

INTERNATIONAL
CHILD PHONOLOGY
CONFERENCE 2024
7-9 MAY



VIRTUAL (online synchronous)

International Child Phonology Conference (ICPC) 2024

Elena Babatsouli, Chair
Department of Communicative Disorders
University of Louisiana at Lafayette



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WELCOME

I am delighted to extend a warm welcome to all delegates of the *International Child Phonology Conference (ICPC) 2024* which is taking place virtually (online synchronous). It is a unique privilege to chair this three-day conference with you as honored guests and participants in the Department of Communicative Disorders at the University of Louisiana at Lafayette.

Since its early informal gatherings in the Midwest of the US dating back to 1976, the International Child Phonology Conference has a long history. ICPC covers all aspects of children's language development and use in L1, bilingualism, multilingualism, dialects, and early second language acquisition, in typical and atypical contexts. The conference encourages a multi- and inter-disciplinary approach across phonology, phonetics, relationships between phonological development and other aspects of language acquisition, production and perception, psycholinguistics, cognitive linguistics, neurolinguistics, clinical phonetics and linguistics, sign language, acoustics, computational modeling, educational linguistics, and the application of new technologies.

I am happy to welcome you all to the Department of Communicative Disorders and its Speech, Language and Hearing Center, whose standing tradition in research and clinical practice epitomizes the empirical, theoretical, and clinical implications of this conference. This is an important year for the University of Louisiana at Lafayette which celebrates its 125th Anniversary. Please join me in thanking all named and anonymous members of UL and my student collaborators: Abigail Stillwell, Elisabeth Boyer, Erin Langlinais, Lauren Sonnier, Olivia Owensby, and Pegah Nikrah who have assisted in facilitating this year's International Child Phonology Conference.

Thank you all for bringing your valuable expertise to this gathering and assisting in paving the way for research on child phonology in the future. *To be* at the University of Louisiana at Lafayette is to partake in the Cajun legacy of the wider community. *Geaux Cajuns*.

Elena Babatsouli, Ph.D.

Chair, *ICPC 2024*

University of Louisiana at Lafayette

ICPC 2024 FULL PROGRAM
US Central Daylight Time (CDT)

(Please see note on final page for actual duration of presentations)

TUESDAY, 7 May

OPENING REMARKS 08:45-09:00	Chair: <i>Elena Babatsouli</i>
SESSION 1 09:00-10:30	Chair: <i>Peggy Mok</i>
09:00-09:30	The acquisition of Mandarin retroflex sibilants by Mandarin-Cantonese-English trilingual children: A case study of the Leo Corpus <i>Tong Shu, Peggy Mok, Virginia Yip, Ziyin Mai</i> The Chinese University of Hong Kong
09:30-10:00	Do children have knowledge of complex tone sandhi? A case study of Xiamen Southern Min <i>Chunyu Ge, Peggy Mok</i> The Chinese University of Hong Kong
10:00-10:30	Clinical assessment of speech sound disorders in Mandarin-speaking children <i>Lujia Yang, Karen Pollock</i> University of Alberta
SESSION 2 10:30-12:00	Chair: <i>Kakia Petinou</i>
10:30-11:00	Phonological intervention in Cypriot Greek SSD <i>Kakia Petinou</i> Cyprus University of Technology
11:00-11:30	The acquisition of Catalan word-initial complex onsets <i>Duna Ninyerola Barea, Eulàlia Bonet Alsina, Anna Gavarró Algueró</i> Universitat Autònoma de Barcelona
11:30-12:00	Two languages, one mind: A bilingual speaker's syllabification strategies at the beginning of elementary school (case study) <i>Cláudia Alexandra Moreira da Silva</i> Università di Roma La Sapienza
BREAK 12:00-12:30	
SESSION 3 12:30-14:00	Chair: <i>Avivit Ben-David</i>
12:30-13:00	Which quantitative measures best mirror real life judgments of speech intelligibility? <i>Leah R. Paltiel-Gedalyovich¹, Avivit Ben-David²</i> ¹ Achva Academic College, ² Hadassah Academic College
13:00-13:30	Development of the Whole Word Match measure as a phonological screening tool <i>Barbara May Bernhardt¹, Daniel Bérubé², G. Carballo, M.-J. Freitas, G. K. Mason, I. Lundeborg Hammarström, D. Ignatova, M. Ozbič, D. Pérez, A. M. Ramalho, J. P. Stemberger¹, P. Vergara Ponce</i> ¹ University of British Columbia, ² University of Ottawa, et al.
13:30-14:00	Acquiring laryngeal categories <i>Lucas Annear, Joe Salmons, Charlotte Vanhecke</i> University of Wisconsin - Madison

TUESDAY, 7 May

SESSION 4 14:00-15:30	Chair: <i>Amy Glaspey</i>
14:00-14:30	SSD treatment meets an early childhood classroom model of service delivery: A sneak peek at measures after the first 6 weeks <i>Amy Glaspey¹, Delaney Clement¹, Andrea MacLeod²</i> ¹ University of Montana, ² University of Alberta
14:30-15:00	Speech sound production accuracy in children attending a Mandarin-English bilingual program <i>Sarah Bishop¹, Michael Stone¹, Youran Lin¹, Fangfang Li², Karen Pollock¹</i> ¹ University of Alberta, ² University of Lethbridge
15:00-15:30	Prosodic focus in Brazilian Portuguese: How do adults and children in typical and atypical phonological development encode the contrast? <i>Geovana Soncin¹, Larissa Cristina Berti¹, Marc Swerts²</i> ¹ São Paulo State University, ² Tilburg University
SESSION 5 POSTERS I 15:30-16:15	Chair: <i>Karen Pollock</i>
15:30-15:45	Listener perceptions of vowels produced by school-aged heritage and second language learners of Mandarin <i>Roberto Aguilar¹, Lujia Yang¹, Youran Lin¹, Fangfang Li², Karen Pollock¹</i> ¹ University of Alberta, ² University of Lethbridge
15:45-16:00	Consonant production features among English-learning elementary school children: A study in rural areas of Northeastern China <i>Ran An¹, Zhao Han²</i> ¹ Fort Hays State University, ² Qingyuan Elementary School
16:00-16:15	Word-final cluster accuracy in Persian-speaking children with social communication disorder <i>Pegah Nikrah, Elena Babatsouli</i> University of Louisiana at Lafayette

WEDNESDAY, 8 May

SESSION 6 09:00-10:30	Chair: <i>Eddy C. H. Wong</i>
09:00-09:30	Tone sequencing performance in children with childhood apraxia of speech: Acoustic analyses <i>Eddy C. H. Wong, Min Ney Wong, Shelley L. Velleman</i> The Hong Kong Polytechnic University
09:30-10:00	The development of Cantonese diphthongs by homeland and heritage children- A preliminary study <i>Chen Lan, Peggy Mok</i> The Chinese University of Hong Kong
10:00-10:30	Prosody or gesture first? The multimodal marking of focus types in development <i>Sara Coego¹, Núria Esteve-Gibert², Pilar Prieto¹</i> ¹ Universitat Pompeu Fabra, ² Universitat Oberta de Catalunya
SESSION 7 10:30-12:00	Chair: <i>Katerina Nicolaidis</i>
10:30-11:00	Euclidean distances for studying developmental aspects of vowel spectral variability in Greek <i>Polychronia Christodoulidou, Katerina Nicolaidis, Dimitrios Stamovlasis</i> Aristotle University of Thessaloniki
11:00-11:30	Acquiring intonational phonology: The case of contrastive focus production and perception in 3-5 year-old children from two regional varieties of Swedish <i>Gilbert Ambrazaitis¹, Nadja Althaus², Charlotte Bertilsson¹, Simone Löhndorf³, Anna Sara H. Romøren⁴, Susan Sayehli⁵</i> ¹ Linnaeus University, ² University of East Anglia, ³ Kristianstad University ⁴ Oslo Metropolitan University, ⁵ Stockholm University
11:30-12:00	Child directed speech during language acquisition: A Brazilian Portuguese case study <i>Raquel Santana Santos¹, Andressa Toni², Vitor Martins Englezias¹</i> ¹ University of São Paulo, ² State University of the Central-West (UNICENTRO)
BREAK 12:00-12:30	
SESSION 8 POSTERS II 12:30-13:30	Chair: <i>Rama Novogrodsky</i>
12:30-12:45	Measuring phonological complexity in the productions of Hebrew-acquiring children <i>Erika Antebi¹, Rama Novogrodsky¹, Avivit Ben David²</i> ¹ University of Haifa, ² Hadassah Academic College
12:45-13:00	Integration of audiovisual cues in speech perception: A developmental analysis <i>Mayara Ferreira de Assis¹, Larissa Cristina Berti²</i> ¹ São Paulo State University, ² São José do Rio Preto/SP
13:00-13:15	Consonant clusters in Chilean children with language development disorder and adolescents with Down Syndrome <i>Patricio Vergara Ponce, Paula Cerón, Francisca Heredia</i> Austral University of Chile
13:15-13:30	Modified vowel productions in preschoolers responding to two different communicative demands <i>Hoyoung Yi¹, Woonyoung Song²</i> ¹ Texas Tech University Health Sciences Center, ² Texas Tech University

WEDNESDAY, 8 May

SESSION 9 13:30-15:00	Chair: <i>Barbara L. Davis</i>
13:30-14:00	<i>Mom, dad, and ball: Manner of articulation in consonant sequences within children's consonant-vowel-consonant (C₁VC₂) words</i> <i>Barbara L. Davis¹, Katsura Aoyama², K. Vest²</i> ¹ The University of Texas at Austin, ² University of North Texas
14:00-14:30	Reconsidering accuracy in speech sound production: Preliminary findings of a rapid review <i>Andrea A. N. MacLeod¹, Amy M. Glaspey²</i> ¹ University of Alberta, ² University of Montana
14:30-15:00	Intonation and stress in Cantonese-English bilingual children: An Optimality-Theoretic account <i>Jonathan Him Nok Lee,¹ Stephen Matthews,² Virginia Yip³</i> ¹ University of Pennsylvania, ² The University of Hong Kong ³ The Chinese University of Hong Kong
SESSION 10 15:00-16:30	Chair: <i>Shengyun Gu</i>
15:00-15:30	ASL phonology develops early for deaf children in non-native signing home environment <i>Shengyun Gu¹, Diane Lillo-Martin¹, Deborah Chen Pichler², Elaine Gale³</i> ¹ University of Connecticut, ² Gallaudet University, ³ Hunter College, CUNY
15:30-16:00	Articulating executive function: The importance of executive function for preschool speech production <i>Nicole van Rootselaar, Alexis Demare, Fangfang Li, Robbin Gibb, Claudia L. R. Gonzalez</i> University of Lethbridge
16:00-16:30	Asymmetric mispronunciation sensitivity between liquids in CV and CCV syllables in Brazilian Portuguese <i>Andressa Toni</i> State University of the Central-West (UNICENTRO)

