

**Methods of Diagnosing Speech Sound Disorders in Multilingual Children**

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**Abstract**

**Purpose:** Identification of speech sound disorder (SSD) in children who are multilingual is challenging for many speech-language pathologists (SLPs). This may be due to a lack of clinical resources to accurately identify SSD in multilingual children as easily as for monolingual children. The purpose of this paper is to describe features of multilingual speech acquisition, identify evidence-based resources for the differential diagnosis of SSD in speakers of understudied language paradigms, and to demonstrate how culturally responsive practices can be achieved in different linguistic contexts.

**Method:** Examples of different approaches used to inform accurate diagnosis of SSD in 2- to 8-year-old multilingual children are described. The approaches used included: (a) considering adult speech models, (b) completing validation studies, and (c) streamlining evidence-informed techniques. These methods were applied across four different language paradigms in countries within the Global North and Global South (e.g., Jamaican Creole-English, *Jamaica*; Vietnamese-English, *Australia*; French and additional languages, *Belgium*; Icelandic-Polish, *Iceland*). The culturally responsive nature of approaches in each cultural/linguistic setting is highlighted as well as the broader applicability of these approaches.

**Results:** Findings related to dialect specific features, successful validation of tools to describe functional speech intelligibility and production accuracy, and the utility of different techniques applied in the diagnosis of SSD are outlined.

**Conclusions:** Culturally responsive methods offer a useful framework for guiding SLPs' diagnostic practices. However, successful application of these practices is best operationalized at a local level in response to the linguistic, cultural, and geographic context.

### 93                    **Methods of Diagnosing Speech Sound Disorders in Multilingual Children**

94                    There are over 7,000 languages spoken in the world (Eberhard et al., 2024) with more  
 95                    than half of all people in the world who speak two or more of these languages (Grosjean, 2021).  
 96                    Speech-language pathologists' (SLP) potential contact with multilingual children has increased  
 97                    with the unprecedented rise in international migration (International Organization for Migration,  
 98                    2022). A broad definition of *multilingualism* is used in this paper to encompass both *bilingualism*  
 99                    and *multilingualism*. Multilingualism is defined as: "People who are multilingual, including  
 100                    children acquiring more than one language, are able to comprehend and/or produce two or more  
 101                    languages in oral, manual, or written form with at least a basic level of functional proficiency or  
 102                    use, regardless of the age at which the languages were learned" (International Expert Panel on  
 103                    Multilingual Children's Speech [IEPMCS], 2012, adapted from Grech & McLeod, 2012, p. 121).

104                    There is a large body of evidence documenting monolingual children's speech  
 105                    development over 70 languages and dialects (McLeod, 2025). For example, 5-year-old children  
 106                    have been found to have acquired almost all consonants in their home language(s) in a review of  
 107                    consonant acquisition in 27 languages (McLeod & Crowe, 2018), including English as spoken in  
 108                    the United States (Crowe & McLeod, 2020). Additionally, across languages caregivers describe  
 109                    their 4- to 5-year-old children as intelligible, even to unfamiliar listeners (McLeod, 2020). Most  
 110                    researchers have described monolingual speech. While all children's consonant acquisition is  
 111                    influenced by "articulatory complexity, ambient frequency, and functional load" (Stokes &  
 112                    Surendran, 2005, p. 277), multilingual children's speech and language is additionally influenced  
 113                    by their exposure to, proficiency, and use of each of their languages (McLeod et al., 2023; Wang  
 114                    et al., 2021; Washington et al., 2023). Children's multilingual speech acquisition has been  
 115                    studied for a number of language pairs, including Spanish-English (e.g., Fabiano-Smith &

Goldstein, 2010), French-English (e.g., MacLeod & Fabiano-Smith, 2015), Cantonese-English (e.g., Holm & Dodd, 1999), German-Turkish (e.g., Albrecht, 2017), and Arabic-English (Khattab, 2006). However, the diversity of possible language pairings and variations within these pairings means that there will never be a *one size fits all* solution for assessing the speech skills of multilingual children (Washington, 2025). Instead, identification of speech sound disorder (SSD) in multilingual children requires evidence of disorder in each language spoken by a child (Holm & Dodd, 1999; Pert, 2023), by way of culturally responsive practices.

Culturally responsive practice assumes that it is not possible to separate an individual's communication use from influences present in their social and cultural environment (De Lamo White & Jin, 2011). In contrast to earlier ideas about cultural competence, cultural responsiveness is viewed as a continuous process of learning to which there is no endpoint, only endless opportunities for growth (Hyter & Salas-Provance, 2021). Cultural responsiveness includes considering the cultural perspectives, beliefs, and values of the child and their family; being aware of one's own culture and how it influences one's perceptions; being willing to listen and learn; and acknowledging what one does and does not know (Hyter & Salas-Provance, 2021; Verdon, 2020). In practice, this is the clinician utilizing methods that are consistent with the linguistic and cultural norms of child and their family (Meeks, 2023). Culturally responsive practice is an umbrella term that can include countless variations in practice, for example employing Native American speech-language pathology assistants (Meeks, 2023), providing culturally informed literacy interventions (Guiberson, 2024), modifying standardized stimuli to be more inclusive of transgender and gender-diverse clients (Dietsch et al., 2023), and adapting caregiver-implemented augmentative and alternative communication interventions for Latinx caregivers (Soto & Vega, 2024). As the cultural setting of the SLP and the children and families

they serve changes from context to context, naturally so does what culturally responsive practice can look like in action.

For multilingual children with suspected SSD, best practice necessarily involves culturally responsive practice. Best practice requires direct speech assessment in each language spoken by the child; that is, the languages used in the home and in the community (Castilla-Earls et al., 2020; Hyter & Salas-Provance, 2021; Jasso & Potratz, 2020; McLeod et al., 2017). There are over 370 speech assessment tools listed on the Multilingual Children's Speech website in over 70 languages and dialects (<https://www.csu.edu.au/research/multilingual-speech/speech-assessments/speech-assessment-tools>). Tools such as the Speech Assessment of Children's Home Languages(s) (SACHL) (Margetson & McLeod, 2025) supports clinicians who may not have the skills, knowledge, and/or confidence to investigate speech production in a language that they do not use themselves. The *converging evidence approach* considers multiple sources of evidence (e.g., parent, teacher, clinician + a learning observation) on a child's skills, with no single source of evidence being considered superior in informing clinical decision making (Castilla Earls et al., 2020). The varied sources of evidence used in a converging evidence approach provide a broader view of children's speech production in a range of languages and environments and goes beyond relying on standardized tests for making diagnostic decisions. For example, evidence for understanding children's functioning can include reported speech intelligibility, reported participation, informal probes of speech production, as well as standardized tests.

Another culturally responsive approach to assessment of potential SSD in multilingual children is crosslinguistic analysis (e.g., Margetson et al., 2024; van der Straten Waillet et al., 2024; Washington et al., 2023; 2024). In this method, a child's speech production is examined to determine (a) which errors are typical for learners of that language, (b) which errors can be

explained by crosslinguistic influences, and (c) which errors cannot be explained by typical developmental or crosslinguistic processes. Understanding of the language context and the phonological similarities and differences between English and children's home language(s) is an essential foundation for conducting crosslinguistic analysis.

The traditional practice of considering multilingual children's speech skills in only one language risks misdiagnosis (Fabiano-Smith et al., 2021; Margetson et al., 2024; Washington et al., 2023). Currently, there is a gap between recommended evidence-based practice and clinical practice, with clinicians reporting that multilingual children's skills are often only considered in the majority, societal language and not all of their languages (Guiberson & Aikins, 2012; Jordaan, 2008; McLeod & Baker, 2014; van der Straten Waillet et al., 2023). As multilingual children often cannot access SLPs who speak their home language(s) (Verdon et al., 2014), this raises the question: how can SLPs differentiate typical and atypical speech acquisition using methods that are culturally responsive? To address this question, this tutorial presents four international examples that illustrate how culturally responsive methods have been implemented in different contexts to identify SSD in multilingual children. These examples are offered to provide a roadmap per se for the application of different methods and tools when working with multilingual children from a variety of linguistic and cultural backgrounds. Case examples presented in this tutorial describe children using (1) Jamaican Creole and English in Jamaica, (2) Vietnamese and English in Australia, (3) French and additional languages in Belgium, and (4) Icelandic and Polish in Iceland. In each case, the Problem, the Language Context, Methods, Culturally Responsive Practices, and Findings are addressed.

