Children’s acquisition of consonants, semivowels, vowels, and tones in Northern Viet Nam

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Certificate of Authorship

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person nor material which to a substantial extent has been accepted for the award of any other degree or diploma at Charles Sturt University or any other educational institution, except where due acknowledgment is made in the doctoral research. Any contribution made to the research by colleagues with whom I have worked at Charles Sturt University or elsewhere during my candidature is fully acknowledged. I agree that this doctoral research is made accessible for the purpose of study and research in accordance with the normal conditions established by the Executive Director, Library Services or nominee, for the care, loan, and reproduction of theses.

Ben Phạm

June, 2018
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Ethics Approval

The study was approved by the Charles Sturt University Human Research Ethics Committee (CSU HREC) (approval number 2015/285).

The study was conducted in educational settings in Viet Nam. Information about the ethical issues were submitted to the study sites. Permission (consent) to conduct the research was gained from the preschool principals, teachers, and parents. Additionally, assent to participate was gained from the children.
The purpose of this doctoral research was to describe the speech acquisition of typically-developing Northern Vietnamese-speaking children. To achieve this overarching purpose, five aims were addressed: (1) to identify the consonants, semivowels, vowels/diphthongs, and tones of the Northern dialect compared with the Standard, Central, and Southern dialects of Vietnamese, (2) to present an overview of tone languages, (3) to develop a speech assessment to elicit speech samples from Vietnamese-speaking children, (4) to investigate children’s acquisition of Northern Vietnamese phonemes (speech accuracy, phoneme acquisition, non-adult realisations, and phonological patterns/processes), and (5) to investigate Northern Vietnamese-speaking children’s intelligibility.

This doctoral research contained two parts and was presented in nine chapters, five of which were publications (one encyclopaedia entry and four journal articles). Part 1 included three comprehensive literature reviews. The first provided a review of phonological differences in the Northern Vietnamese dialect in comparison with the Standard, Central, and Southern Vietnamese dialects (Paper 1). The second provided an overview of tone languages (Paper 2). The third reviewed policy and literature about Vietnamese education and the speech-language pathology profession.

Part 2 commenced with a review of definitions of typical speech acquisition, phonological theories, and research design and methods for studying speech acquisition that informed the methodology of this doctoral research. Paper 3 described the conceptualisation and operationalisation of the Vietnamese Speech Assessment (VSA, Phạm, Le, & McLeod, 2016) used to elicit speech samples during data collection. The main findings of this doctoral research were presented in Papers 4 and 5.
Paper 4 described speech acquisition of 195 typically developing Northern Vietnamese children aged 2;2-5;11 years. Relational analyses were used to measure speech accuracy, phoneme acquisition, non-adult realisations, and phonological patterns/processes that resulted in four main findings. First, the accuracy scores of consonants, semivowels, vowels, and tones for Northern Vietnamese-speaking children were higher as age increased demonstrating the improvement of speech production accuracy with age. Second, by the age of 5;5-5;11, these Northern Vietnamese-speaking children had acquired all Vietnamese consonants, semivowels, vowels, and tones, with the exception of the initial-syllable consonants /ɲ, s, z, x/, the within syllable semivowel /w/, tone 3 (creaky thanh ngã), and tone 4 (dipping-rising thanh hỏi). Third, typical non-adult realisations of Northern Vietnamese consonants, semivowels, and tones were identified and variability of non-adult productions decreased in the older age groups. Fourth, common phonological patterns for younger children were fronting, stopping, deaspiration, aspiration, and semivowel deletion, and for older children were fronting and deaspiration. The children’s age and maternal education but not sex were found to influence the children’s speech accuracy.

Paper 5 described parent-reported data regarding intelligibility of 181 Northern Vietnamese-speaking children aged 2;0-5;11 years and included validation of the Intelligibility in Context Scale: Vietnamese (ICS-VN, McLeod, Harrison, & McCormack, 2012). The mean ICS-VN score of Northern Vietnamese-speaking children was 4.43 (out of maximum 5.00) indicating that these children were “usually” to “always” intelligible. The ICS-VN scores were rated as significantly different between communication partners (higher ICS scores for family members and lower for strangers) and between children whose parents were and were not concerned about their speech and language skills (higher ICS scores for children with no concern). Additionally, factors significantly influencing the ICS-VN scores of Northern
Vietnamese-speaking children were children’s age, parents’ occupation level, and mothers’ educational level but not children’s sex or fathers’ educational level.