THURSDAY, 9 May

SESSION 11 09:00-10:30	Chair: <i>Eleftheria Geronikou</i>
09:00-09:30	Unfolding challenges: A comprehensive case study of persistent speech and literacy difficulties in a Greek-speaking child <i>Eleftheria Geronikou</i> University of Patras
09:30-10:00	Kuwaiti Arabic articulation and phonology test <i>Hadeel S. Ayyad</i> Kuwait University
10:00-10:30	Developing Turkish phonological awareness in children in relation to the national Turkish teaching program <i>Gözde Demirel Fakiroğlu</i> İstanbul University
SESSION 12 10:30-12:00	Chair: <i>Mariia Pronina</i>
10:30-11:00	The development of prosodic, gestural and sentence imitation across typically developing and clinical child populations <i>Mariia Pronina¹, Júlia Florit-Pons², Sara Coego², Pilar Prieto²</i> ¹ The University of the Balearic Islands, ² Universitat Pompeu Fabra
11:00-11:30	On the development of coarticulation in Greek: Insights from ultrasound data <i>Anastasia Deri, Katerina Nicolaidis</i> Aristotle University of Thessaloniki
11:30-12:00	Investigating phonological development via monitoring children's tongue motion <i>Elina Rubertus¹, Aude Noiray²</i> ¹ University of Potsdam, ² Université Grenoble Alpes
BREAK 12:00-12:30	
SESSION 13 12:30-14:00	Chair: <i>Georgios P. Georgiou</i>
12:30-13:00	Assessing voicing contrast discrimination in Cypriot Greek children with developmental language disorder <i>Georgios P. Georgiou¹, Elena Theodorou²</i> ¹ University of Nicosia, ² Cyprus University of Technology
13:00-13:30	Acquisition of prosodic focus acoustic parameters <i>Cecília Lorena Silva Guida, Geovana Soncin</i> São Paulo State University
13:30-14:00	Differential phonological profiles of neurotypical toddlers, low-verbal toddlers with ASD, and middle-verbal toddlers with ASD <i>Grace Corrigan, Letitia Naigles</i> University of Connecticut
SESSION 14 14:00-15:00	Chair: <i>Susana Pérez Castillejo</i>
14:00-14:30	Do bilingual (English-Mandarin) and trilingual (English-Spanish-Mandarin) children produce Mandarin stop consonants similarly? <i>Susana Pérez Castillejo¹, Linxi Zhang²</i> ¹ University of St. Thomas, ² The University of Chicago
14:30-15:00	Illustrating input and usage frequency effects in the development of bilingual segmental contrast <i>Elena Babatsouli</i> University of Louisiana at Lafayette

THURSDAY, 9 May

CLOSING REMARKS (ICPC 2025) 15:00-15:15	Chair: <i>Elena Babatsouli</i>
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Note: Oral presentations: 28 minutes each (23 minutes talk, 5 minutes Q&A) to allow time between presentations.

Poster presentations: 13 minutes each (10 minutes talk, 3 minutes Q&A) to allow time between presentations; all posters of a session will also be posted online during the entire poster session.

ABSTRACTS

Listener perceptions of vowels produced by school-aged heritage and second language learners of Mandarin

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Accentedness can be conceptualized as non-native-like pronunciation (Munro & Derwing, 1995). Although phonemic variables such as vowels influence the perception of accentedness, variables like speaker language background and differences across age groups are less understood, especially in the speech of children (Chan et al., 2017; Jin & Liu, 2014; Li et al., 2020; Willis et al., 2021). Using a cross-sectional design, the present study explores the role of the vowel in the perceived accentedness of bilingual Mandarin-English speakers. Speakers consisted of Mandarin heritage language learners (HL) and Mandarin second language learners (L2) attending grades 1 and 3 in a two-way Mandarin-English bilingual school. Two listener experiments were conducted using ePrime (Psychology Software Tools, 2016) wherein participants used a 9-point Likert scale to rate the accentedness of the children's English (/i/, /ɪ/) or Mandarin (/i/, /y/) vowel productions extracted from elicited words. Vowels were chosen based on being shared (/i/) and unshared (/ɪ/, /y/) between the two languages. Adult listeners were assigned to the English (n = 8) or Mandarin (n = 8) condition depending on their dominant language. Results were analyzed using a three-way ANOVA and independent sample t-tests. In the English experiment, /ɪ/ and the HL group were perceived as more accented than /i/ and the L2 group. HL and L2 productions of /i/ were significantly different in grade 1 but not in grade 3. No significant predictors of accentedness were identified in the Mandarin experiment. Overall, there were no significant changes across grades in either experiment, however, ratings became similarly low by the third grade. Further research involving other shared and unshared vowels is needed to determine the importance of vowel-focused pronunciation instruction. Having a strong background in the target language is advantageous, but other factors such as societal demands may also be important.

Keywords: listener rating, accentedness, vowel, children's speech, English, Mandarin

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Acquiring intonational phonology: the case of contrastive focus production and perception in 3 to 5-year-old children from two regional varieties of Swedish

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The prosodic encoding of information structure (IS) is mastered fairly late in children's language development according to previous research (e.g., MacWhinney & Bates, 1978; de Ruiter, 2010). However, few studies have conducted parallel production and perception experiments to study the relation between children's encoding and decoding of prosodically marked IS (Chen, 2010); earlier studies involving perception have made use of offline paradigms (e.g., Wells et al., 2004), while more recent studies using online methods such as eye tracking have usually not been complemented by production data (e.g., Ito, 2014). In addition, previous production work has indicated that language-specific aspects of IS coding might play a role, too (e.g., Romøren & Chen, 2015, 2021; Prieto & Esteve-Gibert, 2018). In this study, we explore the production and perception of intonationally marked contrastive focus in 3-5-year-old children speaking either Scanian or Stockholm Swedish, two dialects that differ crucially in the way the focus is encoded phonologically. While both dialects exhibit a lexical accent contrast, focus is phonetically marked more subtle in the Scanian variety: instead of adding a prominence H(igh)-tone for focus, phrase-level prominence is encoded through phonetic adjustments of the H(ihg)-L(ow) accent patterns determined by the lexical accent contrast. By comparing these two Swedish varieties we can thus control for other phonological features (incl. lexical tone), as well as grammar and lexicon. Our production experiment involves eliciting adjective-noun phrases in three different focus conditions, using an interactive video/card game. Production data are analyzed acoustically and auditorily. In our visual-word eye-tracking experiment we use the same pictures of colored objects as in the production experiment to investigate whether and how children make use of contrastive intonation for reference resolution. Eye-tracking data are analyzed using growth curve analysis (Mirman, 2014). Data are currently being collected, and preliminary results will be presented at the conference.

Keywords: information structure, prosody, L1, eye tracking, visual-world paradigm

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Consonant production features among English-learning elementary school children: A study in rural areas of Northeastern China

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Previous research has addressed phonological development and error patterns among second language learners (e.g., Ellis, 2008; Gass et al., 2001). A notable gap exists in understanding those features of second language learners in under-researched and under-resourced regions, such as rural Northeastern China. As reported by the National Bureau of Statistics in 2020, 37% of children aged 17 and under in China reside in rural areas. This study investigates consonant production exhibited by English-learning elementary school children in this region and aims to provide educational strategies to enhance the phonological development of English learners in similar contexts. Fifty-seven third graders and 45 sixth-graders in two schools were instructed to read passages from their English textbooks, revealing distinctive variations in consonant production. The most prevalent error identified was consonant substitution including the manifestation of interdental fricatives /θ/ and /ð/ as alveolar fricatives /s/ and /z/ (e.g., *thank* produced as [sæŋk] and *the* produced as [zə]). Additionally, epenthesis errors (e.g., *Kate* produced as [ketə]), and the common omission of single-word final consonants (e.g., *school* produced as [sku]) were observed. Furthermore, there was final consonant cluster simplification, exemplified by *and* being produced as [æn]. These variations align with the concept of transfer in second language phonology (Major, 2008) that learners utilize the nearest native language (L1) equivalent when acquiring a second language (L2). The findings also resonate with the Perceptual Assimilation Model (PAM, Best, 1995) and its extension, PAM-L2 (Best and Tyler, 2007), underscoring the influence of the native language on L2 speech perception and production. Moreover, results align with the Speech Language Model (SLM-R, Flege & Bohn, 2021), suggesting that observed consonant production is a result of the dynamic interaction and updating of phonetic categories within L1 and L2 subsystems. Factors such as perceived phonetic dissimilarity, as well as the quantity and quality of L2 input received, play pivotal roles in shaping these interactions.

Keywords: consonant production, elementary school children, rural areas, Northeastern China

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Acquiring laryngeal categories

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Research on the acquisition of laryngeal contrasts has shown that voiceless unaspirated stops (“short-lag”) are acquired earlier than both aspirated stops (Gandour et al., 1986; Macken and Barton, 1980a) and fully voiced stops (Allen, 1985; Macken & Barton, 1980b; MacLeod, 2016). While results from these studies have been uncontroversial, deciding which phonological categories children acquire has not been straightforward. McLeod and Crowe (2018) emphasize analysis at the level of the contrastive phoneme. However, cross-linguistic studies investigating contrasts at this level have either had unclear findings regarding laryngeal contrasts (Watts & Rose, 2020), or have omitted discussion of laryngeal contrasts (McLeod & Crowe, 2018). We adopt a model of laryngeal phonology that proposes that languages with two series of stop consonants contrast a series with laryngeal specification against a series lacking laryngeal specification (Avery & Idsardi, 2001). For example, Glottal Width ~ Ø (English and Cantonese) and Glottal Tension ~ Ø (French and Dutch). We ask whether the laryngeal category predicts age-of-acquisition and provide re-analyses of previously published studies of consonant acquisition from eight languages: English, Cantonese, Dutch, French, Icelandic, Italian, Mandarin, and Portuguese. Preliminary results from word-initial position using laryngeal category as a fixed effect and language as random effect indicate that *voiceless/voiced* analyses (i.e., traditional analyses of English and French) are not predictive of stop consonant age-of-acquisition cross-linguistically, whereas *plain/specified* analyses predict acquisition of laryngeally specified stops (fully voiced or aspirated) after plain stops. These preliminary results implement a formal framework for analyzing laryngeal categories that predict the age of acquisition cross-linguistically and unify categorization of two-, three-, and four-way laryngeal contrasts. These results are also consistent with previous acquisitional studies of laryngeal features, (Macken & Barton 1980a, 1980b, etc.), and documented child substitution and harmony patterns (Kager et al., 2007; Smit, 1993).

Keywords: laryngeal contrasts, L1, cross-linguistic, phonological acquisition, voicing

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Measuring phonological complexity in the productions of Hebrew-acquiring children

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Phonological ability improves with age as the ability to produce more complex phonological units increases. There are several suggestions for connecting phonological complexity in child language with age of acquisition: the later a unit is acquired, the more complex it is (Jakielski et al., 2006; Stoel-Gammon, 2010). Phonological complexity refers to the complexity of various units such as phonemes, syllables, and words. The current study developed a phonological complexity measure, which included all three levels. The Child Hebrew Complexity Measure (CHCM) was developed and refined based on specific features of the acquisition of Hebrew phonology and on complexity measures developed for other languages such as the Index of Phonetic Complexity (IPC, Jakielski et al., 2006) and the Word Complexity Measure (WCM, Stoel-Gammon, 2010). We tested ten children aged 18-42 months in a structured play interaction. The interaction was transcribed, and for each child 100 words were coded and analyzed in three complexity levels: phonemes, syllables, and words. These words included 36 words from an elicitation list, which is part of the structured play interaction, representing late acquired phonological units in Hebrew (e.g., multisyllabic words, middle codas, clusters and late acquired phonemes) and 64 words from spontaneous productions of the interaction. The results showed that with increasing age, children scored higher on the CHCM measure in total score and in the scores of each phonological level. These results indicate that the CHCM reflects the progress of phonological complexity of Hebrew-speaking children, such that children produce more complex words, syllables, and phonemes with increasing age.

