first block, examining intelligibility, participants were asked to listen to the randomaized recordings and transcribe the target sentences. To test comprehensibility, the participants were asked to provide ratings by clicking on a scale from 1 to 5 (1 = *very easy to understand*, 5 = *very difficult to understand*). As for accentedness, the participants once again listened to the sentences in a new randomized order and rated them for accentedness on a scale from 1 to 5 (1 = *no accent*, 5 = *strong accent*).

For intelligibility, the ratio of errors per sentence by each listener was calculated for each speaker combination. The results showed that native Korean listeners percieved sentences with low-proficient learner segments as more accented than the others. The results of the average accentedness ratings showed that native listeners were more sensitive to prosodic information in low-proficient learners' speech, while they were more sensitive to segmental information in high-proficient learners' speech when rating the degree of foreign accentedness. The results in comprehensibility, however, returned no significant difference between the effect of segments and prosody on perceiving Japanese-accented Korean regardless of proficiency. The results were interpreted to suggest that segmental and prosodic information may differently contribute to the native listeners' perception of foreign accent with different levels of proficiency in the L2.

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The Effect of Dialects on Phonetic Convergence in Non-native Settings

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The aim of this study is to understand how different dialects affect phonetic convergence in non-native settings when second language (L2) learners communicate with each other. Although a large number of studies have investigated phonetic convergence in various native settings (e.g., Babel, 2009; Babel & Bulatov, 2012; Kim, 2012; Pardo, Urmanche, Wilman, & Wiener, 2017), only a few studies (Liu, 2017; Zając, 2013; Zając & Rojczyk, 2014) have examined this phenomenon among L2 learners. Furthermore, it is rare to consider how dialects affect phonetic convergence in non-native settings.

This study investigates phonetic convergence in shadowed English words spoken by ten female Hijazi Arabic speakers with a high-intermediate English proficiency after they were exposed passively to two female model talkers with different Arabic dialects. One model talker spoke Urban Hijazi Arabic, which is the same dialect that the participants spoke, and the other model talker spoke Moroccan Arabic, which is a different dialect. All participants performed three tasks: the pretest of reading a list of words to measure their baseline productions, the passive auditory exposure in which the participants were asked to choose the correct words that complete a list of sentences that had the target words read by the model talkers, and the shadowing task of repeating the words as quickly and clearly as possible after a model talker. Before the latter two tasks, participants were informed of each model talker's dialect to make sure that they were aware of the model talker's linguistic background.

Unlike previous studies (e.g., Babel, 2012; Babel & Bulatov, 2012; Kim, Horton, & Bradlow, 2011; Liu, 2017; Pardo, 2006; Pardo et al., 2017), in which different participants were assigned for each model talker, the same participants shadowed the different model talkers in different sessions with at least a one-week interval in between. For the first session, half of the participants were assigned to the Hijazi model talker, while the other half were assigned to the Moroccan model talker; then, in the second session, participants switched to the other model talker. The target words were English CV.CVC words with the stress on the first syllable. To investigate the degree of phonetic convergence, the values of F1xF2, the vowel duration of the vowels in the first syllable, and the VOT of the initial C were examined. The measurements were converted to difference-in-distance (DID) scores that compared baseline differences between each shadower and model talker as well as shadowed differences. Positive DID scores indicate phonetic convergence while negative ones phonetic divergence (Prado et al., 2017).

Results indicate that participants converged their vowel duration and VOT more to the model talker with the same dialect (Figures 1 & 2). Moreover, we observe tendency that participants converged their F1xF2 more towards the model talker with the same dialect, whereas they diverge from the model talker with the different dialect (Figure 3). These findings indicate that participants converge their English phonetically more to the model talker with whom they share the same dialect. The findings suggest that having the same linguistic background facilitates phonetic convergence in L2.