The findings of this doctoral research provide emerging evidence about Northern Vietnamese-speaking children’s typical speech acquisition to inform policy and practice regarding the Vietnamese Government’s Developmental Standard 15 “Trẻ biết sử dụng lời nói để giao tiếp” (The child uses speech to communicate), Item 65 “Nói rõ ràng” (To speak clearly) and Item 70 “Kể về một sự việc hoặc hiện tượng nào đó để người khác hiểu được” (To narrate an event or a fact intelligibly to others). The findings also provide emerging evidence for professionals in Viet Nam and other countries to assist with the identification of children with speech sound disorders. The doctoral research introduces and validates two assessment tools (VSA and ICS-VN) for clinical and research use with Northern Vietnamese-speaking children. The study presented in this doctoral research is aligned with other international studies about speech acquisition providing a reference for future researchers in Viet Nam.
Publications and Conference Papers Arising from this Doctoral Research

Publications (in order that they appear in this doctoral research)


Translated Publication (with permission)


Editorial


Invited Conference Paper (peer reviewed, published abstract and handout)


Conference Papers and Posters (peer reviewed, published abstracts)


Position Papers


Invited Presentations (non-peer reviewed)


Grants


Awards

Preface

My interest in undertaking this doctoral research stemmed from my previous research, employment, and personal passion. My undergraduate and masters degree research both in philology and special education focused on child linguistics and literature. This interest was strengthened further through my work at the division of Hearing and Speech-Language Impairments, Ha Noi National University of Education (HNUe), Viet Nam since 2003. I was a primary subject coordinator for undergraduate students in several faculties at HNUe (e.g., Special Education, Early Childhood Education, and Primary Education). This position involved lecturing in many courses including Vietnamese, Vietnamese in Use, Child Language and Speech, Child Literature, and Speech-Language Assessment and Intervention for Children with Special Needs. This experience provided opportunities to develop my background in Vietnamese linguistics and education. This also created challenges because currently very little is known about Vietnamese-speaking children’s speech and language acquisition, and normative studies in the area are limited. The information used in my lectures about the typical development of children’s speech and language was mostly based on the research evidence related to children who speak different languages (e.g., English, Cantonese) or who are bilingual Vietnamese-English in other countries.

While working as a lecturer at the Faculty of Special Education at HNUe, I also had opportunities to work collaboratively with educators at the HNUe-affiliated Training and Development Centre for Special Education to design and implement educational assessment and intervention to support the speech and language skills of preschool-aged children with special needs. However, it was challenging to measure the children’s speech and language skills and the extent of any difficulties for two main reasons. Firstly, identifying and interpreting the children’s speech and language developmental milestones was a challenge because of the lack of normative studies of
Vietnamese-speaking children. Secondly, assessment tools standardised in other languages were not appropriate or practical for use with monolingual Vietnamese-speaking children. Even though my knowledge of children’s speech production helped me recognise speech sound errors in terms of consonants, semivowels, vowels, and tones, it was not possible to diagnose those with typical versus disordered versus delayed speech or to determine appropriate goals to assist children to become more intelligible. This lack of normative data and appropriate assessment tools sparked my interest in initiating a normative study on speech acquisition of preschool-aged Vietnamese-speaking children.

As of February 2014, the Viet Nam government has implemented the national education reform titled “Đổi mới căn bản và toàn diện giáo dục và đào tạo” (Fundamental and Comprehensive Reform in Education and Training). In early childhood education, child-focused and evidence-based national educational strategies and directions have been prioritised. For example, completing universal education for children aged 5 in 2015, stipulating the Developmental Standards for 5-year-old children, and implementing the remodelled-preschool curriculum. I am thus excited about contributing to this reform.