Keywords: phonological development, word and syllable complexity, complexity measure

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Kuwaiti Arabic Articulation and Phonology Test

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The Arabic language lacks tests for phonological assessment. Arabic has a large number of dialects making it very difficult to use or adjust standardized speech and language tests. The Kuwaiti Arabic Articulation and Phonology Test (KAAP-test) is designed to measure phonological and articulation skills among Kuwaiti Arabic-speaking children. The test was originally piloted on 80 typically developing four-year-olds in Kuwait and subsequently revised according to the normative results. Kuwaiti Arabic is rich in consonants (32) from labial to glottal, including a set of gutturals (uvulars, pharyngeals, glottals). The test evaluates the Kuwaiti Arabic consonants across word positions in a variety of word lengths and shapes (one to four syllables, with and without geminates and clusters). In accordance with the original study, the test comprises 100 words to be used as stimuli using images displayed on a computer screen or tablet. The test begins with a screener that is composed of 40 words; if a four-year-old achieves 80% and above in Whole Word Match (all segments matching the adult segments, with small phonetic deviations excepted), the child is assumed to be performing within the expected age range. If the child does not pass the screener, a supplemental test of an additional 60 words can be administered using audio and, if possible, video recordings for phonetic transcription as a basis for diagnosis and intervention if warranted. Further development of the test will involve testing of younger and older children. The presentation will describe the test and show recent data from typically developing children and those with Down Syndrome.

Keywords: phonology, speech assessment, consonants, whole word match, Kuwaiti Arabic word shape

Illustrating input and usage frequency effects in the development of bilingual segmental contrast

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Understanding the role of input in bilinguals is both revealing and challenging because of the nature of exposure to each language in terms of input quantity and quality, which is typically context-specific and affected by factors like age of onset and the language, educational, and socioeconomic status (e.g., Hoff, 2018) of those who model language input for the child. High distributional frequencies of a targeted consonant in a bilingual child's dominant language (L1) have a positive effect in the non-dominant language (L2) where a shared phoneme in the languages is acquired later by respective monolinguals of a child's L2 (Babatsouli 2017). There is a scarcity of investigations of the interaction between input and usage distributional frequencies in the less dominant language (e.g., Babatsouli & Nicoladis 2019). This study sought to shed light on context-specific input and usage effects in child bilingualism, focusing on a female child's rhotic development in Greek and English, sketching developmental paths longitudinally (ages 2;7-4;0, 4-5 days per week). Audio files and orthographic and IPA transcriptions are time-aligned in a CLAN (MacWhinney, 2000) database of 511 CHAT files (31,684 child utterances in English, 13,940 child utterances in Greek) totaling 135 hours of 209 recordings. Results here provide evidence of facilitative effects of increased statistical frequencies of speech sounds in the input and evidence of phonemic functional load at the level of distinctive features within this under-represented context of rhotic acquisition in exogenous bilingualism. Findings also illustrate dynamic patterns and distinct developmental stages in the bilingual's early phonological development and are discussed in terms of L2 acquisition theory to decipher the early workings of weaker L2 in child developmental speech. While the single-subject longitudinal case study design is an arduous task, future research can further explore this approach for validation of current results as well as the theoretical interpretations espoused.

Keywords: functional load, use frequencies, rhotic, bilingual child, longitudinal data

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Development of the Whole Word Match measure as a phonological screening tool

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Developing valid, reliable and efficient measures for identifying children with protracted phonological development (“speech disorders”) can be challenging, especially in multilingual contexts. Whole Word Match (WWM) is the proportion of words that match adult targets (minor phonetic deviations excepted). Recent studies suggest that WWM has potential as a clinical screening measure. This measure can reliably differentiate between typical and protracted phonological development (TD/PPD) across languages (Bernhardt et al., 2020). Furthermore, with minimal training, speech-language pathologists can reliably and efficiently identify accuracy of whole words in familiar and unfamiliar languages in samples from TD children and those with PPD (Bérubé et al., 2021). The current study further examines the potential of WWM for phonological screening, examining single-word productions from monolingual children (identified as having TD versus PPD) speaking Bulgarian, English, European Portuguese, Canadian French, Mandarin, Slovenian, Spanish (Chilean, Granada) and Swedish. Preliminary results for Granada Spanish show decreasing WWM by increasing word length, syllable complexity, stress pattern markedness, and presence of later-acquired segments. Five words showed large differences in WWM between TD/PPD three-year-olds (2 trochees, 2 multisyllabic words), and 27, moderate differences (1 monosyllable with an initial /tr/ cluster, 19 trochees [7 with initial clusters], 2 iambs and 6 multisyllabic words). For five-year-olds, different words, but similar proportions of word types, differentiated the groups; four words showed large WWM differences between developmental groups (3 trochees, one wSw word, all including [r]), and another 29, moderate differences (2 monosyllables; 19 trochees, 9 with clusters; 3 iambs; and 8 multisyllabic words, with rhotics appearing to be relevant for differentiation). The presentation will include similar comparisons across languages, discuss identification and nature of PPD in light of the data, and suggest directions for further development of WWM as a clinical and research measure.

Keywords: phonological screening; phonological production measures; multilingual assessment

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Speech sound production accuracy in children attending a Mandarin-English bilingual program

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Mandarin Chinese is the most spoken language in Canada other than the nation's official languages, yet there has been little research on speech development in children who are learning Mandarin as a minority language in bilingual schools (Statistics Canada, 2017; Schwartz et. al., 2016). Our objectives were to investigate the impact of school and home language input on English and Mandarin speech sound accuracy in children attending Grades 1, 3, or 5 in a Mandarin-English bilingual school program in Edmonton, Canada. Connected speech samples were elicited in both languages from a story-retelling task using the Golden Fristoe Test of Articulation 3 (GFTA-3). Children's stories (excluding imitated utterances) were phonetically transcribed in IPA from high-quality audio recordings. Overall percent phonemes correct (PPC) in both languages and percent tones correct (PTC) in Mandarin were calculated using the software Phon (Hedlund & Rose, 2020). Two native English speakers transcribed the English speech samples with a 95.75% inter-rater reliability. Mandarin speech samples were transcribed by four native Mandarin speakers with 91.84% and 96.05% inter-rater reliability respectively. Overall, PPC in both languages was high. Due to a strong ceiling effect, the non-parametric Games-Howell Test was conducted to investigate differences across grades. For English, a significant difference was observed between Grades 1 and 5, but not between the other grades, suggesting continued but gradual development in higher grades. For Mandarin, there was a significant difference between Grades 1 and 5 and Grades 3 and 5 for PPC, but no significant Grade differences for PTC. Significant, but relatively weak, correlations showed that home input in English had a positive impact on children's English PPC. Non-significant correlations between English PPC and Mandarin input at home showed that children can have relatively high input in another language at home without impacting speech accuracy in the majority language. Mandarin PPC was not significantly correlated with Mandarin or English input. However, PTC was significantly positively correlated with Mandarin input and significantly negatively correlated with English input. This suggests that lack of exposure to the minority language may negatively impact speech development in that language.

Keywords: Mandarin-English bilingual school, connected speech, speech accuracy, home input

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Euclidean distances for studying developmental aspects of vowel spectral variability in Greek

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Phonological vowel acquisition typically occurs around age 3 years, regardless of vowel inventory complexity (Kent, 1992; Mennen & Okalidou, 2007). However, adult-like acoustic vowel behavior emerges later (Lee et al., 1999), emphasizing the importance of exploring the developmental trajectory of vowel spectral variability, particularly given its influence on speech intelligibility. For this purpose, 64 typically developing Greek-speaking children were studied, divided into 8 equally distributed and gender-balanced age groups (3, 5, 7, 9, 11, 13, 15, and 17-year-old children), along with 8 adults as a control group (4 males and 4 females). All participants engaged in a delayed repetition task, producing the Greek vowels [i ε ə o u] in symmetrical words of the form /pVpV/, with stress on the first or second syllable (i.e., [ˈpipi], [piˈpi]). The words were repeated five times within the carrier phrase [ˈlɛo to ____ pɛˈdu] ‘I say ____ everywhere’. Both vowels of each word were analyzed, resulting in a total of 7,200 vowels (72 participants × 2 foot types (trochee and iamb) × 2 stress conditions per syllable × 5 vowels × 5 repetitions). Measurements included Euclidean distances of F1 and F2 (Lobanov-normalized and rescaled into Hertz-like values) from their means, categorized by speaker (including information about age and gender), foot type, stress condition, and vowel. Results showed a decrease in Euclidean distances and inter-vowel overlap with age, reflecting the gradual maturation of the speech-motor control system. Gender and foot type had no significant effect, while the stressed condition exhibited smaller Euclidean distances, implying greater stability, compared to the unstressed one. Notably, [i] showed the greatest Euclidean distances among vowels across all age and gender groups, attributed to its high F2 variability.

Keywords: vowels, variability, development, Greek

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Prosody or gesture first? The multimodal marking of focus types in child development

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In adult speech, prosodic prominence, and co-speech gestures are important cues to distinguish focus types (e.g., information, contrastive, corrective), being often combined into multimodal ensembles (e.g., Ambrazaitis & House, 2017). Despite both modalities contributing to distinguishing focus types, developmental research has primarily investigated children's use of prosody independently of their gesture production. Esteve-Gibert and collaborators (2021) explored the behavior of both cues in the marking of focus types in development and suggested a precursor role of head gestures in French 4- to 5-year-olds' speech. The present study pursues two main objectives. First, to assess whether the seeming precursor role of gestures in marking focus types can be reproduced in earlier stages of acquisition, examining a broader developmental window than Esteve-Gibert and colleagues' study. Second, to investigate the interaction between prosodic prominence and gesture production in shaping intricate pragmatic meanings like contrast and correction across age groups. A total of 120 Catalan-speaking children belonging to three age groups (3-4, 4-5, and 5-6) were video recorded during an interaction-based task designed to elicit utterances in three focus contexts (information, contrast, correction). Target productions were coded for prosody using DIMA (Kügler et al., 2015) and Cat_ToBI (Prieto et al., 2015), while visual data were coded for gesture presence. Preliminary results from 27 children revealed that both prosodic prominence and gestures differentiated focus types at ages 3 to 4, with no evidence supporting a precursor role of gestures. Children across all age groups used more prosodic and gestural cues (e.g., head, hand, and body forward movements) in the corrective focus condition, followed by the contrastive focus and the broad focus conditions. Additionally, a consistent tendency to combine prosodically prominent words with gestures was observed across ages and focus contexts.