## **Examples of Working with Multilingual Children to Accurately Diagnose SSD**

### **Example 1: Children using Jamaican Creole (JamC) and English**

185 ***The Problem***

186           In the United States, bilingual speakers of Jamaican Creole (JamC) and English represent  
 187 the third largest group of Caribbean-born individuals (U.S. Census Bureau, 2022). Despite this  
 188 prevalence, there is a lack of resources, tools, and outcome measures to support SLPs working  
 189 with these multilingual speakers. This lack of resources is exemplified by less than ten SLPs on  
 190 the ASHA registry indicating they can provide services in any Creole language (ASHA, 2024).  
 191 The combined effect of a lack of resources with few SLPs knowledgeable about JamC places  
 192 JamC-English bilinguals at risk for misidentification of SSD (cf. Washington et al., 2017). A  
 193 possible solution for increasing diagnostic accuracy, is the development and validation of  
 194 outcome measures that take multilingual contexts, particularly JamC-English bilinguals, into  
 195 consideration.

196           One outcome of importance to SLPs is *communicative participation*, which captures an  
 197 individual's ability to communicate in real-life situations (Eadie et al., 2006; World Health  
 198 Organization [WHO], 2007; Yorkston et al., 2014). Notably, participation centred assessments  
 199 are lacking for monolingual children (Cunningham et al., 2017) while even fewer measurement  
 200 tools are available for use with multilingual preschool-age children (Wright Karem et al., 2019).  
 201 That said, the Focus on the Outcomes of Communication Under Six (FOCUS; Thomas-Stonell et  
 202 al., 2010) is one of the few available tools designed to capture this construct of *participation* for  
 203 preschool-age children. Although the FOCUS was initially developed as a 50 item (i.e., FOCUS-  
 204 50) parent response measure (Thomas-Stonell et al., 2010) consisting of Profile scores in  
 205 capacity (speech, expressive language, pragmatic language, receptive language/attention) and  
 206 performance (intelligibility, expressive language, social/play, independence, coping/emotions) a  
 207 streamlined 34 item version (i.e., FOCUS-34) consisting of the same Profile scores (with the

exception of speech) was later developed (Oddson et al., 2019). Importantly, these are not considered different editions. Rather, the streamlined version, which offers a conversion tool for calculating Total Scores from previously collected FOCUS-50 assessments, is intended to be used in situations that require more expediency.

In terms of psychometrics, the FOCUS was initially validated with monolingual English-speaking children (Thomas-Stonell et al., 2010; Washington et al., 2013), with the FOCUS Total score having been successfully validated in several other languages/contexts including Afrikaans in South Africa (Bornman & Louw, 2021), German in Germany (Neumann et al., 2017), and Italian in Italy (Piazzalunga et al., 2020). While there is increasing evidence that the FOCUS is valid and reliable across several languages, further investigation was required before it could be confidently used (a) in the Jamaican context, (b) with JamC-English bilinguals, and (c) as Profile scores rather than only the FOCUS Total score. The validation study for the FOCUS, which was previously conducted in Kokotek et al. (2023), also presented an opportunity to examine the impact of a culturally responsive converging evidence approach for differentiating children with and without SSD in the Jamaican context (for a detailed description of the study see Kokotek et al., 2023). Stated differently, a converging evidence approach was applied when categorizing children into groups, thus illustrating cultural responsiveness in the Jamaican context while in pursuit of exploring the validity of the FOCUS tool for use with bilingual Jamaican children, which required careful consideration of the language context and examination of available assessments.

### ***The Language Context***

The Jamaican language has been described as occurring on a continuum of use, from acrolect (most privileged language/dialect) to basilect (least privileged language/dialect), with

the mesolect representing varying degrees of language use. More specifically, the acrolect refers to Standard Jamaican English with JamC referring to the range of communication from both the mesolectal and basilectal ranges on the continuum. The basilect itself is a form of JamC that is maximally distinct from Standard Jamaican English. However, the mesolectal forms are considered code-mixed varieties of the basilect (JamC) and the acrolect (Standard Jamaican English) (Washington et al., 2025). Understanding the context of this language pairing is critical to developing culturally responsive procedures. In response to this need, there are two main features that should be considered: (1) JamC's oral history and (2) JamC's lexical composition.

*JamC's oral history.* JamC is historically an oral language, with a relatively recent standardization of orthography developed by the Jamaican Language Unit (JLU; 2009). It is important to note that the relatively recent development of a standardized orthography means that JamC in its written form is unfamiliar for many JamC-English speakers. With this understanding, it is important to use assessment tools that, although not written in the home language, capture children's communicative participation more broadly (i.e., across a linguistic continuum). This makes the FOCUS (Thomas-Stonell et al., 2010) particularly well-suited to documenting Jamaican children's communicative participation as it allows parents to consider how their children use the full range of both of their spoken languages to participate in everyday situations where either JamC, English, or a combination thereof may be most appropriate.

*JamC's lexical composition.* JamC is an English-lexified Creole that pulls influence from both West-African and English languages (Cassidy, 1966). Due to this background, JamC draws much of its vocabulary from English and much of its syntactic structures from West African languages. This places JamC-English speakers in a unique category of multilingualism where there are shared linguistic underpinnings between their two languages as there is considerable

overlap between JamC and English productions (Washington, 2025). This is contrastive to many other language pairings, such as Spanish-English, where the languages are more distantly related. Along with shared vocabulary and morphosyntax, JamC and English also intersect considerably in their phonetic inventory with 20 shared consonants /p, b, t, d, k, g, f, v, s, z, ʃ, tʃ, ʒ, h, m, n, ŋ, w, j, l/. However, English has at least two consonants that do not occur in JamC /θ, ð/, whereas JamC has three phonemes that do not occur in English /kʲ, gʲ, ɲ/, as illustrated in Figure 1. JamC also includes unique linguistic features, such as no obligatory bound morphemes and the use of prosody to change word meaning (c.f., Washington et al., 2025).

Insert Figure 1 about here

## ***Methods***

The validity of the FOCUS (Thomas-Stonell et al., 2010) for examining children's speech skills was undertaken in the Jamaican context by a team that included linguists, monolingual and bilingual (JamC-English) SLPs, and researchers. In that study, 255 simultaneous JamC-English bilingual children aged 3;3-6;3 ( $M = 4;9$ ) were assessed, based on data drawn from a larger study (cf. Washington et al., 2017). This included both children where there were concerns about speech development expressed by caregivers, and teachers and/or researchers, and children where no concerns were raised. All children participating in the study used JamC and English at home and school, had typical hearing, had no reported neurological or pervasive developmental disorder, and had typical oral-motor skills and nonverbal intelligence for their age.

A converging evidence approach (Castilla-Earls et al., 2020) was used to classify children into groups: typically developing (TD) or suspected SSD (sSSD). In this approach, parents, teachers, and SLPs were asked if they had concerns about the child's speech in JamC and in

English. Children whose parents AND teacher OR SLP identified concerns were placed into the sSSD group (see Kokotek & Washington, 2023 for a flowchart detailing this process). Children who did not have any concerns noted or who only had one point of concern documented were classified as TD. Using this approach, 225 children were placed in the TD group and 30 children were placed in the sSSD group. This grouping provided a sample consisting of children with a diverse range of communication abilities necessary for the initial validation process that was completed.