In 2013, I received an Australia Awards Scholarship (AAS) to undertake a four-year PhD program in Australia. Having discussed the research project with Professor Sharynne McLeod via Skype while I was in Viet Nam, I was excited by the prospect of working with highly skilled supervisors at Charles Sturt University in whose expertise I am keenly interested. Given Professor McLeod’s research experience in children’s speech acquisition in multilingual contexts and exposure to Vietnamese language contexts, I decided to undertake my doctoral research on the topic of children’s speech acquisition of consonants, semivowels, vowels, and tones in Northern Viet Nam.
Note on Style

This thesis includes five publications: four journal articles (including three that have been published and one that is currently under review) and one encyclopaedia entry (in press). The three published publications (embedded in Chapters 2, 6, and 8) appear in the format in which they were published. The encyclopaedia entry in press (embedded in Chapter 3) and the journal article in submission (embedded in Chapter 7) are formatted in the style as per publisher requirements and the references of the two submitted manuscripts are double-spaced. As the requirements of the encyclopaedia entry was that minimal references could be used; therefore, the remaining references that informed the paper have been added at the end of the relevant chapter. The reference lists of the remaining chapters (Chapters 1, 4, 5, and 9) are single-spaced to align with Charles Sturt University’s guidelines for doctoral research submission.

As per publisher requirements, tables and figures that are included in published and submitted manuscripts appear in the format in which they were published. These tables and figures are notated with Arabic Numerals (1-9). Tables and figures included in chapters only in this thesis (i.e., not included in any of the above publications) are notated with Roman Numerals (I-IX).

Spelling and Language Conventions

The overall spelling and language conventions of this thesis adhere to the American Psychological Association Publication Manual (6th edition) but using Australian/British English spelling. However, as per publisher requirements, all publications adhere to the spelling, language, style, and transcription requirements of the nominated journal. For example, Paper 1, titled “Consonants, vowels and tones across Vietnamese dialects” and published in the International Journal of Speech-Language Pathology, was written in Australia/British English and did not use the Oxford comma; whereas, Paper 7, titled “Vietnamese-speaking children’s acquisition of
consonants, semivowels, vowels, and tones in Northern Viet Nam” and submitted to a US journal, was written in American English.

The spelling and language conventions for proper names indicating locations in Viet Nam were written in the same format as they were written in Vietnamese but without Vietnamese diacritics throughout this doctoral research including the published papers. For example, Việt Nam, Hà Nội, and Hải Phòng were spelled as Viet Nam, Ha Noi, and Hai Phong in this doctoral research.
Statements from Co-Authors Confirming the Authorship Contribution of the
Doctoral Candidate

Paper 1

As co-author of the paper entitled *Consonants, vowels and tones across Vietnamese dialects*, I confirm that Ben Phạm has made the following contributions:

- Conceptualisation of the paper
- Review and interpretation of the literature
- Writing, editing, and revision of the manuscript.

Furthermore, I agree to the inclusion of the paper in this doctoral research submitted for examination.

Name: Ben Phạm
Date: June 2018

Name: Sharynne McLeod
Date: June 2018
As co-author of the paper entitled *Tone languages and communication disorders*, I confirm that Ben Phạm has made the following contributions:

- Conceptualisation of the paper
- Review and interpretation of the literature
- Writing, editing, and revision of the manuscript.

Furthermore, I agree to the inclusion of the paper in this doctoral research submitted for examination.

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Date: June 2018

Name: Sharynne McLeod
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Paper 3

As co-authors of the paper entitled *Development of the Vietnamese Speech Assessment*, we confirm that Ben Phạm has made the following contributions:

- Conceptualisation of the paper
- Review and interpretation of the literature
- Writing, editing, and revision of the manuscript.

Furthermore, we agree to the inclusion of the paper in this doctoral research submitted for examination.

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Date: 4 August 2016

Name: Sharynne McLeod
Date: 4 August 2016

Name: Xuan Thi Thanh Le
Date: 4 August 2016
As co-author of the paper entitled *Vietnamese-speaking children’s acquisition of consonants, semivowels, vowels, and tones in Northern Viet Nam*, I confirm that Ben Phạm has made the following contributions:

- Conceptualisation of the paper
- Review and interpretation of the literature
- Design of the research questionnaires
- Collection and analysis of data
- Writing, editing, and revision of the manuscript.

Furthermore, I agree to the inclusion of the paper in this doctoral research submitted for examination.