Keywords: prosodic prominence, co-speech gesture, multimodality, focus types, development

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Differential phonological profiles of neurotypical toddlers, low-verbal toddlers with ASD, and middle-verbal toddlers with ASD

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Many children with autism spectrum disorder (ASD) struggle with expressive language (Tager-Flusberg et al., 2005), including phonological skills. Toddlers with ASD produce fewer speech-like vocalizations (SLVs) and have smaller consonant inventories than age-matched neurotypical (NT) peers (Schoen et al., 2011), suggesting that children with ASD may lag in consonant acquisition. However, no study has examined group differences in vowel inventories. Furthermore, given the heterogeneity of ASD, researchers should consider subdividing participants beyond diagnosis alone: e.g., based on expressive language (EL). We present preliminary analyses of the consonant and vowel inventories of two-to-three-year-old NT, low-verbal (LV), and middle-verbal (MV) children with ASD. Participants comprised 15 children from the Longitudinal Study of Early Language (Naigles & Fein, 2017), which matched NT and ASD participants on EL (Mullen, 1995) at study onset. Videos of 30-minute parent-child play sessions ~4 months later, when participants overall vocalized more and now varied in EL level, were phonologically transcribed. The LV/MV groups were defined by EL raw scores; the LV ($M(SD)=10.00(1.00)$) group had significantly lower scores than both the MV ($M(SD)=16.40(2.19)$) and NT ($M(SD)=15.80(2.49)$) groups, $ps<.001$. The LV ($M_{age}=37.92\text{mos}$) and MV ($M_{age}=36.71\text{mos}$) groups were significantly older than the NT ($M_{age}=23.83\text{mos}$) group, $ps<.005$. Non-SLVs (whines/cries/grunts/laughs) were not included, but babbling/self-stimulating vocalizations were transcribed, for a total of 2,272 utterances (20 vowel types, 24 consonant types). The MV and NT groups did not statistically differ on any measures, but the MV group was often numerically higher than the NT group, likely due to averaging a year older. The LV group was statistically lower than one or both of the other groups on several measures. Despite the importance of consonant inventories in past research (Schoen et al., 2011; Paul et al., 2008; Yoder et al., 2015), most group differences were in vowel usage, especially in vowel types. The LV group used a statistically similar number of vowel tokens but fewer vowel types than the other groups. This finding suggests that vowels may require more production precision. Future analyses will include more participants and will examine syllable structure.

Keywords: autism, neurotypical, vowels, consonants, acquisition

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Mom, dad, and ball: Manner of articulation in consonant sequences within children's consonant-vowel-consonant (C₁VC₂) words

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We investigated the acquisition of manner of articulation in consonant sequences in single-word utterances produced by monolingual children acquiring American English (approximately 12 months to 24 months of age). Our goal is to provide a comprehensive view of children's acquisition of the speech production system in this period. We hypothesized that target words with repeated consonant sequences in manner of articulation (e.g., stop-stop, *boat*; nasal-nasal, *mom*, fricative-fricative, *fish*) would be matched in children's actual word productions more frequently than variegated manner sequences (e.g., *ball*, *mat*, *bus*). Manner of articulation in 3,328 tokens of consonant-vowel-consonant (CVC) target words from 18 children in the Davis corpus were analyzed. Target sequences and actual productions were coded for manner of articulation of first and second consonants. For example, if a child said *boat* /bot/ as [bot], it was coded as a stop-stop sequence in both the target word and actual production. If a child said *boat* /bot/ as [bo], it was coded as a stop-stop sequence in the target word but a final consonant deletion in production. Approximately 50% of children's CVC words consisted of repeated manner sequences (e.g., stop-stop, nasal-nasal). The other 50% consisted of variegated manner sequences (e.g., stop-nasal, stop-fricative). When target words contained repeated sequences (e.g., stop-stop, nasal-nasal), children's actual productions matched the target more frequently than when the target words contained variegated sequences (e.g., stop-nasal). The same pattern was previously observed for place of articulation in CVC target words (Aoyama & Davis, 2021) and place and manner sequences in consonant-vowel-consonant-vowel (CVCV) words (e.g., *bunny*, *baby*) (Davis, Aoyama, & Cassidy, 2023). The current study adds further evidence that children are more able to match consonant sequences in target words with repeated consonants, in manner or place, in CVC or CVCV words.

Keywords: consonants, manner of articulation, single-word period, sequences

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On the development of coarticulation in Greek: Insights from ultrasound data

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This study investigates lingual coarticulation in Greek children and adults using the technique of ultrasound tongue imaging. We examine patterns of intrasyllabic anticipatory and carryover coarticulation and describe developmental changes toward a mature, adult-like system. Tongue movements were recorded for five children aged 7-8 years old, five adolescents 14-15 years old and five adults (three male and two female speakers in each group). V-to-C and C-to-V effects are measured in the first stressed syllable of Greek disyllabic words, with C= [p t f s m n] and V= [i a]. Indices of tongue shape at the midpoint of the segment under investigation are used to measure coarticulation. The results of the study suggest that in all age groups, the magnitude of coarticulation is sensitive to the articulatory properties of the consonants and vowels under investigation, in line with the theory of the Degree of Articulatory Constraint model (Recasens et al., 1997). Overall, segments with active tongue dorsum involvement during their production, namely the consonants [t s n] and the vowel [i] are more resistant to contextual variation compared to the labial consonants [p f m] and the vowel [a]. Significant within-speaker variability is reported in child speech, with a gradual decrease from childhood to adolescence and adulthood. Implications for theories of speech development in relation to the Greek language are discussed (Kent, 1983; Nittrouer et al., 1989).

Keywords: coarticulation development, gestural organization, coarticulation constraint/aggressiveness

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Developing Turkish phonological awareness in children in relation to the national Turkish teaching program

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Phonological awareness is one of the most important early literacy skills. Early literacy skills are primary predictors of skills for reading development. Early literacy skills develop not in a sequence in early childhood, but together and influenced by each other. In studies where reading acquisition processes are discussed in detail, it is emphasized that phonological awareness, knowledge and skills are a strong predictor for successful reading performance. Therefore, prepared phonological awareness teaching programs should be expected to develop not only phonological awareness skills but also other early literacy skills (print awareness, vocabulary, etc.). Since children's cognitive-linguistic skills begin to improve at the age of six and learning to read alphabetic script begins in the first grade, the development of phonological awareness skills in the first grade is important (Gökkuş & Akyol, 2020). A successful reading is carried out when readers analyze the words in written texts by relying on appropriate orthographic, phonological and morphological knowledge, then they make sense of the words by associating them with their existing vocabulary, previous knowledge and experience. It is possible to define it as a process in which people can reach the desired message. (Güldenöđlu, Kargın & Ergül, 2016). For students who have reading difficulties and whose native language is not Turkish, phonemic and phonological awareness needs to be developed through different methods. It has been observed that the 1st grade content on phonics in the Turkish Curriculum is only suitable for students whose native language is Turkish and are typically developing. Phonological awareness education needs to be developed and included in the program not only in the 1st grade but also in other levels of primary school. To this end, this study suggests classroom activities that can be done to develop Turkish phonological awareness for both monolingual and bilingual children at all levels of primary school grades.

Keywords: Turkish teaching program, phonological awareness, classroom activities, bilinguals, literacy skill

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Integration of audiovisual cues in speech perception: A developmental analysis

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McGurk and McDonald (1976) provided a new perspective for understanding speech perception, characterizing it as a multimodal event. This study aimed to compare the integration of audiovisual cues in speech perception at different ages. Assuming that there would be a difference in the degree of audiovisual integration across age groups (Sekiyama & Tohkura, 1993), it is further assumed that children of younger ages present worse performance in perceiving the visual cue in an audiovisual perception task. A total of 75 subjects participated in the study, speakers of Brazilian Portuguese with typical speech development, divided equally into five groups according to age groups: (G1) 4-5 years old; (G2) 6-8 years old; (G3) 9-10 years old; (G4) 11-12 years old; and (G5) 20-30 years old. An audiovisual perception test was administered using the Opensesame software (Mathôt et al., 2012), which consisted of presenting the syllables /fa, sa, ja/ in the following conditions: auditory (A), visual (V) and congruent/incongruent audiovisual (AV+) and (AV-). Repeated measures ANOVA to compare the analysis between the AV+ and AV- conditions showed a significant effect for the group and presentation conditions. Specifically, the evaluated groups showed better perceptual accuracy for the AV+ condition when compared to the AV- condition. Tukey's Post Hoc test demonstrated lower perceptual accuracy for the G1 group compared to the G2, G4 and G5 groups. In the comparison analysis between conditions (A and AV+), the repeated measures ANOVA only showed a significant effect for the group. Tukey's Post Hoc test demonstrated lower perceptual accuracy for the G1 group compared to the other groups. In conclusion, the integration of audiovisual cues would be present at 4 years of age for Brazilian Portuguese speakers. However, there would be a difference in the degree of audiovisual integration depending on age, confirming the study hypothesis.

Keywords: multimodal perception, age, sound identification

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Do children have knowledge of complex tone sandhi? A case study of Xiamen Southern Min

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Language acquisition requires children to learn abstract linguistic rules and to accurately apply these rules to new materials. Xiamen Min/Taiwanese tone sandhi is a complex system in which all citation tones undergo tone sandhi in non-final positions. All the sandhi forms are also present as citation tones, and the whole system is cyclic. Xiamen tone sandhi is phonologically opaque in that it is not driven by surface-true generalizations. Previous studies have shown that Xiamen tone sandhi is not fully productive, especially for words with accidental gap (AG) syllables. However, it was also found that Taiwanese speakers were highly accurate in recovering citation tones when presented with sandhi tone forms. This study employed a picture-naming task to test children's knowledge of the complex Xiamen tone sandhi. Two pictures, each corresponding to one syllable, were presented to the children (aged 4-12), and they were asked to combine the two syllables into a disyllabic word. The materials included real words, semi-wug disyllabic words with two actually occurring (AO) syllables and wug words with the first syllable as an accidental gap (AG) syllable. They were also asked to recover the citation tone of the first syllable when presented with a picture corresponding to a disyllabic word. Children were very accurate in applying the correct tone sandhi rules to real words, despite some mistakes. They were less accurate in semi-wug words, but the accuracy was still above 50%. The accuracy of recovering citation tone forms, although not completely adult-like, was still very high (above 60%). Most surprisingly, their accuracy in wug words was similar to that of teenagers and adults. The results highlight the effect of phonotactic constraints on the productivity of Xiamen tone sandhi. They also suggest that Xiamen tone sandhi is not completely unproductive and children do have phonological knowledge of these rules.

Keywords: tone sandhi, productivity, acquisition, Min Chinese

Assessing voicing contrast discrimination in Cypriot Greek children with developmental language disorder

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A hallmark of developmental language disorder (DLD) is children's difficulty in speech perception, particularly in discriminating voicing contrasts (Collet et al., 2012; Georgiou & Theodorou, 2023; Ziegler et al., 2011). This study examines how different groups of children with DLD and children with typical development (TD) discriminate voiced and voiceless consonants of their native language and their processing speed in this discrimination. Fourteen Cypriot Greek children with DLD (*n*females = 7) and 14 peers with typical development (TD) (*n*females = 5) with an age range of 7;10 – 10;4 were recruited. Children were divided into four groups of 7 based on their age and condition: young-DLD, young-TD, old-DLD, and old-TD. Children among all groups matched for intelligence as measured by Raven's Colored Progressive Matrices test. The speech material included five stop/fricative voiced consonants [b d g v z] and their voiceless counterparts [p t k f s] embedded in trisyllabic /CCV.CV.CV/ nonsense words, which correspond to the phonotactics of real words. The child participants completed an AX discrimination test on a computer based Praat script (Boersma & Weenink, 2021) in which they listened to two words through headphones. Then, they were instructed to select whether the words were acoustically the same or different. The data were analyzed using Bayesian regression models in R. The results demonstrated that the young-DLD group exhibited lower performance in discriminating consonants compared to the young-TD group, while such differences were not observed between the old-DLD and old-TD groups. Furthermore, while no significant differences in processing time were found between the DLD and TD groups, both young DLD and TD groups displayed longer reaction times compared to their older counterparts. These findings highlight the role of voicing discrimination as a diagnostic marker of DLD as opposed to reaction time. Moreover, they underscore the role of age in determining DLD.