Figures: (Note: Negative values indicate divergence and positive values indicate convergence):

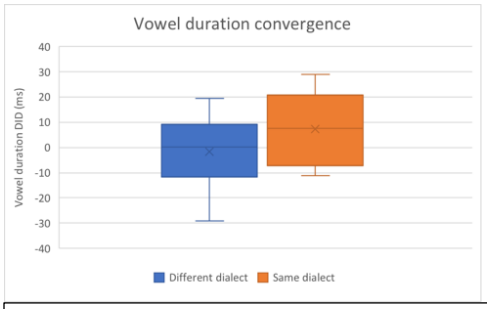

Fig. 1. Boxplots of vowel duration DID in Hz between the model talker with different dialect and the model talker with same dialect.

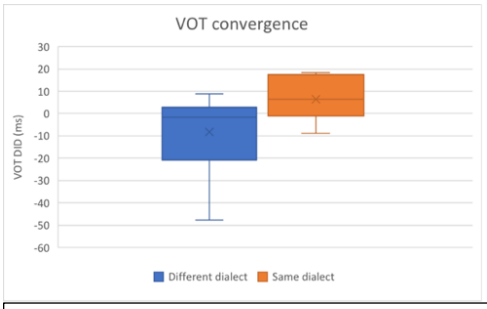

Fig. 2. Boxplots of VOT DID in Hz between the model talker with different dialect and the model talker with same dialect.

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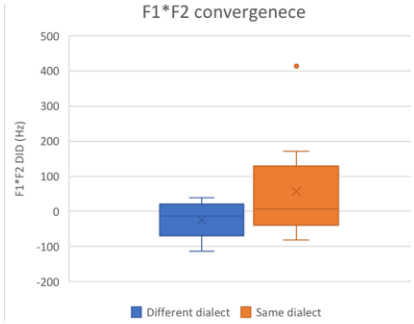

Fig. 3. Boxplots of F1*F2 DID in Hz between the model talker with different dialect and the model talker with same dialect.

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A Comparative Study of Iraqi and Najdi Arabic Word-initial and Word-final Consonant Cluster

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The purpose of this study is to provide detailed description of word-initial and word-final consonant cluster productions in Iraqi and Najdi dialects. It has been argued that Iraqi speakers have difficulty in producing consonant clusters (CCs) in word-initial and word-final positions (Blanc, 1964; Erwin, 2004; Al-Bazi, 2006) whereas Najdi speakers do not have such difficulty (Alghmaiz, 2013; Alkhonini, 2014; Salem, 1999). However, these results are based on different methods (e.g., Iraqi studies were done without production data whereas Najdi studies were based on Najdi participants' production of Arabic words in isolation and in sentences). Thus, we investigate the productions of consonant clusters of both Iraqi and Najdi speakers using the same method (i.e., the same set of stimuli and elicitation procedure) for a better comparison of these two dialects.

Five native speakers of Iraqi and five native speakers of Najdi dialects read a list of nonsense words in the form of CC[a]CV for word-initial sequences and CVCC for word-final sequences. The list in Arabic script consisted of 20 word-initial and 20 word-final consonant clusters which included most potential 10 types of consonant cluster patterns that are argued by the scholars mentioned above to be allowed in Najdi Arabic. We analyzed their productions by examining spectrograms to decide whether the consonant clusters were produced correctly or with modification such as epenthesis (CVC) or prothesis (ʔVCC).

Results replicated previous findings for the Iraqi dialect: Iraqi speakers had difficulty in producing both word-initial (96% errors) and word-final CCs (76% errors) as Figure 1 shows. We also noted that the Iraqi speakers modified with epenthesis for most word-initial CCs, except for nasal + fricative, fricative + nasal, and nasal + stop stimuli (See Figure 2). On the other hand, we observed that Najdi speakers also had difficulty in producing some word-initial CCs (39% errors) and most word-final CCs (72% errors) (See Figure 1), contrary to the previous findings. Most word-initial errors involved a nasal in the CCs (nasal + fricative, fricative + nasal, stop + nasal, and nasal + stop) and they were modified with epenthesis, except for the fricative + nasal sequences that tend to be produced mostly with prothesis modification (See Figure 3).