Name: Ben Phạm  
Date: June 2018

Name: Sharynne McLeod  
Date: June 2018
As co-authors of the paper entitled *Validation and norming of the Intelligibility in Context Scale in Northern Viet Nam* we confirm that Ben Phạm has made the following contributions:

- Conceptualisation of the paper
- Review and interpretation of the literature
- Design of the research questionnaire
- Collection and analysis of data
- Writing, editing, and revision of the manuscript

Furthermore, we agree to the inclusion of the paper in this doctoral research submitted for examination.

Name: Ben Phạm
Date: 27 February 2018

Name: Sharynne McLeod
Date: 27 February 2018

Name: Linda Harrison
Date: 27 February 2018
Chapter 1
Introduction and Orientation to this Doctoral Research

Vietnamese is one of the top 20 languages commonly spoken in the world. In Viet Nam, education and special education is prioritised and speech-language pathology is an emerging profession. The Vietnamese government indicates that “to speak clearly” is one of the Developmental Standards for 5-year-old children (Viet Nam Ministry of Education and Training, 2010). To date, there are no standardised speech assessments or normative data regarding Vietnamese-speaking children’s speech acquisition and intelligibility. This doctoral research endeavoured to fill the gap in knowledge by describing Northern Vietnamese-speaking children’s speech acquisition and intelligibility.

Background

Viet Nam

Viet Nam is located in Southeast Asia, bordering China to the north, Laos and Cambodia to the west, and the Gulf of Thailand, Gulf of Tonkin, and South China Sea to the south and east (Figure I). Although the country is spread over a geographically small area of approximately 331,000 km$^2$, the population is the 15th largest in the world accounting for over 92 million people (General Statistics Office of Viet Nam, 2016).

The country is in a shape of the letter “s” and geographically and administratively consists of three regions (miền): Northern, Central, and Southern Viet Nam. In the Northern region, there are two areas (vùng) including the Red River delta (đồng bằng sông Hồng) with nine provinces and two municipalities, and the Northern midland and mountain area (trung du miền núi phía Bắc) with 14 provinces. In the Central region, there are two areas including the North Central and Central coastal area (bắc trung bộ và duyên hải miền trung) with 13 provinces and a municipality, and the
Central highlands area (tây nguyên) with five provinces. In the Southern region, there are two areas including the South East area (đông nam bộ) with 5 provinces and a municipality, and the Mekong delta (đồng bằng sông Cửu Long) with 12 provinces and a municipality (General Statistics Office of Viet Nam, 2016). There are significant gaps between the urban, rural, mountainous, and remote areas in terms of living standards, educational, and vocational opportunities (Bélanger & Liu, 2008; Nguyen, 2004).

Figure I. Location of Viet Nam. Created by the Spatial Analysis Network, Charles Sturt University for the author.

Since the 1990s, Viet Nam has shown the greatest development in the country’s history in terms of its rapidly expanding economy (Holsinger, 2009); however, the
country has remained a low middle income country with the per capita gross domestic product of $1,890 (World Bank, 2014). As a developing country, human development in Viet Nam has been ranked as medium with the human development index at 0.638 which is the 121st amongst 187 countries, and falls below the international poverty line (United Nations Development Programme, 2014).

Viet Nam has a young population with 24.1% aged 0-14 years, 17.2% aged 15-24 years, 45.1% aged 25-54 years, 7.8% aged 55-64, and 5.8% aged 65 years and over (Central Intelligence Agency, 2015). The number of children under age 5 is approximately 7.14 million (United Nations Development Programme, 2014). The national gender ratio at birth has been estimated to be 1.13:1 between boys and girls (General Statistics Office of Viet Nam, 2016). Since the 1990s, family planning rules have been applied to advocate for no more than two children per family in order to enhance educational opportunities for children (Truong, Knodel, Lam, & Friedman, 1998). While reducing the size of the nuclear family, families have also become more heterogeneous. Many families have multi-generations that co-reside and create intergenerational exchanges between extended family members in terms of mutual spiritual and material support (Knodel, Friedman, Truong, & Bui, 2000). Nuclear families are also becoming popular, either as a result of employment in other cities or disconnection from the kinship network. Due to six months of paid maternity leave, childcare is usually delegated to grandparents when the mother returns to the workplace. Typically, grandmothers come to stay in their son or daughter’s house to look after their grandchild or the infant is sent to live at their grandparents’ house that is often far away from the mother and father. Many affluent families can hire servants or nannies. During the first years of childhood, many children are reared more by their kin and paid caregiving nannies than by their parents, resulting in attachment to these caregivers.
Therefore, caregivers’ language(s)/dialect(s) may become the ambient language for the early phonological development of the child.