### **Measures.**

***FOCUS.*** The FOCUS (Thomas-Stonell et al., 2010) is a valid and reliable parent-report measure to help SLPs capture current functioning and clinical change within children's communicative participation. Two different versions of the FOCUS were used to address the annual needs of the Jamaican Creole Language Project. The original 50 item (FOCUS-50) (Thomas-Stonell et al., 2010) and the streamlined 34 item (FOCUS-34) (Oddson et al., 2019). The FOCUS Profile scores for the FOCUS-50 and FOCUS-34 are dichotomized to describe the child's communication *capacity* and *performance* and to complement the FOCUS Total scores. To validate the FOCUS in the Jamaican context, parents were asked to complete the FOCUS questionnaire while considering contexts where their child uses JamC, English, or any combination thereof. Since most Jamaicans are familiar with reading in English, but not in JamC, only the English version of the FOCUS (50 or 34) was used, and FOCUS Profile and Total scores were calculated. Using the calculation for conversion described in the FOCUS manual, the original 50 item FOCUS scores were converted to FOCUS 34 scores for analysis.

***Intelligibility in Context Scale (ICS) and ICS-Jamaican Creole (ICS-JamC).*** The ICS (McLeod et al., 2012a,f) and ICS-JamC (McLeod et al., 2012b) are parent rating forms that

measure children's functional speech intelligibility in context (e.g., with family, friends, teachers; versions freely available from the multilingual children's speech website: McLeod, 2024). The ICS has demonstrated strong psychometric properties in many languages (McLeod, 2020), including in the JamC context (León et al., 2021; Washington et al., 2017). Prior research has documented evidence that the ICS and ICS-JamC are valid and reliable (Washington et al., 2017) and have good sensitivity and specificity (León et al., 2021) for use with Jamaican children. With such strong evidence in support of their use, the ICS and ICS-JamC were considered appropriate and necessary tools to include when exploring the validation of the FOCUS measure for Jamaican children's speech skills conducted by Kokotek et al. (2023). By extension, the inclusion of the ICS and ICS-JamC in the FOCUS validation study also highlighted how children's functional speech intelligibility relates to communicative participation.

Administration of the ICS and ICS-JamC required the use of audio recordings to provide a culturally responsive approach that considered the language needs and preferences of children's caregivers. This is because JamC is historically an oral language, and not all parents were familiar with written JamC. In response to this observation, audio recordings of the ICS were used along with the written form to facilitate parents completion of the forms and to support them in thinking only of their child speaking JamC as they completed the form. Likewise, this process was also used for the ICS to ensure parents were only thinking of their child's speech in English and maintain consistency across assessment administrations.

**DEAP.** The DEAP assessment can be used to calculate speech production accuracy using calculations of percent: consonants correct (PCC), vowels correct (PVC), and phonemes correct (PPC; Dodd et al., 2006). The DEAP has also been successfully adapted for the Jamaican context

to reflect production variation and crosslinguistic transfer (Washington et al., 2017; León et al., 2022) and is an appropriate tool in the absence of validated assessments of speech production accuracy for JamC-English speakers (Washington et al., 2017; 2023). Children completed the DEAP Articulation (30 words) and Phonology (50 words) subtests in JamC and in English. Responses were then transcribed and analyzed for PCC, PVC and PPC in each language.

### ***Cultural Responsivity***

***Integrating lexical features for assessments in the Jamaican context.*** Two important considerations addressed the unique positioning of JamC-English within a multilingual context. First, due to the absence of validated assessments suitable for use with JamC-English speakers, a converging evidence approach (Castilla-Earls, 2020) was utilized to classify children as TD or sSSD by considering reports of concern from multiple perspectives: caregiver, teacher, and SLP. Second, given the shared underpinnings between JamC and English, code-mixing and crosslinguistic language transfer were taken into careful consideration (Wright Karem & Washington, 2021). Although previous studies involving the DEAP addressed this consideration through an adapted scoring protocol (León et al., 2021; Washington et al., 2017), the validation study of the FOCUS (Kokotek et al., 2023) addressed code-mixing and crosslinguistic transfer differently. This difference was accomplished by having the parents complete the FOCUS in English only, while considering their child's full range of communication abilities across both their spoken languages. This approach was in keeping with research from Paradis et al. (2010) with parents of French-English speaking children who were able to capture their children's language abilities across both of their languages while completing interviews in English only. By applying this approach, parents were encouraged to think about their child's speech skills holistically while also supporting parents to complete the assessment in a more familiar format

(written English) versus a less familiar format (a translated JamC written questionnaire). This latter consideration offers a segway into the second aspect of the JamC language context - its oral history.

***Respecting oral tradition for a heritage language.*** JamC is historically an oral language often being used in more social and informal environments, while English is more often used in more formal and academic environments. Given this understanding, the way in which families are provided with tools examining speech skills in JamC must be considered. Unlike the FOCUS, which examines a child's full range of communicative skills, the ICS/ICS-JamC examine the child's speech intelligibility. Despite the shared inventory in consonants between JamC and English, speech intelligibility varies based on the linguistic context and environment in which it is used. As such, assessing the child's intelligibility in both languages offered important and unique information. To ensure culturally responsive practice, the ICS and ICS-JamC were audio recorded and presented to the parents in a paired written-audio modality. Furthermore, assessments were conducted at participants' schools, an environment where English is more often encouraged. To ensure children were comfortable using both languages, language-specific evaluators were employed to encourage speech production in context and allow for the use of JamC and English when they were completing the DEAP.

### ***Findings***

Overall, analyses from Kokotek et al. (2023) indicated there was evidence of construct validity for the FOCUS when considering the speech skills of JamC-English-speaking preschoolers (a detailed description of results are available in Kokotek et al., 2023). Specifically, evidence of construct validity between the FOCUS Total and Profile scores and speech intelligibility measures (ICS/ICS-JamC and the DEAP) were found by way of convergent and

divergent evidence (see Tables 1 and 2). For example, convergent evidence was observed with moderate significant correlations noted between FOCUS Total scores and the ICS, and ICS-JamC. Further, FOCUS Total scores were minimally, but significantly correlated with the DEAP English, and the DEAP JamC. Likewise, the FOCUS Profile score *speech*, was also moderately correlated with the ICS, the ICS-JamC , and the DEAP JamC; and minimally correlated with the DEAP English. This evidence indicates that both the FOCUS Total score and the *speech* Profile score can provide dependable information about children’s speech production skills. Conversely, divergent evidence was noted between the FOCUS Profile score *coping/emotions*, and the ICS and ICS-JamC. This divergent evidence suggests that the FOCUS Profiles scores are more aligned with speech assessments that consider children’s context and less aligned with assessments of speech production accuracy in isolation.

Insert Tables 1 and 2 about here

The findings reported in Kokotek et al. (2023) suggested that the FOCUS is a valid tool for assessing communicative participation related to speech production with JamC-English-speaking preschoolers. Moreover, these findings provide preliminary support for investigating the validation of the FOCUS measure for use with children from other multilingual backgrounds, particularly when English is one of the spoken languages. This type of work offers insights on previous studies that have used the FOCUS Profile scores for descriptive purposes, the use of which was not previously validated. Lastly, culturally responsiveness in this local context meant taking into consideration the oral history of the language (i.e., audio administration of the ICS/ICS-JamC and the English only administration of the FOCUS), the lexical composition (i.e., DEAP adapted scoring protocol), and involvement of stakeholders of the Jamaican community

(i.e., parents). As a result, findings using these methods are more likely to reflect the views of this linguistic community.

## **Example 2: Children using Vietnamese and English**

### ***The Problem***

Across the world, Vietnamese is the 21st most spoken language (Eberhard et al., 2024). In the United States, Vietnamese is the fourth most spoken language other than English, with over 1.5 million speakers (U.S. Census Bureau, 2022). In Australia, Vietnamese is the third most spoken language other than English (ABS, 2022). Recently researchers have described monolingual Vietnamese children's speech acquisition in Northern Vietnam (Phạm & McLeod, 2019), Central Vietnam (Lee et al., 2024), and Southern Vietnam (Le et al., 2022). However, until recently there has been no research considering Vietnamese-English-speaking children's speech development. This research is important to enable English-speaking SLPs to assess, transcribe, and analyze Vietnamese-English-speaking children's speech.