Keywords: developmental language disorder, speech perception, voicing, Cypriot Greek

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Unfolding challenges: A comprehensive case study of persistent speech and literacy difficulties in a Greek-speaking child

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Case studies unveil individual characteristics and patterns in phonological development, highlighting strengths and underlying weaknesses in speech disorders (Pascoe et al., 2006). Persistent speech sound disorders (PSSD) correlate with later literacy difficulties (Harris et al., 2011; Hesketh, 2004). Understanding PSSD features allows a better understanding of the disorder's nature (Wren et al., 2016). Few studies focus on Greek children with PSSD, particularly preschoolers (Babatsouli & Geronikou, 2022; Geronikou et al., 2019). To add insights into the challenges faced by Greek-speaking children, this paper presents a detailed single case study of a Greek-speaking girl with SSD persisting from the age of six to nine years, despite receiving ongoing speech and language intervention. The initial assessment reported unintelligible speech and a limited phonetic inventory. A range of phonological processes, changing over time, characterized her speech: at the age of six, the most prominent processes included syllable deletion, initial consonant deletion, consonant harmony, and syllable reduplication; at age seven, cluster reduction, lateralization of fricatives, especially /s/ and /z/; by age eight, transposition of consonants in syllable final within word position was observed. Assessment of phonological processing revealed underspecified phonological representations and difficulties with phonological awareness: at age six, she had difficulties segmenting a word into constituent syllables; at age seven, she struggled with segmenting a word into constituent phonemes, as well as manipulating the phonological form of a word by adding or deleting a phoneme. Upon starting school and literacy instruction, she faced literacy difficulties (deleting graphemes, transposing sounds); difficulty decoding the written form of words. This case aligns with literature on English-speaking children, showing intervention gains in phoneme awareness and vocabulary but requiring more support for word decoding and spelling (Gillon et al., 2020). Theoretical and clinical implications will be discussed, highlighting the connections between phonological development, speech disorders, and literacy.

Keywords: SSD, protracted phonological development, literacy difficulties, Greek, case study

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Speech sound disorder treatment meets an early childhood classroom model of service delivery: A sneak peek at measures after the first 6 weeks

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Children with speech sound disorder (SSD) are most often seen in brief individual or small group treatment sessions (Farquharson et al., 2022). Although these models are common, would children's speech sound production benefit from a learning environment that more closely replicated the early learning context? The current study explored the implementation of a group therapy model of intervention where children were engaged in an extended session organized similarly to an early childhood classroom. The participants included four children with SSD ages 3;9 to 4;3. They completed a pre-treatment test battery and participated in the first 6 weeks of a 12-week treatment program. The intervention environment included a 2.5-hour group session once a week in the format of a half-day preschool class. Each session featured a "sound of the day" as a connective theme for all activities. The sound was identified as a challenging exemplar across all four children with low adaptability scores based on a dynamic assessment conducted in the pre-treatment battery. The children participated in circle time (e.g., rhyming, songs, stories), table crafts, floor games, outside time, and snack activities. Throughout these activities, focused target words were embedded to provide practice of the target sound in naturalistic or play-oriented tasks. The children were provided with scaffolding to elicit successful productions at the highest linguistic levels with the least amount of cueing. For this presentation, the pretreatment assessment profiles of the children will be presented along with the first 6 weeks of intervention results including: session progress, and static and dynamic assessment outcome measures. The benefits and challenges of the model will be highlighted. The clinical implications will be discussed including how an early learning model offers children social interaction, peer practice and modeling, and the potential opportunity to learn developmental skills in addition to speech sound production.

Keywords: speech, sound, disorder, treatment, group

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ASL phonology develops early for deaf children in non-native signing home environment

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Almost 95% of deaf children are born to hearing parents (Mitchell & Karchmer, 2004), although most previous research has focused on sign language development by children with deaf, signing parents (Chen Pichler et al., 2018; Lillo-Martin & Henner, 2021). This paper presents an investigation of phonological development in American Sign Language (ASL) by deaf children with hearing ASL-learner parents. We developed the ASL-PET (Phonological Elicitation Test), which includes 50 sets of 12 real ASL signs each, and sign iconicity and complexity are balanced for each set. Deaf participants were between 2;0 and 3;2 at the start of the study. Participants completed anywhere from 5 to 12 months of weekly ASL-PET. Participants watched a video showing each sign twice and were instructed to copy the sign exactly. We scored participant signs for accuracy at the feature level (Gu et al., 2022; Lutzenberger et al., 2023). We have analyzed 5 participants' performance at monthly intervals. We found that children's accuracy on sign production increased with age. Statistical analysis revealed a positive correlation between overall accuracy and age. We found similar significant age effects on accuracy for location, movement, and handshape parameters and a moderate age effect for joint activations, but the age effects for orientation and positioning of wrists/elbows/shoulders did not reach significance. The lack of orientation development is primarily attributed to the fact that children already control this well at the starting weeks, consistent with reports of orientation as an early acquired parameter for other L1 signers (Chen Pichler, 2012). Children also moderately improve in joint activations, an articulatory property that requires fine motor control and takes longer to master (Meier, 2006). These observations point to early phonological development for deaf children of hearing L2 signer parents and support the benefits of early exposure to a natural sign language, even for deaf children with parents who are still learning to sign.

Keywords: sign language phonology, first language acquisition, American Sign Language, deaf children of hearing parents, non-native environment

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Acquisition of prosodic focus acoustic parameters

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During language acquisition, phonological skills stand out, housing prosodic elements that characterize the native language. This study investigates prosodic phonology, defining prosody as a hierarchical and intricate structure (Nespor & Vogel, 2007; Selkirk, 1984). Prominence marking is considered a key prosodic function (Esteve-Gibert, 2022; Terken & Hermes, 2000). The most extensively studied means of marking prominence is through contrastive prosodic focus, acoustically characterized by higher fundamental frequency (F0) values, increased intensity, and duration (Ladd, 1996; Terken & Hermes, 2000). Crosslinguistic studies focus on prosodic development in children, aiming to identify the average age range for acquiring specific skills like contrastive prosodic focus (DeRuiter, 2014; Filipe, 2017; Peppé & McCann, 2003). Generally, this development occurs after nine years of age, irrespective of language. However, two literature gaps are observed: the first is related to the acquisition of contrastive prosodic focus production in Brazilian Portuguese, and the second concerns the acoustic analysis of children's focus production. This study explores how native speakers of Brazilian Portuguese children of different ages express contrastive prosodic focus, aiming to understand acquisition details. Specific objectives include (i) characterizing acoustic parameters; (ii) assessing production differences in various syntactic positions; and (iii) comparing production among different age groups (4-6 years old and 7-9 years old). Utilizing a digital board game on a tablet, we collected 450 speech samples, recorded and acoustically analyzed using PRAAT software (Boersma & Weenink, 2022). Results revealed a hierarchy in using three parameters (duration, F0, and intensity, respectively), indicating changes in implementing prosodic focus with age. Additionally, children under nine years produced prosodic focus gradually, supporting the hypothesis, based on previous work (Santos et al., 2023), of gradual phonetic-phonological development in both prosodic and segmental aspects.

Keywords: language acquisition, typical development, prosodic focus, acoustic analysis.

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**The development of Cantonese diphthongs by homeland and heritage children
– A preliminary study**

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This study investigated how Cantonese-speaking children (2;0-6;0) in Hong Kong (homeland) and in Vancouver (heritage) acquire the eleven Cantonese diphthongs [ai, ɛi, au, ɛu, ei, ɛy, ɔi, ui, iu, ou] (Zee, 1999). 18 homeland and 18 heritage children participated in a picture-naming task. 9 native speakers of Hong Kong Cantonese were included as control. The onset and the offset of the first three formants and the duration of the diphthong were measured. The formant movement was calculated by dividing the difference between the offset and the onset of the formant by the duration of the diphthong. Auditory judgment was conducted to evaluate the accuracy rate. Results indicated that even though the diphthongs produced by both homeland and heritage children had an accuracy rate over 75% by age 3, acoustic analysis revealed varied performance between the two groups and between children and the control speakers. First, the vowel space by both children groups was centralized at age 2, and they were expanded as age increased. However, the positions of some diphthongs still differed from the reference patterns at age 6. Second, the formant movement patterns of the homeland children aligned with the reference patterns for all the diphthongs at age 6, while heritage children still had different patterns for some diphthongs by age 6. For example, /ɔi/ produced by the heritage children moved from lower F1 to higher F1, which was the opposite compared to the reference and homeland patterns. Third, offglide deletion (e.g., /ou/→[o]) and substitution (e.g., /ɛi/→[ei]) were two common error patterns for both homeland and heritage children. Interestingly, a unique heritage production pattern was found: the onglide of /au/ was produced with a significantly higher F1 by the heritage children, which was perceived closer to [æu] by the judges. The early and frequent exposure to English may account for this production pattern.

Keywords: acquisition, diphthong production, Cantonese, heritage speakers

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Intonation and stress in Cantonese-English bilingual children: An Optimality-Theoretic account

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Lee et al. (2023) investigated bilingual interaction in intonation in simultaneous bilingual children acquiring a tonal language (Cantonese) and a stress/intonational language (English). They observed the transfer of English prosody to code-mixed utterances (henceforth bilingual intonation) predominantly in the presence of Cantonese sentence-final particles. Bilingual intonation is produced by Cantonese-English bilingual children but not monolingual Cantonese-speaking children. However, it is unclear when high (H) and low (L) tones were produced in bilingual intonation. We propose an Optimality-Theoretic (OT) account for the bilingual intonation patterns observed. We investigated the code-mixed utterances produced by the bilingual children ($N = 9$, age: 1;3-4;6) in the Hong Kong Bilingual Child Language Corpus (Yip & Matthews, 2007), the same corpus analysed by Lee et al. (2023). We analysed code-mixed utterances with English words immediately preceding Cantonese sentence-final particles ($n = 167$). We find the following generalizations for both utterances with Cantonese intonation and bilingual intonation. First, Cantonese particles were always not stressed. Second, syllables with primary stress were generally produced with H, others with L. Third, English stress in the lexical input is preserved in the output correspondent. Despite this, in addition to target stress patterns, we present novel data of non-target stress placement exclusively in utterances with bilingual intonation but not Cantonese intonation. We propose that the bilingual children have two grammars respectively for bilingual intonation (= English prosody) and Cantonese intonation. The co-existence of target and non-target stress patterns can be explained by the variably ranked constraints in the grammar of bilingual intonation, which allows multiple equioptimal candidates to win. The non-target stress patterns are caused by metrifying Cantonese particles into English foot structure, complying with ALIGN-PRWD-FT-R = Align(Prwd, R; Foot, R). By contrast, only target stress patterns were attested in Cantonese intonation, suggesting DEPSTRESS >> ALIGN-PRWD-FT-R in Cantonese grammar.

