Editorial

Exploring Cross-Linguistic Effects and Phonetic Interactions in the Context of Bilingualism: Introducing the Special Issue

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1. Background and Motivation

Bilinguals who have acquired both of their languages simultaneously since birth or have learned their first language (L1) and their second language (L2) sequentially, as children or as adults, are able to produce and perceive two different sound systems. To accomplish this, a bilingual individual will have to attune their perceptual abilities to the sound system of each language and also produce acoustically distinct sounds depending on which language they are using. Over the past three decades, one of the central questions in bilingualism research has been to determine to which extent the bilingual's two phonological inventories are interconnected, and thus influence each other, and in what ways they remain independent, especially in comparison with the single system of monolinguals.

As predicted in current theoretical models of L2 phonological acquisition, such as the Speech Learning Model, SLM (Flege 1995); the revised Speech Learning Model, SLM-r (Flege and Bohn 2021); the Perceptual Assimilation Model, PAM (Best 1995); the Perceptual Assimilation Model of Second Language Learning, PAM-L2 (Best and Tyler 2007); and the Second Language Perception Model, L2LP (Escudero 2005), the learnability of L2 speech sounds is perceptual in nature and depends on the perceived phonetic distance between the sounds in the L2 and the most similar sounds in the L1 phonetic inventory. For instance, the SLM postulates that a bilingual's L1 and L2 sounds are interrelated and coexist in a common acoustic-phonetic space, with the bilingual sound system being a combination of the two languages' segmental inventories. If this is the case, the bilingual sound system will, by consequence, be prone to cross-linguistic influence.

Cross-linguistic phonetic/phonological influence has been defined as "the way in which a person's knowledge of the sound system of one language can affect that person's perception and production of speech sounds in another language" (Jarvis and Pavlenko 2008, p. 62). This type of cross-linguistic influence plays an important role in provoking the percept of a discernable 'foreign accent'. However, this accent is not exclusive to speech production. In addition to speaking with a "foreign" or L1-influenced accent, previous studies have also shown that language users also "hear with an accent" (Jenkins et al. 1995). A growing body of research on bilingual speech has examined cross-linguistic influence in the production, perception and processing of sounds in the L1 and the L2, focusing on how bilinguals categorize speech sounds, their sensitivity to phonetic variation, and the phonemic and phonetic abilities of these bilinguals in their production of language-specific segmental and suprasegmental features.

A number of these studies suggest that bilingual speakers do not necessarily produce acoustic targets free of influence from the L1 in their L2; rather, the bilinguals' combined or interrelated systems influence each other at a fine-grained acoustic level in speech production and perception. In order to better understand the phonological/phonetic systems of early and late bilinguals, it is clear that we are obligated to consider many variables in addition to age of acquisition, such as language proficiency, language dominance, language

use, and other non-linguistic variables that are particular to the experiences of the bilingual individuals under investigation.

The present Special Issue brings together fifteen state-of-the-art papers that investigate phonetic interactions between the sound systems of multilingual speakers at the segmental and suprasegmental levels, using a wide variety of methodologies, and that inform current theoretical frameworks on bilingual speech. The authors are leading experts representing research institutions in the U.S., Canada, Australia, Spain, Poland, Korea, Germany, Austria, and the United Kingdom. The target languages that are investigated in this compilation of original research studies include English, Spanish, Japanese, Korean, Russian, German, French, and Catalan in the production and perception of early simultaneous bilinguals, heritage speakers, adult L2 learners, and L3 learners.

2. Article Summaries

The fifteen articles in this Special Issue are divided into two sections: five studies on speech perception and ten studies on speech production. Ideally, the reader should read the papers in the order established below, since this order renders a thematically coherent overview of the work included in the Special Issue. However, every paper may also be read independently and, as the reader will find out, the order of the papers on the journal website based on date of publication differs from the one adopted here.