The VietSpeech research was funded by an Australian Research Council Discovery Grant (DP180102848) to: (a) explore Australian Vietnamese-English-speaking children's speech development, (b) support children's speech skills in Vietnamese and English, (c) promote home language maintenance, and (d) create multilingual resources for English-speaking SLPs. The research team included bilingual Vietnamese-English-speaking members with backgrounds in linguistics, speech-language pathology and special education, as well as monolingual English-speaking SLPs and researchers with experience working in Vietnam.

### ***The Language Context***

Vietnamese consonants, vowels, and tones can vary across dialects (Phạm & McLeod, 2016). The three major dialects are Northern Vietnamese, Central Vietnamese, and Southern

Vietnamese. Vietnamese is a tonal, syllable-timed language that does not include consonant clusters or polysyllabic words (Phạm & McLeod, 2016). In contrast, English is a non-tonal, stress-timed language that contains many consonant clusters and polysyllabic words. Standard Vietnamese has 23 consonants. Vietnamese and English share 16 consonants /p, b, t, d, k, m, n, ŋ, f, v, s, z, h, w, j, l/. Vietnamese includes an additional 13 consonants that do not occur in English /tʰ, ʈ, c, kʰ, ʔ, ɲ, ŋᵐ, ʀ, ʂ, ʑ, x, ɣ, ʈʰ/, although some of these are dialectal variants or contested symbols (Margetson et al., 2024). English includes eight consonants that do not occur in Vietnamese /g, θ, ð, ʃ, ʒ, tʃ, dʒ, ɹ/. It is important to identify differences between Vietnamese and English, as Vietnamese-English-speaking children who mostly speak Vietnamese at home may develop English-specific syllabic structures and consonants (such as polysyllabic words, consonant clusters, and non-shared English consonants) later than monolingual English-speaking children.

## ***Methods***

The VietSpeech research involved conducting Vietnamese and English speech assessments with 69 Australian Vietnamese-English-speaking children aged 2 to 8 years old and 85 adult family members aged 22 to 80 years old. Two research protocols were used to assess, transcribe, and analyze speech. First, the VietSpeech Multilingual Assessment Protocol (McLeod et al., 2023) involved collaborating with Vietnamese experts; assessing children's speech in both Vietnamese and English; assessing adult family members' speech to consider ambient phonological influences; accepting dialectal variations as correct; and analyzing speech in the context of children's language proficiency and influences on multilingual speech development. Adult speech assessments involved the adult family members reading aloud the same single word test items in Vietnamese and English as the children. Adult productions were compared to

children's productions to determine matches and explore the influence of ambient phonology on multilingual children's speech development (McLeod et al., 2023). Second, the VietSpeech Multilingual Transcription Protocol (Margetson et al., 2023) was a process for ensuring reliable transcription, informed by models of speech perception (e.g., Best & Tyler, 2007) and studies of SLPs' transcription of unfamiliar languages (e.g., Masso et al., 2020). The Transcription Protocol involved: team training in Vietnamese and English phonology; speech assessment of Vietnamese and English with bilingual speakers; comparison of transcriptions; and consensus. To apply the VietSpeech research to clinical contexts, the Speech Assessment of Children's Home Language(s) (SACHL) has been designed as a clinical protocol based on these two VietSpeech research protocols and is described in full in Margetson and McLeod (2024). The SACHL is a step-by-step process that SLPs can integrate into their existing speech assessment practices. Key techniques of the SACHL are described below. The acceptability and feasibility of the SACHL is currently being explored.

#### *SACHL: Multilingual Preparation*

SLPs can prepare for assessing speech in children's home languages by considering similarities and differences between the home language and English phonological systems. First, identify the shared and non-shared consonants (Figure 1). This comparison may also identify phonological skills that multilingual children may find easy or difficult to acquire (e.g., if there are no consonant clusters in the home language, English consonant clusters may be difficult). Second, use this information and the Multilingual Transcription Traffic Lights (Margetson & McLeod, 2025) (Figure 2) to identify the probable level of transcription difficulty for each target consonant (Masso et al., 2020). Shared consonants should be easier to transcribe as they are familiar to SLPs. Non-shared home language consonants will be difficult for SLPs to transcribe

if they do not speak the home language, as they will be less familiar, and it will be harder to decide if children are correct. Shared consonants that are produced with phonetic differences in each language (e.g., allophones) will be moderately difficult to transcribe.

Insert Figure 2 about here

After categorizing consonants according to whether they are shared/non-shared and level of transcription difficulty, SLPs can identify a single word speech assessment in the children's home language, and other speech assessments, for example the ICS (McLeod et al., 2012a,f) and ICS Vietnamese (McLeod et al., 2012e) from the Multilingual Children's Speech website (McLeod, 2024). Before the assessment, SLPs can mark on single word speech assessment forms which consonants/target words will be easy, moderately difficult, and difficult for them to transcribe.

#### *SACHL: Multilingual Collaboration*

To conduct speech assessments in languages that they do not speak, SLPs will need to identify collaborators (e.g., family members, interpreters, or multilingual colleagues) who speak the same home language(s) as the child and can support the SLP in assessing the child's speech in their home language. For example, before the assessment, SLPs can review differences in phonology with collaborators and ask for their assistance in evaluating the child's productions of home language non-shared consonants (and shared consonants that are produced differently from English). SLPs can ask the adult family members to read aloud the single word test items to provide a model of the correct productions in the languages/dialects that the child speaks, so that they have a reference point for a correct production of target sounds and words in the child's home language.

#### *SACHL: Multilingual Assessment*

Comprehensive speech assessment that covers all the usual elements is recommended (e.g., hearing status, oro-musculature assessment, single word and connected speech sampling, intelligibility, stimulability). This component of the SACHL focusses on how to directly assess the child's speech in their home language as part of a comprehensive speech assessment. SLPs will need to work with collaborators to administer single word tests in their home language(s). Audio or video recording the children's and adult's speech assessments in their home language (and English if possible) can be useful for (a) identifying the dialect(s) spoken at home; (b) obtaining a sample of correct productions in the home language from the adult which can be used to determine whether the child is correct; (c) identifying ambient phonological influences on children's speech e.g., children's productions that match adult family members. Following the assessment, SLPs can check with the family or interpreter whether they perceived the child's productions of home language non-shared consonants as correct (and shared consonants that are produced differently to English). Also, it is important to clarify whether they heard the child using any home language non-shared consonants while speaking English.

#### *SACHL: Multilingual Analysis*

After the assessment, SLPs can analyze children's speech by considering various influences on multilingual children's speech that could explain mismatches between children's speech productions and adult targets (see Supplementary Material 1). Comparing children's productions with adult productions (using audio recordings) helps to determine whether children can accurately produce consonants compared to adults in their home environment, and helps to identify any dialectal, ambient phonological, or cross-linguistic influences on their speech (see Margetson & McLeod, 2025). Speech productions due to these influences should not be considered true errors or indicative of speech sound disorder; but rather, productions that are the

result of natural multilingual speech development (McLeod et al., 2023; Phạm & McLeod, 2019). During diagnostic decision-making, it is important to consider similarities and differences in children's speech productions in each language, children's language proficiency, and data from comprehensive case history and assessment according to the converging evidence approach (Castilla-Earls et al., 2020). Diagnosis of SSD should only be made if there is evidence of disorder in each language that the child speaks (that is, true errors that cannot be explained by influences on multilingual speech development).

### ***Cultural Responsivity***

The SACHL (Margetson & McLeod, 2025) is a culturally responsive approach in that it involves SLPs acknowledging their limitations and inviting families to collaborate with them to conduct assessments (Verdon et al., 2020). Families share their expertise in their home languages and partner with SLPs in deciding whether their child's speech would benefit from speech-language pathology support. By directly assessing children's home languages, SLPs view multilingual children's communication from a holistic perspective, rather than from a Western/English-centric perspective. It reduces the risk of misdiagnosis by revealing strengths and/or indicators of speech sound disorder in each language. Through developing a comprehensive understanding of multilingual children's strengths and areas of need in their home languages, English-speaking SLPs will be better equipped for supporting multilingual children's speech skills in their home language (not only in English) (cf. McLeod et al., 2017).