Keywords: bilingual intonation, stress, sentence-final particles, Optimality Theory, cross-linguistic influence

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Reconsidering accuracy in Speech Sound Production: Preliminary findings of a rapid review

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When we assess children's speech sound production, many factors influence whether we document the phonemes that are produced as correct or incorrect. Our methods for determining this phoneme accuracy will then influence how we view the children's developmental abilities, their treatment needs, and their treatment outcomes. Within a research context, how we determine phoneme accuracy will also influence comparability across studies and applicability to clinical practice. Thus, it is critical that we are transparent about our methods when we report phonological abilities and interpret findings for our own procedures and populations. The current study seeks to review how researchers have reported their findings and developed procedural rules to account for unique contextual characteristics within their data sets. Three areas for closer inspection regarding how accuracy is established include the influences of (1) the dialect spoken in the child's context, (2) the linguistic environment of spontaneous speech, (3) and the treatment context. Thus, our research question is: *How is phoneme accuracy defined for children's (age 2-6) phonological development when considering the production context influenced by dialect, spontaneous speech, and treatment?* To answer this question, we implemented a Rapid Review (Dobbins, 2017). A Rapid Review follows the steps of a Systematic Review process, but components are simplified or omitted to produce information in a shorter timeline (Khangura et al., 2012). We screened 106 papers and identified 52 papers that met our inclusion criteria. This presentation summarizes how accuracy was defined across these studies. Our initial analysis has revealed patterns in reporting including detailed rules defining accuracy, reference to an external definition, and limited or absent accuracy definition. The implications of how accuracy is reported on the study of child phonology in typical and atypical development and across languages will be discussed.

Keywords: accuracy, phonology, development, dialect, cross-linguistic, treatment

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Two languages, one mind: A bilingual speaker's syllabification strategies at the beginning of elementary school

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This case study of a Portuguese and Italian speaking child at the first year of elementary school aims to compare the syllabification patterns of words presenting similar structures in both languages in order to reflect on the strategies used by the same individual when faced with two different languages. Based on the phonological descriptions of Mateus and Andrade (2000) and Mateus *et al.* (2003) for Portuguese, as well as Bertinetto (1999) and De Dominicis (2010) for Italian, the following structures present differences in these languages: i) a coronal fricative as first member of a consonant cluster in word-medial position (/S/+C), which may be part of a complex onset in Italian or a coda in Portuguese (fe-sta vs. fes-ta); ii) a nasal coda, which is segmentally filled in Italian, but has a nasal autosegment in Portuguese (den-te vs. deN-te). For control purposes, similar structures in both languages were also included, such as rhotic and lateral codas (e.g.: ver-de, sal-to). The individual was a 5-year-old native speaker of Italian and Portuguese with typical cognitive development. She attended the first year of primary education in Italy, being exposed to a teaching method in which the letter corresponding to the consonant in coda position acquired the role of bridge between CV syllables. The experimental study consisted of naming images of objects and subsequently dividing the words into syllables, first in Italian and, two months later, in Portuguese. The results are not as expected. In fact, there is no systematic use of syllabification strategies, but rather an unsystematic oscillation of syllabification patterns that seem unsupported by phonological motivation. A possible explanation could be the influence of literacy involving the learning of orthographical syllabification that does not align with the phonological rules of the language, but further investigation is clearly required.

Keywords: bilingualism, syllable structure, spelling, Portuguese, Italian

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Word-final cluster accuracy in Persian-speaking children with social communication disorder

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Children with social communication disorder (SCD) face delayed speech acquisition and language impairment (APA, 2013). Studies have investigated the age of cluster acquisition and developmental patterns in Persian (Jalilevand et al., 2013; Ghasisin et al., 2011; Zarifian et al., 2015). However, there is minimal representation of how atypically developing children acquire this skill. Shooshtaryzadeh and Stemberger (2022) investigated word-medial cluster productions of a Persian-speaking child with protracted phonological development. Franke and Durbin's (2011) narrative intervention is utilized here to address clinical speech assessment and therapy in the context of SCD; this procedure holistically considers children's event knowledge, linguistic, and cognitive abilities. We investigated Farsi-specific word-final cluster accuracy in three monolingual Persian boys with SCD (ages between 3;7- 5;0). Narrative procedures elicited speech data longitudinally in three phases: Initial, Treatment, and Maintenance. Children had 3, 12, and 3 sessions per phase respectively, with 6, 12, and 6 corresponding audio recordings. Audios and transcriptions were aligned in Phon (Hedlund & Rose, 2020). All children used various CC cluster types of which, /mb br kr dr zl xr hd ?d t?/, are not represented in the literature. The most common cluster types were stop+stop [ʔd] and fricative+stop [st ft] (Children 1, 2) and fricative+stop, nasal+stop, and liquid+stop [ft ng rd] (Child 3). Omissions occurred mostly in fricative+stop, as follows: /st jk dr/ (1 token each, Initial, Child1); 2/ft/, 1/st/ (Initial, Child2), 1/ft/ (Maintenance, Child2); 1/ft/, 1/dr/, 2/rd/, 1/rg/, Initial, Child3). Mismatches occurred in: /rd rg ng ks hd jl/ Child1, /st xr rd/ Child2, and /lm ng dr rd rg rx/ Child3. Results indicate that only /ʔd ft xt/ were adult-like in all children showing a preference for obstruent sequences with falling or level sonority. Children's cluster accuracy showed delay compared to typically developing (TD) peers but it matched normative skills following intervention (by Maintenance).

Keywords: clusters, phonological development, child, Persian, social communication disorder

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The acquisition of Catalan word-initial complex onsets

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We investigate the acquisition of word-initial complex onsets in Catalan children, taking the work by Jongstra (2003) for Dutch as departure point. The scope of the study are clusters where the first consonant (C1) is voiceless. The empirical base of the study is an elicitation task administered to 27 children (mean age: 2;10) and adult control group (n=3). A total of 729 child productions were collected from which 43.54% were target productions, 37.86% cluster reductions (CR), 16.30% no responses and 9.41% second consonant shifts. Previous work in the field has reported variation in CR patterns in children for Spanish and Dutch (Lleó & Prinz, 1996; Jongstra, 2003), with reduction to C2 or alternation between C1 and C2. The results of our experiment show that Catalan children present a consistent pattern of CR to C1 (100% of the time). CR patterns have been associated with sonority distance, with clusters where the sonority distance is higher being more easily produced (Pater & Barlow, 2002). Our results are consistent with this claim. For Catalan [r, l], considered to have equal sonority values by Pons-Moll (2011), the data from our experiment show a better performance of C[l] over C[r] clusters, which is interpreted as evidence that [l] is more sonorous than [r], following the sonority distance account. We propose two different constraint rankings to account for the differences between Dutch and Catalan child productions by revising the constraint *LIQUID-ONSET (Pater & Barlow, 2002) as two different constraints */l/-ONSET and */r/-ONSET. Thus, Dutch ranks */l/-ONSET above */r/-ONSET, while Catalan ranks */r/-ONSET above */l/-ONSET. The study also considers the effect of frequency of complex clusters in language acquisition. The results indicate that frequency does not play a relevant role, with clusters that were more often pronounced in child-directed speech having the poorest results in the experiment.

Keywords: consonant cluster, complex onset, language acquisition, phonology, Catalan

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Which quantitative measures best mirror real life judgments of speech intelligibility?

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Quantitative measures have been used for both research and clinical purposes as estimates of speech production abilities. The question arises: do such measures truly mirror the functional intelligibility of speakers? We examined the validity of six quantitative measures. Recordings of twenty-eight Hebrew-speaking children with typical development producing thirty-two words, ten sentences and one picture description were presented to thirty-five adult judges. The judges were asked to interpret the recordings and their interpretations were then compared to the speakers' speech targets. The recordings were phonetically transcribed and six quantitative measures were calculated. These were: percent phonemes correct (PPC), percent consonants correct (PCC), percent vowels correct (PVC), percent words correct (PWC), whole word proximity (WWP) and phonological mean length of utterance (pMLU). In addition, the children's parents completed the ICS:Heb (Intelligibility in Context Scale: Hebrew). A significant correlation was found between each of the six measures, the ICS:Heb and the judges' interpretations for words and sentences (but not for picture description). An evaluation of these measures found that pMLU was the best predictor of intelligibility as perceived by naïve judges. The clinical implication of our finding is that pMLU is the preferred choice for a quantitative measure, predicting the actual intelligibility of a speaker in real communicative situations at word and sentence level. However, the distinction between the correlation of the measures, including pMLU, with judges' interpretation of words and sentences, and the lack of correlation with the judges' interpretations of picture descriptions, challenges us to find a measure which will successfully parallel real judges' interpretations in a clinical setting, at the level of connected speech.

Keywords: intelligibility, quantitative measures, pMLU, PPC

Do bilingual (English-Mandarin) and trilingual (English-Spanish-Mandarin) children produce Mandarin stop consonants similarly?

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This study examines the production of Mandarin stop consonants by bilingual (English-Mandarin) and trilingual (*English-Spanish-Mandarin*) children. It analyzes how VOT (Voice Onset Time) values (time between the stop burst and the start of the vocal cords' vibration) relate to four aspects of the children's multilingual experiences: the number of languages in their repertoire, current exposure and length of exposure to Mandarin, and whether Mandarin is a heritage language. Both English and Spanish use voicing contrastively. English distinguishes long-lag /p t k/ from positive short-lag /b d g/. However, Spanish /b d g/ are typically produced with negative VOT. Mandarin uses aspiration to distinguish /p t k/ from /p^h t^h k^h/, with long-lag VOT values that are typically longer than in English. Fifty-one children (aged 5;08 to 13;11) were divided into three groups: Mandarin heritage bilinguals (N = 21), sequential bilinguals (N = 15), and trilinguals (N = 15). Bilingual children completed two picture naming tasks (one for each language) and trilinguals completed an additional picture naming task in Spanish. Parents/guardians completed an online questionnaire eliciting information about their children's multilingual acquisition experiences. A total of 1,375 tokens (687 voiceless/aspirated and 688 voiced/unaspirated) were acoustically analyzed and submitted to mixed effects linear regression analyses. Although group analyses revealed no difference in the Mandarin VOT values produced by bilinguals and trilinguals, individual analyses showed influence from Spanish. Although heritage status was not statistically significant, our data showed that, overall, trilinguals behaved more like sequential bilinguals than like heritage Mandarin-English bilinguals. We also observed an effect of current exposure to Mandarin for the heritage bilingual group. Our results align with previous research with trilinguals learning a language through immersion schooling (Llama & López Morelos, 2016, 2020; Mayr & Montanari, 2015) highlighting the role of the societal dominant language in cross-linguistic interactions.