Mariela López Velarde and Miquel Simonet (University of Arizona) open the bilingual speech perception section of this special issue, with the article entitled "The perception of postalveolar English obstruents by Spanish speakers learning English as a Foreign Language in Mexico". In their study, López Velarde and Simonet investigate the perception of the English contrast /tʃ/–/ʃ/ (as in *cheat* and *sheet*) by two groups of L2 English learners who speak a different variety of Mexican Spanish. More specifically, this study compares the perceptual behavior of English learners from northwestern Mexico, where [tʃ] and [ʃ] are variants of the same phoneme in their Spanish variety with learners from central Mexico, whose native dialect includes only [tʃ]. The results of a word-categorization task and a categorical discrimination task show that both groups of learners have difficulties to identify and discriminate this contrast but the group of learners in northwestern Mexico find these tasks particularly challenging. These results show that phonetic variants in one's native dialect modulate the perception of sounds of their second language.

The study by Charles B. Chang (Boston University) and Sungmi Kwon (Pukyong National University), "The contributions of crosslinguistic influence and individual differences to nonnative speech perception" investigates the relative importance of cross-linguistic transfer from a listener's native language (L1) vis-à-vis individual learner differences. It explores the hypothesis that the nature of L1 transfer changes as learners gain experience with the L2, such that individual differences are more influential at earlier stages of learning and L1 transfer is more influential at later stages of learning. In a pretest-posttest design, novice L2 learners of Korean from diverse L1 backgrounds were examined with respect to their perceptual acquisition of novel L2 consonant contrasts: the three-way Korean laryngeal contrast among lenis, fortis, and aspirated plosives, and the /o/-/ʌ/ and /u/-/ɨ/ Korean vowel contrasts. The results indicate that even though pretest performance showed little evidence of L1 effects, posttest performance showed significant L1 transfer. These findings suggest that L1 knowledge influences L2 perception dynamically, as a function of the amount of experience that learners gain with the L2. Therefore, both individual differences and L1 knowledge play a role in L2 perception, but to different degrees over the course of L2 development.

The third study, "Perceived phonological overlap in second-language categories: The acquisition of English /r/ and /l/ by Japanese native listeners" by Michael D. Tyler (Western Sydney University), tests the idea that Japanese learners who have acquired English in a formal learning setting may perceive phonological overlap when they encounter L2 phones, and that the overlap may decrease with immersion experience in an L2 environment. In this study, Japanese native speakers differing in English L2 immersion and native English

speakers completed a *forced category goodness rating task*, where they rated the goodness of fit of an auditory stimulus to an English phonological category label. The auditory stimuli consisted of 10 steps of a synthetic /r/-/l/ continuum, plus /w/ and /j/. The results indicated that less experienced Japanese participants rated steps at the /l/-end of the continuum as equally good versions of /l/ and /r/, but steps at the /r/-end were rated as better versions of /r/ than /l/, and for those with more than two years of immersion there was a separation of goodness ratings at both ends of the continuum. However, the separation was smaller than it was for the native speakers. These findings show that for L2 listeners the perceived phonological overlap appears to improve with immersion experience.

The fourth study on speech perception by Jaydene Elvin (California State University, Fresno), Daniel Williams (University of Potsdam), Jason Shaw (Yale University), Catherine Best (Western Sydney University), and Paola Escudero (Western Sydney University), "The role of acoustic similarity and non-native categorisation in predicting non-native discrimination: Brazilian Portuguese vowels by English vs. Spanish listeners" examines whether Australian English (AusE) and European Spanish (ES) listeners differ in their categorization and discrimination of Brazilian Portuguese (BP) vowels. The results from the perception tasks showed comparable performance for the AusE and ES participants in their perception of the BP vowels. More specifically, discrimination patterns were largely dependent on contrast-specific learning scenarios which were similar across AusE and ES, and the acoustic similarity between the individuals' own native productions and the BP stimuli were largely consistent with the participants' patterns of non-native categorization. Furthermore, the results indicated that both acoustic and perceptual overlap successfully predict discrimination performance. However, accuracy in discrimination was better explained by perceptual similarity for ES listeners and by acoustic similarity for AusE listeners. Finally, the group averages were found to explain discrimination accuracy better for ES listeners than predictions based on individual production data, but this was not the case for the AusE group. These findings are interpreted in light of the predictions put forth by the Second Language Perception Model, L2LP (Escudero 2005).