### ***Findings***

The VietSpeech research found that (a) children's PCC in Vietnamese was higher when Vietnamese dialects were included as correct; (b) some children had cross-linguistic transfer of non-shared consonants; and (c) children's speech most often matched their mother's speech

(McLeod et al., 2023). The researchers demonstrated the importance of considering multilingual children's speech in each language that they speak, language proficiency, dialectal variation, cross-linguistic influences and ambient phonology in diagnostic decision-making (McLeod et al., 2023). Using the VietSpeech Multilingual Assessment Protocol and VietSpeech Multilingual Transcription Protocol to assess children's speech in both Vietnamese and English resulted in more accurate diagnosis compared to English speech assessment only (Margetson et al., 2023, 2024). For example, one child from VietSpeech participated in a longitudinal study. Her speech was assessed in Vietnamese and English at four time points between 3- and 6-years. When 3-years-old, she presented with multiple English speech mismatches that would be considered atypical and indicative of SSD in monolingual English-speaking children. However, when her Vietnamese speech and influences on multilingual speech development were considered, most errors could be explained by cross-linguistic transfer and ambient phonology. By 6 years her speech accuracy improved in both languages (Margetson et al., 2023). In a second study, case examples of four other children who participated in VietSpeech further revealed the importance of basing diagnosis on speech assessment in both Vietnamese and English. Four children from two families, aged between 4 and 6 years, each showed signs of SSD in their English speech assessments. When both their Vietnamese and English speech assessments were included in diagnostic decision-making, it was clear that only two of the four children had speech sound disorder (Margetson et al., 2024). Their "errors" in English could be explained by influences on multilingual speech acquisition (i.e., cross-linguistic transfer, ambient phonology, dialect). SuperSpeech is an online group intervention that was developed to target Vietnamese-English-speaking children's speech in both languages and home language maintenance (McLeod et al.,

2022). More information and free VietSpeech intervention resources are available from McLeod (2024).

### **Example 3: Children using French and Additional Languages**

#### ***The Problem***

SLPs traditionally use a (not recommended) norm-referenced approach to assess multilingual children's speech (McLeod & Baker, 2014; van der Straten Waillet et al., 2023). Resources are, however, increasingly available to SLPs that outline more appropriate assessment practices and can be found in the form of published recommendations (De Lamo White & Jin, 2011; IEPMCS, 2012), resource lists (McLeod, 2022), and tutorials (Castilla-Earls et al., 2020; McLeod et al., 2017). Common to all these resources is that they are written by and for English-speaking SLPs and primarily pertain to children growing up in environments where English and additional languages are being acquired. Given this practice, SLPs working in contexts where English is not a language being acquired by their clients may struggle to follow evidence-based recommendations for assessing the speech of multilingual children. Accordingly, this mismatch in practice standards and multilingual profiles can negatively impact these SLPs' accuracy in diagnosing SSD in a broader range of multilingual children. In response to this need, the implementation of recommended approaches to assessing multilingual children's speech in a French-speaking context has been explored in this case example.

#### ***The Language Context***

This project was based in the region of Brussels and the province of Walloon Brabant (Belgium). Brussels has two official languages—Dutch and French—but French is the predominant language (Janssens, 2018). The province of Walloon Brabant is situated in the French-speaking part of Belgium and has French as the only official language. In addition, a wide variety of non-

official languages are used by people in Brussels, and to a lesser extent in Walloon Brabant (Janssens, 2018). Children included in this project were speaking French, as the societal language, combined with a non-French and non-Dutch home language. The group of multilingual children included 14 different languages spoken from Eurasia and Africa: Albanian, Egyptian Arabic; English, German, Greek, Italian, Lithuanian, Moroccan Arabic, Polish, Portuguese, Pulaar, Romanian, Somali, and Turkish.

### ***Methods***

Twenty multilingual children aged 4-6 years participated in a picture-naming task from the French test Exalang 3/6 (Helloin & Thibault, 2006). Parents rated their child's intelligibility in each language using the Intelligibility in Context Scale (ICS; McLeod et al., 2012f), a free parent reporting tool that considers the intelligibility of children with different communication partners. The Parental Bilingual Questionnaire (PaBiQ; Tuller, 2015), a questionnaire for parents of multilingual children, was used to collect parental concern about early speech development. We compared the diagnostic decisions (typical speech vs. SSD) obtained using alternatives to the norm-referenced approach. These were (a) a criterion-referenced approach, (b) a contrastive analysis of errors, and (c) a converging evidence approach. For the criterion-referenced approach, the PCC was calculated for each child and these scores were compared to normative data for French (Kehoe et al., 2020; Kehoe & Girardier, 2020; MacLeod et al., 2011, 2014; Mezziane & MacLeod, 2017). A cut-off score of  $-1.65\sigma$  was used to distinguish between typical and atypical speech performance.

A contrastive analysis of errors was conducted for the multilingual children with a PCC suggesting atypical speech performance to consider potential cross-linguistic interactions (Jasso & Potratz, 2020; McLeod et al., 2017). As an illustration, the phonological structure of Turkish

and French was compared which is possible given publicly accessible information (*Langues et Grammaires Du Monde Dans l'Espace Francophone*, n.d.; MacLeod, 2022). French and Turkish have 17 common consonants, but there are also differences. The consonants /p, ʁ, w, ɥ/ occur in French only and the consonants /ʔ, h, ɾ/ occur in Turkish only. Syllable shape also differs between the languages. Possible syllable shapes in Turkish range from V to CVCC but in French the possible shapes range from V to CCCVCCC. Consonant clusters in initial position are illegal in Turkish, as are final voiced plosives, which are commonly substituted by unvoiced plosives by Turkish speakers of French. In the current study, errors in French speech production that were explainable through the phonological rules of the other language(s) a child spoke were counted as correct productions. From this, a new value of PCC – *corrected PCC* – was calculated for all children. To continue the example of a French-Turkish bilingual child, omission of consonant cluster elements was not counted as errors, for example omission of /l/ in /flœʁ/ *fleur* ‘flower’ and /ʁ/ in /kʁejɔ/ *crayon* ‘pencil’. In contrast, devoicing of voiced consonants in initial position did not appear to be a cross-linguistic effect as voiced initial consonants are permissible in Turkish. Therefore, devoicing of /b/ in /balɛ/ *balai* ‘broom’, and devoicing of /z/ in /zɛbʁ/ *zèbre* ‘zebra’ were considered as true errors.

The converging evidence approach involved combining multiple assessment measures, as this compensated for the inherent weaknesses of each individual measure (Castilla-Earls et al., 2020). Diagnostic decisions were based on the convergence of three criterion-referenced measures: (corrected) PCC in French, ICS scores in both languages, and parental concern. PCC was compared to the cut-off score of  $-1.65\sigma$  for each child’s age. The ICS scores were compared to the cut-off score of 4 (McLeod, 2020) and interpreted as typical (home language and French scores  $> 4$ ), as a cause for concern (home language or French score  $\leq 4$ ), or as atypical (home

language and French scores  $\leq 4$ ). Parental concern about speech/language development was obtained from the PaBiQ questionnaire as either *yes* or *no* (Tuller, n.d.).

### ***Cultural Responsivity***

A culturally responsive approach is based on the assumption that an individual's language and speech use is inseparable from the influence of their social and cultural environment (De Lamo White & Jin, 2011). The speech acquisition and use of a multilingual child is inseparable from the language contact environment in which they grow up. This project is therefore culturally and linguistically responsive in several ways: First, it adopts a holistic view by incorporating multiple speech assessment measures that give a picture of all of the languages that a child uses. Second, it accounts for typical features of multilingual speech acquisition—such as cross-linguistic influences—through a contrastive analysis of errors in the societal language. Finally, it considers the client's perspective using parental rating scales and by gathering parental concerns about speech development.