Keywords: voice onset time (VOT), multilingual phonetics, Mandarin, Spanish, English

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Phonological intervention in Cypriot Greek SSD

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The study focused on promoting expressive phonological skills in 3 bidialectal children with autism spectrum disorder (ASD) and comorbid speech sound disorders. It was hypothesized that the experimental manipulation of target stimuli bearing phonological similarity vis-à-vis lexical organization models (phonological dense neighborhood) would yield positive expressive phonology gains. A multiple-baseline single-subject design was implemented across 2 subjects. Three baseline sessions measured expressive phonology variables. Sixteen bi-weekly 30-minute intervention sessions were carried out for a period of two months. Dependent variables included phonetic inventory size, proportion of consonants correct, occurrences of phonological processes, and percentage of whole word matches elicited via specific word-probe stimuli. The Intelligibility in Context Scale was completed by the child's teacher prior to the initiation of intervention and at follow-up session. Experimental stimuli were grouped together in phonologically dense word clusters. Comparison between pre-test and post-test measures revealed expressive phonology gains across all measured variables. Follow-up session results showed generalization of expressive phonology gains on untreated targets. Significant expressive phonology gains were achieved through the implementation of phonologically similar word stimuli within a systematic intervention protocol with the implementation of specific word-level variables. The findings supported this treatment approach in ASD/SSD clinical profiles, while providing evidence for the phonological density advantage from a cross-linguistic perspective.

Keywords: speech sound disorder (SSD), dialectal, intervention, density

The development of prosodic, gestural and sentence imitation across typically developing and clinical child populations

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Imitation has been shown to act as a core mechanism for early social, communicative, and language development (Carpenter et al., 1998; 2005), and imitation deficits have been linked to difficulties in social communication skills (Nadel, 2014). While the crucial role of prosodic and gesture imitation is well-documented and sentence imitation tasks are often used as diagnostic tools, few studies have compared imitation developmental paths and fewer still have assessed different types of imitation together. This study compares the development of imitation skills in typically and atypically developing children of preschool and early school age by focusing on multimodal imitation, i.e., the imitation of target sentences, their prosody and accompanying gestures. A total of 292 Catalan-Spanish bilingual children (129 girls; 237 typical, 55 clinical) between ages 3 and 7 participated in the study ($M_{months} = 59.6 (\pm 9.5)$). Following the transdiagnostic approach (Astle et al., 2022), the clinical group included children with and at risk of ASD and DLD and children with severe language difficulties. All children undertook the Multimodal Imitation Task (Castillo et al., 2023) in which they were asked to repeat pragmatically contextualized sentences reproducing their prosodic contours and co-speech gestures. Linear mixed effect models showed that the atypical group had overall significantly lower scores for gesture and sentence imitation than the typical group but not for prosody. Moreover, age had a general effect on all imitation scores, with scores improving with age across the groups. Interestingly, a significant interaction of age and group was found for gesture, showing that only the typical group improved significantly in gesture imitation as they got older. The results show a significant delay in the acquisition of imitation skills in the atypically developing children, with gesture and sentence imitation being particularly impaired. Overall, this study shows clearly different developmental paths of multimodal imitation in typically and atypically developing children.

Keywords: typical and atypical development, imitation, prosody, gesture, sentence repetition

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Investigating phonological development via monitoring children's tongue motion

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Understanding changes in the units of phonological organization across childhood has been a longstanding debate in developmental psycholinguistics. One way to address this question is investigating coarticulatory degree (CD), which regards the amount of spatio-temporal overlap between speech segments (Nittrouer, Studdert-Kennedy, & McGowan, 1989). Converging cross-linguistic evidence of a developmental decrease of CD suggests broad organizational units of syllable- or word-size in early speech production that are gradually differentiated into separate segments (Cychosz, Munson, & Edwards, 2021). However, CD also changes with developments in speech motor control (Smith & Zelaznik, 2004) and the specific speech material used (Recasens, Pallarès, & Fontdevila, 1997). Accounting for these interconnections in addition to developmental changes in the overall CD, can shed light on more specific phonological developments and inform models of speech production. We cross-sectionally investigated developmental changes in lingual vocalic CD by recording tongue motions of 75 German native speakers in 5 different cohorts (children aged 3, 4, 5, 7 years old and adults) via ultrasound tongue imaging. In an acoustic repetition task, participants produced C1VC2ə pseudowords (C = /b/, /d/, /g/, V = /i/, /y/, /u/, /a/, /e/, /o/, C1 ≠ C2) preceded by the determiner /aɪnə/. Using generalized additive mixed modeling, we investigated vowel-induced horizontal displacement of the tongue body and its interaction with age and consonant identity in the anticipatory (Noiray et al., 2019) and the carryover (Rubertus & Noiray, 2020) directions. In both directions, CD substantially decreased with age. However, children coarticulated less during alveolars than adults, suggesting protracted achievement of independent control of tongue tip and body. While consonantal articulatory demands impeded on V-to-V coarticulation in adults, they did not in children. These results provide evidence for longer and stronger activation of vowels in children than adults. Our results are compatible with the coproduction framework (Fowler, 1980), viewing coarticulation as coproduction of articulatory gestures, and suggest that a major change in phonological representations regards timing parameters of vocalic gestures.

Keywords: phonological representations, typical acquisition, coarticulation, speech production, ultrasound tongue imaging

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Child directed speech during language acquisition: A Brazilian Portuguese case study

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This paper deals with changes in child directed speech (CDS) during language acquisition. Although it is a known fact that adults make changes in their speech when talking to children, less is known about when (and how) this type of talk disappears as children grow older, going towards an “adult way of speaking”. Brazilian Portuguese (BP) is an interesting language to discuss CDS because there is a mismatch between the developing CDS stress pattern and the underlying stress algorithm. In BP, 68,5% of words are stressed on the penultimate syllable ([**'ka.zɐ**] “house”), 25,9% present final stress ([ka'**fɛ**] “coffee”), and only 0,04% are stressed on the antepenultimate ([**'pɾi.si.pi**] “prince”) (Benevides; Guide 2017). However, according to Lee (1994), the penultimate stress is due to a stress in the root + a thematic vowel (**cas**+a “house”, **menin**+o “boy”). Two facts are worth noticing regarding CDS in BP: i) the overwhelming majority of word creations are stressed in the final syllable, as [ko.'ko] “poop”; ii) there is pervasive use of diminutives, which always places the stress on the penultimate syllable ([**'ka.zɐ**] >> [ka'**zi.jɐ**] “little house”, [ka'**fɛ**] >> [ka.fɛ'**zi.jɐ**] “little coffee”, [**'pɾi.si.pi**] >> [pɾi.si.pi'**zi.jɐ**] “little prince”). For this paper, we analyzed data from two dyads child-caregiver comparing the stress patterns of these same caregivers in adult conversation. We found that when children are around 2;0, the use of monosyllables in CDS are 38% of the stressed words, which decreases to 26,8% when children are around 3;0 and remains close to that in adult conversation (27.4%). The final stress words are 18,8% of CDS when children are 2;0, rises to 23,6% at 3;0, and drops to 11,2% among adults. Words with penultimate stress represent 42,6% of the CDS at 2;0, reach 48,8% at 3;0 and decrease to 34,8% between adults. Finally, words with antepenultimate stress are 0,59% at 2;0, rise to 0,9% at 3;0 and reach 3,7% among adults. This shows us that the main difference in CDS is not due to a change in stress position but to a change in the number of syllables in the word. At 3;0, adults use less monosyllables, which increases the final and penultimate stress patterns. Both final stress and penultimate stress drops in Adult Conversation, which coincides with the lack of babytalk words and diminutives.

Keywords: child directed speech, prosodic properties, stress patterns, Brazilian Portuguese

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The acquisition of Mandarin retroflex sibilants by Mandarin-Cantonese-English trilingual children: A case study of the Leo Corpus

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This study investigated the production of Mandarin retroflex sibilants by Leo, a Mandarin-Cantonese-English trilingual toddler in Hong Kong (Mai & Yip, 2022), compared to Tong, a monolingual peer in mainland China (Deng & Yip, 2018). Retroflex sibilants /tʂ tʂʰ ʂ/ contrast with the dental sibilants /ts tsʰ s/ in Mandarin (Lee & Zee, 2003), while their counterparts are merged into a single alveolar series /ts tsʰ s/ in Cantonese (Zee, 1991), opening the window for cross-linguistic influence (CLI). In addition, Leo's grandmother provided the majority of Mandarin input (82%), in which the retroflex sibilants were used interchangeably with their dental counterparts. This offers a great opportunity to observe input and CLI effects in early multilingual development. We transcribed the production of /tʂ tʂʰ ʂ/ in both children across four time points from 1;6 to 2;11 and identified the underlying phonological processes in target-deviant productions. The results showed that Tong's accuracy steadily increased over time, while Leo showed higher accuracy rates at the first three time points, followed by a notable decline at the final time point, at age 2;11. Specifically, at 2;11, Leo frequently substituted the retroflex /tʂ tʂʰ ʂ/ with their non-retroflex counterparts through "fronting" (Hua & Dodd, 2000). In contrast, Tong constantly replaced the retroflex /tʂ tʂʰ ʂ/ with the retroflex approximant /ɹ/ ("gliding"), retaining the retroflex feature of the sibilants. These preliminary findings suggest that accented Mandarin input and CLI may contribute to weakening the distinctions between the Mandarin /tʂ tʂʰ ʂ/ and /ts tsʰ s/. It is suggested that cognate vocabulary between the two languages may mediate the CLI from Cantonese to Mandarin. The delayed emergence of these effects at the later timepoint of 2;11 is intriguing and being investigated in terms of potential influence of English phonology.

Keywords: phonological development, Mandarin retroflex sibilants, cross-linguistic influence, accented input

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Prosodic focus in Brazilian Portuguese: How do adults, children under typical and atypical phonological development encode the contrast?

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This work deals with prosody acquisition and its implications for clinical purposes. We analyze speech samples produced by adult speakers, children in typical language development and children with phonological disorders (PD). PD comprises deviating manifestations characterized by inconsistencies in the phonological representation of a linguistic system under acquisition (ASHA, 2024; Dodd, 2014). Clinical assessment is performed mostly based on contrasts whose manifestations occur in the segmental level of a phonological system. Prosodic organization of spoken utterances is not included in standard assessment. However, assuming that prosody is part of the phonological system (Nespor & Vogel, 2007), it was hypothesized that children with PD could present inconsistencies that also occur at a prosodic level. Based on this hypothesis, the paper aims to analyze contrastive focus marking in speech of children with PD in comparison with speech of children under typical language development and adults. The participants of all groups were native speakers of Brazilian Portuguese. Contrastive focus in Brazilian Portuguese is marked by increasing duration, F0 and intensity on the focused element as well as by a particular type of pitch accent (L*+H) (Frota et al., 2015; Moraes, 2009). Forty-five subjects participated, fifteen from each group. Acoustical analysis was performed, considering duration, intensity and F0 as parameters. Results show differences among groups that suggest children increase duration and intensity in comparison with adults, but do not increase F0 in a sufficient magnitude as adults do to encode focus. Specially, children with phonological disorder present inconsistencies when compared with typical children, not increasing duration. Differences observed on phonetic implementation of contrastive focus marking are discussed as evidence of a gradual process (Scobbie et al., 1996) of mapping information structure to prosodic contrasts (Chen et al., 2020). This process, however, can be affected by the children's developmental and clinical conditions.