The final article in the speech perception section is also the only study in this special issue that investigates cross-linguistic effects in L3 acquisition, entitled "Cross-linguistic interactions in third language acquisition: evidence from multi-feature analysis of speech perception" by Magdalena Wrembel (Adam Mickiewicz University, Poznań), Ulrike Gut (University of Münster), Romana Kopečková (University of Münster), and Anna Balas (Adam Mickiewicz University, Poznań). This study contributes to the few studies that have examined cross-linguistic effects in the speech perception of multilingual learners by exploring the development of speech perception in a group of young L1 Polish speakers learning L2 English and L3 German. These multilingual individuals performed a forced-choice goodness task in their L2 and L3 to test their perception of rhotics and final obstruent (de)voicing. Data on their response accuracy and reaction times indicate that cross-linguistic influence in perceptual development is feature-dependent with relative stability evidenced for L2 rhotics, reverse trends for L3 rhotics, and no significant development for L2/L3 (de)voicing. These results also show that the source of cross-linguistic influence differed across the speakers' languages.

Shifting to bilingual speech production, the first study that opens this section is the article by Daniel J. Olson (Purdue University), "Short-term sources of cross-linguistic phonetic influence: Examining the role of linguistic environment". This production study investigates the potential for linguistic environment to serve as a source of short-term cross-linguistic phonetic influence. To test this, a group of L1 English-L2 Spanish bilinguals produced Spanish utterances in two different sessions in different locations: in an English-dominant linguistic environment in Indiana, USA, and in a Spanish-dominant linguistic environment in Madrid, Spain. The results from an acoustic analysis of VOT and native speaker global accent ratings show that the linguistic environment did not significantly impact either measure of phonetic production, regardless of a speaker's L2 proficiency.

These findings point to a possible primacy of the immediate context of an interaction, rather than broader community norms, in determining language mode and cross-linguistic influence.

The next study by Robert Mayr (Cardiff Metropolitan University), David Sánchez (Cardiff Metropolitan University), and Ineke Mennen (University of Graz), entitled "Does teaching your native language abroad increase L1 attrition of speech? The case of Spaniards in the United Kingdom" focuses on cross-linguistic influence from the L2 to the L1 (i.e., reverse transfer). Specifically, it examines the perceived L1 pronunciation of two groups of native Spaniards residing in the United Kingdom (Spanish language teachers and non-teachers) and monolingual Spanish controls in Spain. Crucially, the Spanish language teachers significantly used more Spanish at work than non-teachers. Global accentedness ratings were obtained from monolingual native Spanish listeners living in Spain, who rated short speech samples extracted from a picture-based narrative. The results showed significantly greater foreign-accent ratings for teachers than for non-teachers and monolinguals, and this non-native speech was associated with a range of segmental and suprasegmental features. These results suggest that language teachers who teach their L1 in an L2-speaking environment may be particularly prone to L1 attrition since they need to co-activate both of their languages in professional settings and are regularly exposed to non-native speech from L2 learners.

As in the previous study, the next article on bilingual speech production entitled, "The effect of instructed second language learning on the acoustic properties of First Language Speech" by Olga Dmitrieva (Purdue University), Allard Jongman (University of Kansas), and Joan. A. Sereno (University of Kansas) also contributes to the growing evidence of reverse transfer from the L2 to the L1 during L2 phonetic acquisition. In this study, Russian and English productions of 20 American classroom learners of Russian were compared to 18 English monolingual controls with a focus on the acoustics of word-initial and word-final voicing. The results indicated that learner's Russian voiced and voiceless stops were acoustically different from their English ones demonstrating a successful acquisition of these L2 Russian segments. These learners also showed an L1 phonetic change in comparison to the monolingual English speakers: their English VOTs were shortened, therefore, they were more Russian-like. This was taken as evidence of assimilation with Russian whereas the frequency of prevoicing in English was decreased, indicating dissimilation with Russian. With respect to word-final voicing, the duration of preceding vowels, stop closures, frication, and voicing during consonantal constriction all demonstrated drift towards Russian norms of word-final voicing neutralization. These findings demonstrate that L2-driven phonetic changes in the L1 are possible even in L1-immersed classroom language learners, challenging the role of reduced L1 use and highlighting the plasticity of the L1 phonetic system.