### ***Findings***

The diagnostic decisions using the different approaches (i.e., norm-referenced, criterion-referenced, corrected PCC after contrastive analysis of errors, and converging evidence) for the 20 multilingual children are presented in Supplementary Material 2 (see also van der Straten Waillet et al., 2024). For nine children (45%), the diagnostic decision varied depending on the approach used. This confirms that the norm-referenced approach led to over-diagnosis for several multilingual children ( $n = 5$ , 20%). In addition, these findings highlight the fact that alternative approaches – such as the contrastive analysis of errors and the converging evidence approach – are available for (non-English-speaking) SLPs and lead to more informed and more nuanced decisions in the diagnosis of SSD in multilingual children.

**Example 4: Children using Icelandic and Polish*****The Problem***

SLPs in Iceland have been unprepared for the relatively recent influx of Polish-speaking immigrants to Iceland and few SLPs are fluent users of both Icelandic and Polish. Icelandic SLPs currently are not well equipped with the knowledge or tools necessary to accurately diagnose SSD in multilingual children in general, and Icelandic-Polish multilinguals in particular. In addition to this, there are long waiting lists for public and private speech-language pathology services in Iceland. It is suspected that part of the reason for this is inappropriate over-referral of multilingual children, including Polish-Icelandic multilinguals, who show dialect specific features in their speech acquisition, but not necessarily SSD. The inability to distinguish these features adds unnecessary burden to the services. Simultaneously, it is of concern that some multilingual children who have SSD are not being referred for speech-language pathology services at an early age and are referred later with reading difficulties that could have been avoided with timely early intervention for SSD. Inappropriate speech-language pathology referral patterns could be contributing to poor outcomes of Polish-speaking children in the Icelandic education system (Hafsteinsdóttir et al., 2022; Ólafsdóttir, 2017). In addition, currently there are no valid and reliable screening methods for identifying SSD in multilingual children who speak Icelandic. Together, these issues pose a significant problem for SLPs working in Iceland, though these are issues shared by SLPs across the world when there is a mismatch between the SLP and their clientele.

***The Language Context***

Iceland is an island nation situated in the North Atlantic with a population of 375,000 which, like many places in the world, has experienced rapid changes in the cultural and linguistic

landscape over the past 20 years. Immigration to Iceland has rapidly increased in recent years, with 18% of residents being born outside of Iceland in 2023, compared to only 3% in 2000 (Statistics Iceland, 2023b,d). The official languages are Icelandic and Icelandic Sign Language (Íslenskt Tákmal: ÍTM). English is also widely used by Icelanders, and Danish is studied as a compulsory subject and 63% of students studying additional language/s as electives in upper high school education (Statistics Iceland, 2024e). While immigrants in Iceland represent a wide range of cultural and linguistic groups, the majority of immigrants are of Polish heritage and these immigrants represent 6% of the population of Iceland (Statistics Iceland, 2024c,d). In 2022, 15% of children enrolled in Icelandic preschools spoke a language other than Icelandic, and 5% of all children in Icelandic preschools are multilingual learners of Polish and Icelandic in the early childhood years (Statistics Iceland, 2024a). As approximately 98% of children aged 2 to 5 years attend preschool in Iceland, this figure is a good indication of the linguistic diversity of Icelandic children.

Polish and Icelandic are both Indo-European languages. Icelandic is a language with only around 400,000 speakers and is a West Nordic and North Germanic language closely related to Faroese, and more distantly related to Norwegian, Danish, and Swedish. Phonologically it consists of about 25 consonants and more than 300 consonant clusters, eight monophthongs, and five diphthongs (Másdóttir, 2025). There is little dialect variation in Icelandic. Polish is a West Slavic language with more than 60 million speakers. While it is spoken in Poland, there is also a large diasporic community spread across the globe. Polish has 31 consonants and more than 1000 consonant clusters, six monophthongs, and two diphthongs (Zydorowicz & Czaplewska, 2025). Similarities and differences in the between the phonetic inventory of Icelandic and Polish are shown in Figure 1.

**Methods**

A method for evaluating speech and diagnosing SSD in multilingual children that has empirical validity and reliability, as well as high levels of social validity is the converging evidence approach (Castilla-Earls et al., 2020). This approach was used with Icelandic-Polish multilingual children to determine which methods and analyses provided the best indication of whether a child had a difference in their Icelandic speech production, or true SSD. Data used in this tutorial were drawn from a cluster-randomized controlled trial of the preschool-based language intervention Orðaheimurinn (World of Words) involving over 200 4-year-old children in 15 preschools. Following the converging evidence approach (Castilla-Earls et al., 2020), data were collected and evaluated to inform whether children had SSD or were using features of their home language/s. Data were collected from a wide variety of sources. Reported concern on Icelandic skills was taken from teachers' responses to the Parent Evaluation of Developmental Status (PEDS; Glascoe, 2000) and for Polish from parents' responses to the PEDS as well as teachers' and parents' responses to open ended questions asking if they had concerns about their child's speech.

Qualitative data were collected from parents by asking if their child said 10 Polish words correctly. This word list was developed by a Polish-speaking SLP who selected the words based on those that commonly produced incorrectly by Polish-speaking children with delayed speech acquisition or SSD, based on both research and clinical experience. Parents also reported their child's current proficiency in using both Icelandic and Polish. Children's language history and experience were considered by asking parents about their child's early language milestones (e.g., babbling, first words) and whether they had ever been referred to speech-language pathology or received assessment or therapy from an SLP. Parents were also asked if their child was born in

Iceland or when they moved to Iceland and when their child started attending preschool (i.e., being in an Icelandic-speaking environment daily).

Language environment was considered through questions to parents about the languages that their child most frequently heard and used at home, when their child first received consistent and significant exposure to Icelandic, parent skills in using Icelandic and Polish, and which languages the child usually spoke with different people in their environment. Objective reports were obtained through children's teachers completing the ICS for Icelandic (McLeod et al., 2012c) and parents completing the ICS for Polish (McLeod et al., 2012d). All information from parents and teachers were collected by questionnaire, with relevant questions taking two to five minutes to complete. Parent questionnaires were provided in Polish. Finally, objective evidence in the form of data from Icelandic speech production tests were collected. Icelandic-Polish multilingual 4-year-old children participating in the Orðaheimurinn study had data available from two Icelandic speech tests: Málhljóðapróf (MHP; Másdóttir, 2014) and Málfærni eldri leikskólabarna (MELB; Másdóttir et al., 2021). In addition, 19 native Polish-speaking adults who lived in Iceland and had learnt Icelandic as an additional language were assessed using the same speech test as the children completed to understand which 'errors' in Icelandic speech production might be the result of cross-linguistic transfer. Children's and adults' speech samples were transcribed and analyzed using the Phon (Hedlund et al., 2020), a free, open access software program designed for research in phonetics, phonology and language acquisition.

### ***Cultural Responsivity***

While other approaches described in this tutorial have demonstrated a carefully considered, refined, deliberate approach to collecting specific information from children and families in designing culturally responsive assessment methods, here a different approach is

taken. Instead, here every piece of available information was used as evidence and analyzed to determine which sources of evidence provide the best and most clinically utilitarian solution for identifying children with SSD in the context of Icelandic-Polish speaking children in Iceland. The culturally responsiveness of this approach lies in SLPs respecting the skills that children bring to from Polish to their acquisition of Icelandic. Further, it equally considers evidence provided by parents, teachers, and SLPs to bring diverse and equally weighted sources of knowledge to decisions about SSD diagnosis. Speech samples were analyzed across a range of dimensions (e.g., whole word match, PPC-R, phoneme inventory etc.) in two ways: (a) using standard clinical (monolingual) practice and (b) after adjusting transcriptions and scores to reflect cross-linguistic transfers from identified in the speech of Polish-speaking adult learners of Icelandic. From this, recommendations can be made about streamlined clinical assessment and speech analysis for Icelandic-Polish speaking children, resulting in concrete, ecologically valid guidelines for SLP on how to be culturally responsive in their daily practice while adding the minimum possible work to their busy caseloads.