Vietnamese

Vietnamese is a sub branch of Vietic in the Austroasiatic language family, one of the five major language families spoken in Asia (Cheng, 1990). Vietnamese is the official language of Viet Nam. It is spoken by most of the population (over 92 million people from all 54 ethnic groups). Vietnamese is spoken as the first language of the Kinh people (or ‘Vietnamese’ people), the largest ethnic group accounting for approximately 86% of the population in the country (Trần, 2000). Vietnamese is spoken as a second language of the 53 other ethnic minority groups who speak indigenous languages in Viet Nam (Trần, 2000). Vietnamese is also spoken as a home language by nearly four million Vietnamese diaspora, and by a number of Vietnamese nationals who have migrated to many other countries including Australia, Canada, Czech Republic, and United States (Australian Bureau of Statistics, 2017; Camarota & Zeigler, 2014; Statistics Canada, 2012; Viet Nam Ministry of Foreign Affairs, 2012).

Vietnamese is the official language to be used in schools and other educational institutions in Viet Nam as reiterated in Article 7 of the 2005 Education Law (Viet Nam National Assembly, 2005). Vietnamese has three main dialects including Northern, Central, and Southern Vietnamese. Each of the Vietnamese dialects has a number of specific characteristics regarding phonology and vocabulary. Due to differences between the Vietnamese dialects, the Vietnamese government has promoted a long-term campaign of Vietnamese standardisation to have standard pronunciation (chuẩn phát âm) and standard orthography (chuẩn chính tả) for the Vietnamese language. Standard Vietnamese is formulated mainly from the Northern Vietnamese spoken in the capital city Ha Noi in combination with additional key features from other regions (Huỳnh, 1999). Standard Vietnamese is a main subject in the curriculum of all educational
levels. Additionally, in accordance with the goals of the 2014 educational reform, programs available and supportive of teaching Vietnamese language for Vietnamese communities in other countries around the world have been designed and promoted. This doctoral research investigates speech acquisition of Northern Vietnamese-speaking children. Information about the Vietnamese language is described further in detail in Chapter 2 (Paper 1) titled Consonants, vowels, and tones across Vietnamese dialects and Chapter 3 (Paper 2) titled Tone languages and communication disorders.

Support for Children’s Communication in Viet Nam

Viet Nam is a Majority World country. The country is emerging regarding delivery of communication specialist services and the education of speech-language pathologists. These issues have been identified similarly in other Majority World countries throughout the world and in the Asia-Pacific region (Cheng, 2010; Wylie, McAllister, Davidson, & Marshall, 2013). Recently there have been efforts to support for the development of specialist services for people with communication needs in Majority World countries; for example, Cambodia (Heine, 2018; Randazzo & García, 2018), Fiji (Hopf, 2018), Ghana (Crowley et al., 2013; Wylie et al., 2017) and Uganda (Barrett & Marshall, 2013). Within this global scheme, education of communication specialists and services for people with communication needs in Viet Nam is emerging with the support of clinical training programs and professional development workshops through international collaborations (Atherton, Nguyễn, & Võ, 2013; Eitel, Tran, & Management Systems International, 2017; McAllister et al., 2013). Further information about support for children’s communication in Viet Nam is discussed in Chapter 4.

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1 Majority World countries are referred to as “developing”, “low income” or “third world”, and are where the large proposition of the world’s population lives. This is contrary to Minority World countries which are commonly described as “developed” countries that capture a relatively small proportion of the world’s people (Speech Pathology Association of Australia, 2016).
The Communication Capacity Research program (Hopf, 2018) recommends four stages for the development of communication specialist services in Majority World countries. The four stages include: “(1) gathering knowledge from policy and literature; (2) gathering knowledge from the community; (3) understanding speech, language and literacy use and proficiency; and (4) developing culturally and linguistically appropriate resources and assessments” (p. 84). These four stages have been followed within this doctoral research in alignment with the following research aims.