Our study using the same method to investigate consonant cluster productions in Iraqi and Najdi dialects results in different conclusions regarding the status of CCs in the phonology of Najdi dialect; Najdi dialect does not allow most CCs in either word-final position or with a nasal in word-initial position. In our presentation, we will discuss possible reasons for the discrepancy between our results and previous results on this issue while also presenting the acoustic analysis results for the productions.

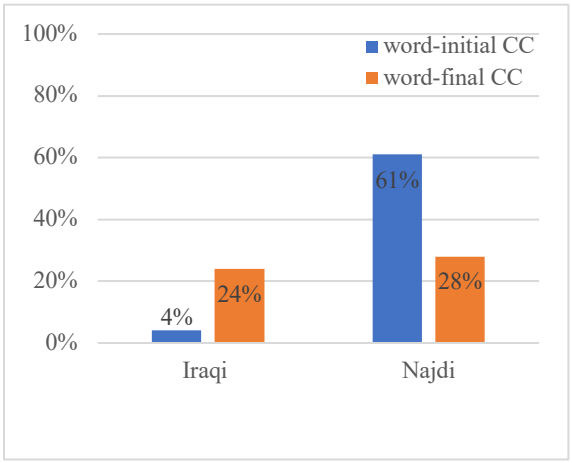

Figure 1. Mean correct production (%) of word-initial and word-finial consonant clusters by Iraqi and Najdi speakers.

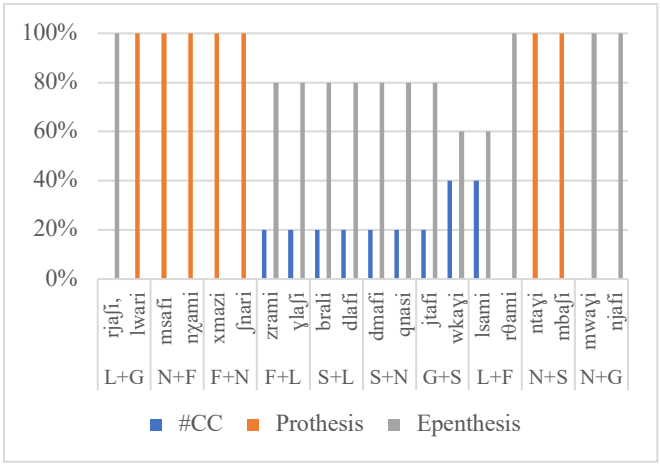

Figure 2. Mean proportions (%) of word-initial consonant cluster productions without and with prothesis and epenthesis modifications by Iraqi speakers.

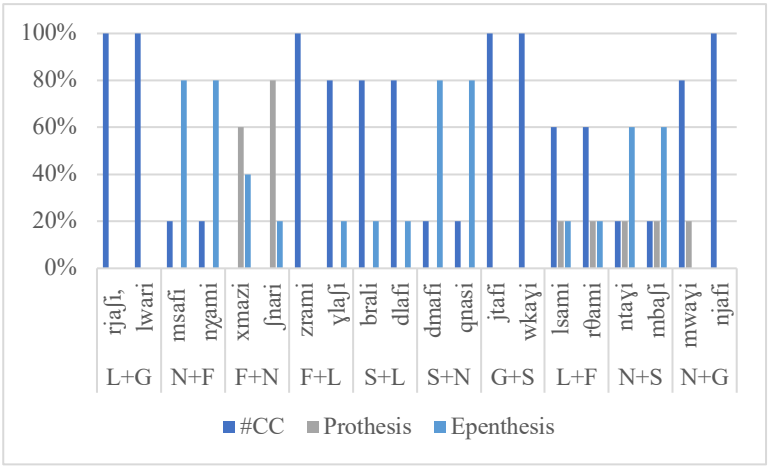

Figure 3. Mean proportions (%) of word-initial consonant cluster productions without and with prothesis and epenthesis modifications by Najdi speakers.

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