### ***Findings***

Preliminary findings for adult and child speech samples suggest that common cross-linguistic differences include seven processes that differ from typical acquisition of Icelandic by monolingual children: (a) voicing of stops was observed, which is not seen in monolingual acquisition (example: *bók* /pou:k/ → [bou:k] ‘book’); (b) de-preaspiration of plosives, which is infrequently observed in monolingual acquisition (example: *dúkka* /tuhka/ → [tuk:a] ‘doll’); (c) mismatches in syllable length (i.e., long vowel when they should be short and vice versa), which is not seen in monolingual acquisition (example: *fata* /fa:ta/ → [fat:a] ‘fata’); (d) difficulties with voiceless sonorants, which is a later developing feature in monolingual acquisition (example:

757 *hnífur* /ni:vYɹ/ → [ni:vYɹ] ‘knife’); (e) unusual vowel mismatches/substitutions/distortions, which  
 758 are infrequently observed in monolingual acquisition (example: *blóm* /plou:m/ → [plœym]  
 759 ‘flower’); (f) stopping of velar fricatives, which is a process observed in monolingual acquisition  
 760 (example: *fluga* /fly:ya/ → [fly:ka] ‘fly’); and (g) deaspiration of postaspirated stops in word-  
 761 initial position, a common process in young monolingual children (example: *kaffi* /kʰaf:ɪ/ →  
 762 [kaf:ɪ] ‘coffee’). These preliminary findings indicate that it is important for SLPs to be aware of  
 763 not only the differences in the phonetic inventories of the languages that a child uses, but also  
 764 how phonological processes may be impacted by crosslinguistic influences.

### 765 **Conclusion and Implications**

766 The four different methodologies described in this paper for assessing multilingual  
 767 children’s speech have a range of implications that address the clinical problem of misdiagnosis  
 768 of SSD in this population while also supporting the human right to communicate (cf. Farrugia-  
 769 Bernard 2018). The JamC-English case study provided a model for validating pre-existing  
 770 outcome measures for use in new contexts with multilingual children using methods tailored to  
 771 the JamC-English linguistic community and adapted to the unique lexical and historical context  
 772 of these languages. Adapted scoring of the DEAP allowed for accurate assessment of speech in  
 773 JamC while the FOCUS provided a tool to examine speech skills of multilingual children  
 774 through the lens of communicative participation. Based on this example, SLPs are encouraged to  
 775 collaborate with families and community members to understand each child’s unique linguistic  
 776 context, allowing for the selection of culturally appropriate tools that center the individual in  
 777 their care. In contrast, the description presented in the VietSpeech case study provided an  
 778 example of how researchers and SLPs can assess, transcribe, and analyze children’s speech in  
 779 both English and their home language in outlining the SACHL. SLPs may apply techniques from

the SACHL when working with multilingual children who do not speak the same languages and them. This case study shows that including direct speech assessment of home languages (with the support of family members, interpreters, and/or multilingual colleagues) is both necessary and possible for accurate diagnosis of SSD and provides a foundation for English-speaking SLPs to support multilingual children in all the languages that they speak. Data from adult and child speakers of the language advances the ecological validity of findings.

From the case-study conducted in Belgium we learned that SLPs do have the skills and knowledge to implement recommended approaches to assessing multilingual children's speech beyond the English-speaking world, a context which is often neglected in published research. In this case example, this occurred through the collection of multiple speech measures in each of the child's languages and through techniques such as the ICS (McLeod et al., 2012f). In addition, new applications such as Speakaboo (*Speakaboo*, n.d.) which allow SLPs to directly examine speech production in multiple languages might also be of interest to readers. In addition, evidence collected through speech measures was interpreted considering possible cross-linguistic influences of the languages that children spoke so that diagnostic decisions can be based on a holistic and culturally responsive approach. Finally, from the study of Icelandic-Polish multilingual children, changes that are currently underway are described. Specifically, the possibilities of using adult models and a broad range of parent (home language) and teacher (community language) measures in a converging concern approach were demonstrated. More importantly, the approaches employed reinforced the need for partnerships between the SLP, family, and community members in the assessment and diagnostic process.

Figure 3 has been developed by the authors of this tutorial as a proposed model for practice in the assessment and differential diagnosis of SSD for multilingual children. This

model is based on the current recommendation in the literature, the combined evidence from these case examples, and the clinical and research experience of the authors. Converging evidence for diagnosis of SSD requires, at a minimum, data concerning a child's speech accuracy, speech intelligibility, and reported concern. Based on the convergence of each of these sources of information, a diagnostic decision of SSD or typical speech may be made. If data from these sources of information are diverging, a decision of review would be recommended. Reviewing could include collecting more assessment data of different types or from different sources concerning the child's speech as well as monitoring the child's progress over time before deciding whether a diagnosis of SSD or typical development would be possible. For measures of speech accuracy, it is recommended that speech production is measured (in some way) in both the child's home language and the language used in their community. For speech intelligibility, reports of different interlocutors' abilities to understand the child in each of the languages they use should be considered, for example using the ICS that informs the functional aspects of speech intelligibility (McLeod et al., 2012f). Finally, reported concern should be considered based on the perspectives of people who know the child well, for example parents and teachers, and who see the child in different language environments. Tools such as the FOCUS (Oddson et al., 2019; Thomas-Stonell et al., 2010; Washington et al., 2013) or the PEDS (Glascoe, 2000) can be used to facilitate the collection of these perspectives.

Insert Figure 3 about here

Ultimately, a converging evidence approach (Castilla-Earls et al., 2020) using intentional and culturally responsive methods is needed to accurately diagnose SSD in multilingual preschoolers. SLPs can be enabled to demonstrate cultural responsiveness by bridging the gap between research recommendations and clinical practices. Culturally responsive practices, while

a universal construct for speech-language pathology, need to be operationalized at a local level if they are to be successful.