**Research Aims**

The overarching aim of this doctoral research was to describe Vietnamese-speaking children’s speech acquisition and intelligibility in Northern Viet Nam. To address the overarching aim, a number of research activities were conducted in respect of the five research aims:

Aim 1: To identify the consonants, semivowels, vowels/diphthongs, and tones of the Northern dialect compared with the Standard, Central, and Southern dialects of Vietnamese

Aim 2: To present an overview of tone languages

Aim 3: To develop a speech assessment to elicit speech samples from Vietnamese-speaking children

Aim 4: To investigate children’s acquisition of Northern Vietnamese phonemes (speech accuracy, phoneme acquisition, non-adult realisations, and phonological patterns)

Aim 5: To investigate Northern Vietnamese-speaking children’s intelligibility.

These five research aims were achieved with five papers published and submitted as summarised in Table I below. Aims 1 and 2 relate to stages 1 and 2, and aims 3, 4, and 5 relate to stages 3 and 4 of the Communication Capacity Research program (Hopf, 2018).
Synopsis

This doctoral thesis contains two parts presenting new knowledge about Northern Vietnamese-speaking children’s speech acquisition and intelligibility to address the five stated research aims. Part 1 contains the literature review and consists of four chapters (Chapters 1-4), two of which are publications (Papers 1 and 2). Part 2 contains the research studies and consists of five chapters (Chapters 5-9) including Papers 3, 4, and 5.

Part 1: Vietnamese Language and Context

Part 1 includes literature reviews undertaken in this doctoral research. The current chapter (Chapter 1) provides a general introduction of the research topic and background regarding demographic information, language and communication specialist services in Viet Nam. The chapter also outlines the research aims, synopsis, theoretical framework, and methodology.

Chapter 2 is formatted in the style of a published journal article (Paper 1) that provides a comprehensive literature review of variations of consonants, semivowels, vowels, and tones in the Northern Vietnamese dialect in comparison with the Standard, Central, and Southern Vietnamese dialects. The information presented in Chapter 2 provides a phonological foundation for consideration of the Vietnamese phonemes included in the speech assessment and speech analysis in Part 2 of this doctoral research.

Chapter 3 is an invited encyclopaedia entry (Paper 2) that presents an overview of communication disorders in tone languages. Different features of tones (e.g., definition, conventions, acquisition, assessment, and intervention) were described across languages including languages with simple and complex tones. The information presented in Chapter 3 provides a phonological foundation for consideration of Vietnamese tones in assessment and analysis of Vietnamese-speaking children’s speech.
Part 1 concludes with Chapter 4, which provides an introduction to the Vietnamese context, containing an overview of literature and policy regarding the educational system (e.g., the educational structure, early childhood education, and special education) and the speech-language pathology profession (e.g., terminology, history, laws and policies, and education and services of speech-language pathology). This chapter also outlines the Vietnamese government’s Developmental Standards for 5-year-old children and describes six standards comprising 30 items regarding language and communication development. In reviewing the Developmental Standards for 5-year-old children, it is apparent that there is a pressing need for finer-grained data to assist with the enactment and understanding of the Developmental Standards for Standard 15 “The child uses speech to communicate”, Item 65 “To speak clearly”, and Item 70 “To narrate an event or a fact intelligibly to others”. Therefore, information presented in Part 1 of this doctoral research lays the foundation regarding the Vietnamese speech sound system and context for study of Vietnamese-speaking children’s speech acquisition that is presented in Part 2.

**Part 2: Vietnamese Children’s Speech Acquisition**

Part 2 includes the research studies undertaken in this doctoral research. Part 2 begins with Chapter 5, which provides information about definitions, theories, and methodological considerations for studying speech acquisition. Each section within Chapter 5 is described theoretically and is followed with clinical applications for this doctoral research. To provide a multi-faceted perspective on children’s speech acquisition, an overview of different phonological theories is undertaken including the Emergence Approach (Davis & Bedore, 2013) that is used as the theoretical underpinning of this doctoral research. Chapter 5 also outlines methodological considerations including research designs for studying speech acquisition and speech
acquisition measurement protocols for cross-sectional studies that are transferred to this doctoral research.