Keywords: prosody acquisition, contrastive focus, phonological disorder, Brazilian Portuguese

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Asymmetric mispronunciation sensitivity between liquids in CV and CCV syllables in Brazilian Portuguese

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This study investigates the role of syllable development on the perception of liquid consonants by children learning Brazilian Portuguese (BP). In BP, lateral /l/ and tap /ɾ/ can form simple (CV) and branching (CCV) onsets, the latter being acquired later. Previous studies like Ribas (2002) show the following liquid repair strategies in children's productions:

$C/\tau/V \rightarrow C[l]V$ (/bruʃa/ → ['blu.ʃɐ] 'witch') $C/l/V \rightarrow C[r]V$ (/bluza/ → ['bru.za] 'shirt')
 $/\tau/V \rightarrow [l]V$ (/barata/ → [ba'la.te] 'cockroach') $*/l/V \rightarrow [r]V$ (/baleia/ → *[ba're.jɐ] 'whale')

To discuss the segmental, structural and/or developmental causes of this liquid instability, we conducted a mispronunciation detection task testing i) if both CV and CCV would tolerate the liquid switching; and ii) if both switch directions (/l/→[r]; /ɾ/→[l]) would be detected by the child. 70 monolingual children were tested and qualitatively grouped according to their liquid production patterns. Four mispronunciation conditions were tested:

CCV:

$C/\tau/V \rightarrow C[l]V$ (/prato/ 'dish' → *['pla.tɔ]) $C/l/V \rightarrow C[r]V$ (/bluza/ 'shirt' → *['bruzɐ])

CV:

$/\tau/V \rightarrow [l]V$ (/koruʒa/ 'owl' → *['ko.lu.ʒɐ]) $/l/V \rightarrow [r]V$ (/galijna/ 'chicken' → *['ga.ri.jɐ])

Results show asymmetric mispronunciation sensitivity in both syllable and segmental patterns: only liquid switches in CV were productively detected by children who cannot articulate CCV; that is, those children could detect /ɾ/V→[l]V and /l/V→[r]V mispronunciations, but not C/ɾ/V→C[l]V and C/l/V→C[r]V (same segments, different structure). For children who could articulate CCV, but not with the correct liquid, the lowest rates of detection were the C/l/V→C[r]V direction, even if in their own production children preferred C/ɾ/V→C[l]V repairs (the opposite way of the *fish-fis* phenomenon). Therefore, there is a moment when children can perceive and articulate CCV but not with the correct liquid, even when liquids are fully acquired in CV. The branching structure is thus acquired before the CCV segmental tier, and syllable context influences segmental production and perception. We argue that CCV acquisition in BP goes through a moment of incorrect segmental neutralization conditioned by the syllable context, which can be modeled by the Contrastive Hierarchy Feature theory (Dresher 2003). The neutralization is caused by an overgeneralization of the C/ɾ/V frequent segmental pattern, combined with the low density of C/ɾ/V-C/l/V but high density of /ɾ/V-l/V in the input, which was verified in a corpora study.

Keywords: syllable, liquid consonants, mispronunciation detection, phonotactic development, contrast neutralization

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Articulating executive function: The importance of executive function for preschool speech production

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An understudied phenomenon is the benefit of executive function on other childhood developmental milestones, like speech (Torrington & Ratner, 2016). Executive function refers to a host of skills that act like air traffic control and allow a child to regulate their emotions and direct their attention (Gioia et al., 1996; Gonzalez et al., 2018). Previous research suggests that better executive function is associated with adult-like speech production for children four to six years old (Netelenbos et al., 2018). We recruited 62 children and their parents to investigate the co-development of executive function and speech, along with other vital skills such as fine motor control, receptive language, and social development. We collected multiple measures (parent questionnaires and child assessments) for each of the listed domains. We hypothesized executive function is related to speech production, as well as fine motor development. We used a speech repetition task to encourage children to produce 53 words from a wordlist (initial consonant: [ʃ], [s], [w], [ɹ], [l], [θ]). We calculated a phoneme error rate based on the child's incorrect pronunciation. Children also completed a battery of tasks, while parents completed several questionnaires. With a multiple linear regression, we found that one of the main predictors of phonetic accuracy is the parent EF questionnaire (BRIEF-P; Goia et al., 1996). These results highlight the importance of supporting both fine motor skills and EF development in young children, and suggests there is value in a holistic, multi-modal approach to speech therapy.

Keywords: language acquisition, executive function, preschool children

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Consonant clusters in Chilean children with Language Development Disorder and adolescents with Down Syndrome

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Down syndrome (DS) is the most prevalent genetic cause of intellectual disability, with a high incidence in Chile (1:400). Individuals with DS exhibit a weakness in phonological production that impacts speech intelligibility. A significant proportion of children with Developmental Language Disorder (DLD) may have a speech sound disorder. Consonant clusters (CCs) represent complexity in child phonology, with high error rates and late age of acquisition. This study proposed to compare the phonological patterns in the production of CC in Chilean children with DLD and adolescents with DS from a non-linear perspective, and to identify whether omission and substitution strategies are assimilable. The participants were: 4 with DLD (3;3-3;6), 4 with DS (13;1-20;5), and 4 with TD (3;0-3;2). Children with DLD and TD were evaluated using standardized tests in Chile for the evaluation of oral language. In addition, the *Spanish Phonology Test* (Bernhardt et al., 2016) was applied for the study. The phonological analyses were carried out with Phon (Hedlund & Rose, 2020) and the statistical analyses with SPSS program. In all study groups, the production of heterosyllabic CCs obtained a higher accuracy rate than tautosyllabic CCs. In tautosyllabic CCs omission predominated, except in the group with DS, where both strategies were equally represented. In heterosyllabic CCs, substitutions predominated in children with TD while omissions predominated in children with DLD and adolescents with DS, with a greater proportion in the latter. CCs represent a major challenge in phonological acquisition, as has been suggested in previous studies, with their development being persistent in the late stages. The phonological trajectories in children with DLD and DS are expected to be different than in typically developing children. The need for intervention approaches adapted to the phonological profiles of children with DLD and adolescents with DS is suggested.

Keywords: phonological acquisition, consonant clusters, Down syndrome, developmental language disorder, nonlinear phonology

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Tone sequencing performance in children with childhood apraxia of speech: Acoustic analyses

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Pitch (fundamental frequency f_0) has recently been proposed as a measure to differentially diagnose childhood apraxia of speech (CAS) in Cantonese-speaking children (Wong et al., 2021). This study addresses the limitations of previous studies and aims to examine f_0 changes within tone-syllables and also the effects of syllable structure, lexical status, and syllable position on pitch variation in Cantonese-speaking preschool children with and without CAS. Ninety-seven Cantonese-speaking children participated in this study and were assigned to four groups based on assessment results, including CAS, non-CAS speech sound disorder only (SSD), non-CAS speech and language disorder (S&LD), and typical speech-language development (TD) groups. All of the participants performed the Tone Sequencing Task (TST), which required five repetitions of monosyllabic and trisyllabic items. Growth curve analysis (Mirman, 2014) was employed to model f_0 within syllables with three Cantonese tones (high-level, high-rising, and low-falling). Within- and between-group comparisons were conducted to examine the effects of syllable structure (V versus CV), lexical status (word versus non-word), and syllable position (initial, medial, and final) on f_0 . Within each group, the effects of syllable structure and position on f_0 were found with different patterns. Between-group comparisons showed that the CAS group had reduced tone contrast. The CAS group could be differentiated from the control groups based on interactions of tone with syllable structure and position, but not lexical status. The dissimilarity detected between the CAS and SSD/TD groups was more prominent than that observed between the CAS and S&LD group. Cantonese-speaking children with CAS had reduced tone contrasts, suggesting a possible method for differential diagnosis. A distinct approach to analyzing pitch production in children with and without CAS was suggested. Future development of an objective measure for CAS identification is recommended.

Keywords: childhood apraxia of speech, acoustic analysis, Cantonese, tones, pitch

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Clinical assessment of speech sound disorders in Mandarin-speaking children

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Most children acquire intelligible speech by the age of four. However, about 10% of children have speech difficulties, which can make them hard to understand and may negatively affect their social, academic, and vocational well-being. Speech-language pathologists (SLPs) typically use standardized tests to evaluate children's speech development. However, there is no standardized test for Mandarin speech development, which makes it challenging to identify Mandarin-speaking children with speech difficulties. In addition, a shortage of SLPs in China and Mandarin-speaking SLPs in English-dominant countries makes it even more challenging for children to receive timely assessments (Williams & McLeod, 2012; Li, 2022). To address this need, my research aims to explore the challenges of diagnosing speech sound disorders in monolingual and bilingual Mandarin-speaking children, including the development and validation of a Mandarin speech test (MST) that is culturally appropriate and easy to administer and score. The MST will enable examiners to pinpoint different subtypes of speech difficulties, following Dodd's differential categorization model (Dodd, 2014), subsequently informing the choices of remediation strategies tailored to each subgroup. This widely accepted model has demonstrated its effectiveness across multiple languages, including English, Danish, and Mandarin (Dodd, 2014; Clausen & Fox-Boyer, 2022; Hua & Dodd, 2000). A partly automated scoring system will allow for in-depth phonetic and phonological analyses which will reduce scoring time and assist examiners with different levels of Mandarin proficiency. Field testing of the MST is currently underway and results will be shared.

Keywords: Mandarin, speech assessment, test design, bilingual, speech sound disorder

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Modified vowel productions in preschoolers responding to two different communicative demands

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Acquiring the ability to modify speaking styles for effective communication is essential, particularly for children interacting with diverse conversational partners in various communication settings. Previous research consistently indicates that adults adjust their speaking styles to enhance speech intelligibility in challenging communicative situations, including the environment or the interlocutor (Cooke et al., 2014; Lindblom, 1990; Smiljanic, 2021). In the presence of background noise, talkers undergo auditory feedback interference and involuntarily adapt their speaking styles, known as noise-adapted speech (NAS) or Lombard Speech. Similarly, speakers modify their styles to facilitate communication when listeners face challenges like hearing loss, referred to as listener-oriented clear speech (CL). The current study explored the differences between NAS and CL in vowel production in young children. Spontaneous speech samples from 28 monolingual English-learning children aged 3-5 years were examined across three speaking styles: conversational speech (CO), NAS, and CL. A "spot the difference" task (Baker & Hazan, 2011) was employed to elicit spontaneous speech with CO involving a casual conversation about pictures with a research assistant, CL requiring the child to explain differences to an interlocutor simulating visual and hearing difficulties, and NAS introducing background noise. The analysis focused on acoustic features of four-point vowels, including formant 1 (F1) and formant 2 (F2) frequencies, vowel space area (VSA), and vowel duration. Preliminary results highlighted that 5-year-olds exhibited an expanded VSA for both NAS and CL compared to CO. Younger preschoolers (3 to 4 years old) did not show expanded vowel areas for CL compared to CO. Regardless of age, NAS exhibited significantly longer vowel duration than CO, while CL did not differ from CO. However, the vowel duration of CL appeared to be longer than CO only in 5-year-olds. These findings provide valuable insights into the intricate development of speech modification in children across various communication scenarios.

Keywords: noise-adapted speech, clear speech, speech modification, preschoolers, Lombard speech

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