**Data Availability Statement.** Data may be requested by contacting the authors.

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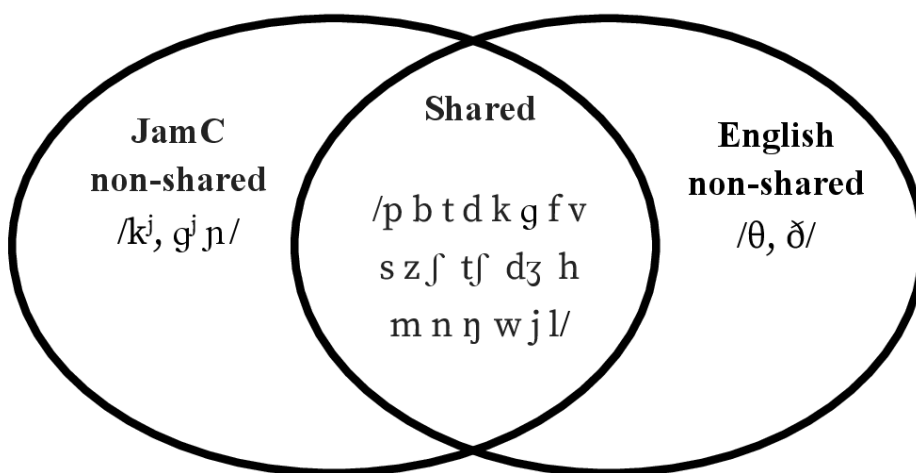
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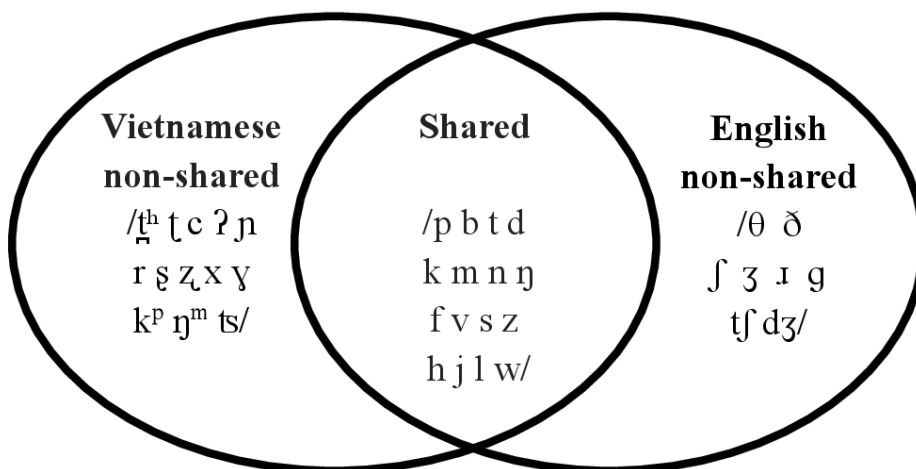
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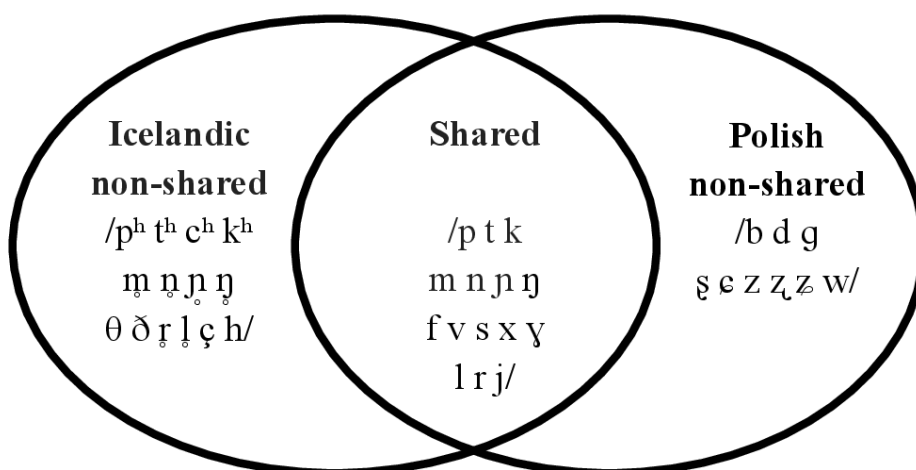
### Jamaican Creole and English



### Vietnamese and English



### Icelandic and Polish



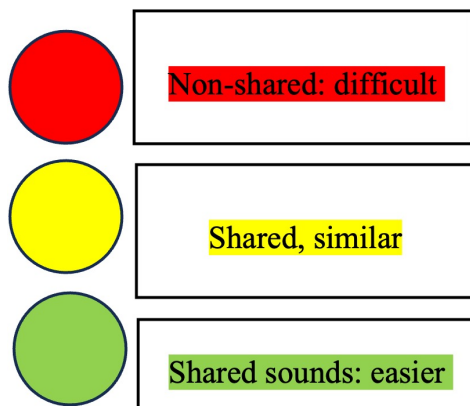
1180 **Figure 1:** *Shared and non-shared consonants across example languages*

1181 *Note.* The Vietnamese and English consonants: consonant figure is reprinted with permission

1182 from Kate Margetson (2024). Some Vietnamese consonants are dialectal or contested.

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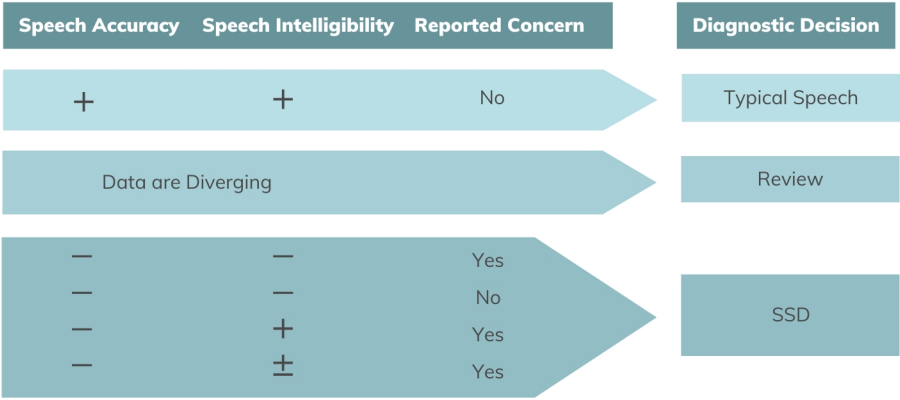
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1186 **Figure 2:** *Multilingual Transcription Traffic Lights* (Margetson, 2024)

1187 Reprinted with permission from Kate Margetson (2024) as described in Margetson and

1188 McLeod (2025).

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1191 **Figure 3:** *Proposed Procedure for Diagnostic Decisions with Multilingual Children*

1192 *Note.* **+** = typical in both/all languages, **—** = atypical or cause for concern in both/all

1193 languages, **±** = typical in one language and atypical or cause for concern in another language

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**Supplementary Materials**

1196

Supplementary Material 1

1197

*Reasons for Mismatches in Multilingual Children's Speech*

| <b>Reasons for mismatches in multilingual children's speech</b> | <b>Explanation</b>                                                                                                    |
|-----------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| Development                                                     | Phonological patterns. Note phonological patterns can be typical in one language, but atypical in another.            |
| Dialect                                                         | Consonants, vowels and tones may differ between standard forms and dialects of the same language.                     |
| Cross-linguistic transfer                                       | Linguistic structures from one language are used while speaking the other or have an influence on the other language. |
| Ambient phonology                                               | Sounds that children are exposed to across different environments by all their communication partners.                |
| True errors                                                     | Mismatches in children's speech that cannot be explained by any of the above reasons.                                 |

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*Note.* See McLeod, S., Margetson, K., Wang, C., Tran, V. H., Verdon, S., White, K., & Phạm, B. (2021). Speech acquisition within a 3-generation Vietnamese-English family: The influence of maturation and ambient phonology. *Clinical Linguistics and Phonetics*, 36(4-5), 470-493. <https://doi.org/10.1080/02699206.2020.1862915>

1203

1204 Supplementary Material 2

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1206 *Diagnostic Decisions Using Each Assessment Approach*

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| Children | Norm-Referenced Approach | Criterion-Referenced Approach | Contrastive Analysis of Errors | Converging Evidence Approach |
|----------|--------------------------|-------------------------------|--------------------------------|------------------------------|
| 1        | SSD                      | SSD                           | SSD                            | SSD                          |
| 2        | SSD                      | SSD                           | SSD                            | SSD                          |
| 3        | SSD                      | SSD                           | SSD                            | SSD                          |
| 4        | SSD                      | SSD                           | SSD                            | To Monitor                   |
| 5        | SSD                      | SSD                           | Typical                        | Typical                      |
| 6        | SSD                      | SSD                           | Typical                        | Typical                      |
| 7        | SSD                      | Typical                       | Typical                        | To Monitor                   |
| 8        | SSD                      | Typical                       | Typical                        | To Monitor                   |
| 9        | SSD                      | Typical                       | Typical                        | Typical                      |
| 10       | SSD                      | Typical                       | Typical                        | Typical                      |
| 11       | SSD                      | Typical                       | Typical                        | Typical                      |
| 12       | Typical                  | Typical                       | Typical                        | To Monitor                   |
| 13       | Typical                  | Typical                       | Typical                        | Typical                      |
| 14       | Typical                  | Typical                       | Typical                        | Typical                      |
| 15       | Typical                  | Typical                       | Typical                        | Typical                      |
| 16       | Typical                  | Typical                       | Typical                        | Typical                      |
| 17       | Typical                  | Typical                       | Typical                        | Typical                      |
| 18       | Typical                  | Typical                       | Typical                        | Typical                      |
| 19       | Typical                  | Typical                       | Typical                        | Typical                      |
| 20       | Typical                  | Typical                       | Typical                        | Typical                      |

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