The next article by Magdalena Romera (Universidad Pública de Navarra) and Gorka Elordieta (Universidad del País Vasco-Euskal Herriko Unibertsitatea), entitled "Information-seeking question intonation in Basque Spanish and its correlation with degree of contact and language attitudes", analyzes the prosodic characteristics of Spanish in contact with Basque in the Basque Country. More specifically, the study focuses on the prosody of information-seeking yes/no questions, which present different intonation contours in Spanish and Basque. In contrast to previous work in urban areas, this study examined the suprasegmental features of speakers in rural areas. The results showed that falling intonational contours at the end of information-seeking absolute interrogatives were more common than in urban areas, and no correlation was found with the degree of contact with Basque and with attitudes towards Basque. The authors interpret these results as evidence that in rural areas the presence of Basque in daily life is stronger than in urban settings, and that there is a consolidated variety of Spanish used by all speakers regardless of their language attitudes. These findings reveal the relevance of subjective social factors in the degree of convergence between two languages.

Justin Davidson (University of California, Berkeley) in "Asymmetry and directionality in Catalan-Spanish contact: intervocalic fricatives in Barcelona and Valencia" examines another situation of language contact in Spain (Spanish/Catalan), this time focusing on the variable voicing and devoicing of intervocalic alveolar fricatives in Spanish, Barcelonan Catalan, and Valencian Catalan. The results from data elicited using a phrase-list reading task and sociolinguistic interviews reveal a stronger influence of Catalan on Spanish in Barcelona and Spanish on Catalan in Valencia, showing that these asymmetries, corroborated by attitudinal differences afforded to Catalan and Spanish in Barcelona and Valencia, reinforce the role of social factors in language contact outcomes.

The sixth article in this bilingual production section is entitled "Shared or separate representations? The Spanish Palatal Nasal in Early Spanish/English bilinguals" by Sara Stefanich (Northwestern University) and Jennifer Cabrelli (University of Illinois at Chicago). This acoustic study investigates whether a group of twenty Spanish heritage speakers living in the Chicagoland area have established a representation for the Spanish palatal nasal /ɲ/ (e.g., /kaɲon/ *cañón* 'canyon') that is separate from the similar, yet acoustically distinct English /n+j/ sequence (e.g., /kænjn̩/ 'canyon'). Duration and formant contour data elicited in a delayed repetition task in each language show that these early bilinguals distinguish between the Spanish /ɲ/ and English /ɲ+j/ in production, indicative of the maintenance of separate representations for these similar sounds. These results provide evidence of a lack of interaction between systems for bilinguals in this scenario.

In "Redefining sociophonetic competence: mapping COG differences in Phrase-Final fricative Epithesis in L1 & L2 speakers of French" by Amanda Dalola (University of South Carolina) and Keiko Bridwell (University of Georgia), the objective is to evaluate different measures of center of gravity (COG) in phrase-final fricative epithesis (PFFE) produced by L1 and L2 speakers of Continental French. Forty participants completed a reading task with target stimuli that elicited /i,y,u/ in phrase-final position. Results of the COG measures revealed that L2 speakers showed higher COG values than L1 speakers in low PFFE-to-vowel rations at the 25%, 50%, and 75% marks. After categorizing COG measures into six profile types on the basis of their frequencies at each timepoint (flat-low, flat-high, rising, falling, rising-falling, and falling-rising), the results revealed that although L1 speakers produced predominantly flat-low profile types at a lower percent devoicing, L2 speakers preferred multiple strategies involving higher levels of articulatory energy (rising, falling, rise-fall). These findings show that additional phonetic dimensions are necessary in the construct of L2 sociophonetic competence.

The next article by Laura Colantoni (University of Toronto), Ruth Martínez (University of Toronto), Natalia Mazzaro (University of Texas at El Paso), Ana T. Pérez Leroux (University of Toronto), and Natalia Rinaldi (University of Toronto) is entitled "A phonetic account of Spanish-English bilinguals' divergence with agreement". This study investigates the acoustic realization of Spanish word-final unstressed vowels /a,e,o/ in read and semi-spontaneous speech produced by 11 monolingual Spanish speakers, 13 early Spanish-English bilinguals, and 13 late Spanish-English bilinguals. The results of an acoustic analysis showed that early bilinguals exhibited clear patterns of vowel centralization and higher rates of hiatuses than the other two groups. Specifically, /a/ and /o/ were realized as centralized vowels, particularly with [+Animate] nouns. It is concluded that such variable vowel realizations may be a factor in the vulnerability to attrition in gender marking in Spanish as a heritage language.

The following article entitled "(Divergent) Participation in the California Vowel Shift by Korean Americans in Southern California" by Ji Young Kim (University of California, Los Angeles) and Nicole Wong examines the participation in the California Vowel Shift by Korean Americans in Los Angeles. First generation, generation 1.5, and second generation Korean-Americans are compared to Anglo-Californians and non-immigrant Korean late learners of English with respect to their English vowel productions. Results from a picture narrative task show a clear distinction between early vs. late bilinguals: while the first-generation Korean Americans and the late learners showed apparent signs of Korean

influence, the 1.5- and second-generation Korean Americans participated in most patterns of the California Vowel Shift. However, divergence from the Anglo-Californians was observed in early bilinguals' speech. These findings indicate that age of arrival has a strong effect on immigrant minority speakers' participation in local sound change and that second-generation Korean Americans may be in a more advanced stage of the California Vowel Shift than Anglo-Californians or that the California Vowel Shift is on a different trajectory for these speakers.

The final article of the bilingual speech production section, and of the Special Issue as a whole, is entitled "Interlingual interactions elicit performance mismatches not "compromise" categories in early bilinguals: Evidence from meta-analysis and coronal stops" by Joseph V. Casillas (Rutgers University). This study uses meta-analytic techniques and coronal stop data from early bilinguals in order to assess the claim that early bilinguals produce the sounds of their languages in a manner that is characterized as "compromise" with regard to monolingual speakers. In this paper, Casillas provides an assessment of the literature and presents an acoustic analysis of coronal stops from early Spanish-English bilinguals. A range of studies were coded for linguistic and methodological features, as well as effect sizes, and then analyzed using a cross-classified Bayesian meta-analysis, and the results indicated that the pooled effect for "compromise" VOT was negligible. The acoustic analysis of the coronal stops showed that a group of early Spanish-English bilinguals often produced Spanish and English targets with mismatched features from their other language, and that these are likely to have occurred as a result of interlingual interactions elicited by the experimental task. Taken together, these results are interpreted as evidence that early bilinguals do not have "compromise" VOT, though their speech involves dynamic phonetic interactions that can surface as performance mismatches during speech production.

3. Final Remarks

The articles contained in this Special Issue examine cross-linguistic phonetic/phonological influence in bilinguals and trilinguals. These experimental studies contribute to the field with novel empirical data collection techniques, sophisticated methodologies and acoustic analyses, and present findings with robust theoretical implications for a variety of subfields, such as L2 acquisition, L3 acquisition, Laboratory Phonology, Acoustic Phonetics, Psycholinguistics, Sociophonetics, Bilingualism, and Language Contact. These studies will serve as a source of motivation for future research and to further elucidate the nature of phonetic interactions in the context of bilingualism and multilingualism.

(Universität Wien), Melinda Fricke (University of Pittsburgh), Michael Gradoville (Arizona State University), Miquel Llompart (Friedrich-Alexander-Universität Erlangen-Nürnberg), Mónica Chamorro (Universidad Javeriana Cali), Robert Mayr (Cardiff Metropolitan University), Sara Zahler (SUNY Albany), Silvina Bongiovanni (Michigan State University), Timothy Face (University of Minnesota), and Zsuzsanna Fagyal (University of Illinois Urbana-Champaign).

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