Chapter 6 describes the creation of the Vietnamese Speech Assessment (VSA, Pham, Le, & McLeod, 2016) in the form of a published journal article (Paper 3). The VSA is a single-word picture-naming task that can be used to elicit speech samples from Vietnamese-speaking children and was developed during this doctoral research program. The conceptualisation and operationalisation of the VSA resulted in a research version that consists of 77 colour stimuli, four-step prompts for elicitation of the 77 target words, expected responses including dialectal variants transcribed using the International Phonetic Alphabet for each of the 77 target words, and a scoresheet. This research version of the VSA was used for data collection for Chapters 7 and 8 of this doctoral research. In addition, Chapter 6 provides an example of how to begin the development of a standardised assessment instrument in a Majority World country (cf. Hopf, 2018) where there is a dearth of culturally and linguistically appropriate resources and assessments. The chapter also demonstrates an example of knowledge transfer and exchange through international research collaboration between Minority and Majority World countries that is recommended by Cheng (2013) as an innovative approach leading to improved services for under-served populations.

Chapter 7 presents a research study that investigates children’s speech acquisition in Northern Viet Nam formatted as a manuscript submitted to a journal (Paper 4, currently under review). Chapter 7 uses speech samples collected from 195 typically-developing children from four preschools in Ha Noi and Hai Phong, Northern Viet Nam. The children’s speech samples were elicited by administering the VSA as described in Chapter 6. These speech samples were used to calculate productions of consonants, semivowels, vowels, and tones to complete a number of speech analyses; for example, percentage of consonants, semivowels, vowels, and tones correct, non-
adult realisations, and phonological patterns. Chapter 7 reports data regarding phoneme acquisition, factors influencing speech skills, non-adult realisations, and common phonological patterns of Vietnamese-speaking children.

Chapter 8 presents a research study that examines Northern Vietnamese-speaking children’s intelligibility in the format of a published journal article (Paper 5) using responses collected from 181 parents who completed the Intelligibility in Context Scale: Vietnamese (ICS-VN, McLeod, Harrison, & McCormack, 2012). Chapter 8 shows results of the mean ICS-VN scores for Northern Vietnamese-speaking children, factors influencing the children’s scores on the ICS-VN, as well as comparison of the results obtained within this study with those reported in other international studies using the ICS. This chapter also reports information regarding validation of the ICS-VN to indicate it is a valid parent-report screening tool for the use with Northern Vietnamese-speaking children.

Chapter 9, the final chapter of this doctoral research, summarises information presented throughout this doctoral research. Chapter 9 presents a summary of new knowledge about Northern Vietnamese children’s speech acquisition and the key contributions of this doctoral research associated with the research aims. This chapter also highlights the contributions to literature, theory and the implications for policy and practice, summarises the limitations, recommends directions for future research, and reveals the impact of this doctoral research to date.

The appendices mentioned in the chapters throughout this doctoral research follow Chapter 9. A summary of all the chapters and papers included in this doctoral research and their connection to each of the research aims is included in Table I below.
<table>
<thead>
<tr>
<th>Thesis chapter</th>
<th>Research aim addressed</th>
<th>Chapter/ paper title</th>
<th>Aims of the chapter/ paper</th>
<th>Participants</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction and orientation to this doctoral research</td>
<td>Introduction and orientation to this doctoral research</td>
<td>To provide a general introduction of the research topic, background, research aims, synopsis, theoretical framework, and methodology.</td>
<td>-</td>
<td>Literature review</td>
</tr>
<tr>
<td>2</td>
<td>Aim 1: To identify the consonants, semivowels, vowels/diphthongs, and tones of the Northern dialect compared with the Standard, Central, and Southern dialects of Vietnamese.</td>
<td>Paper 1: Consonants, vowels, and tones across Vietnamese dialects (Phạm &amp; McLeod, 2016).</td>
<td>To provide a review of Vietnamese and English literature to describe: 1. the different dialects of Vietnamese 2. the standardisation of Vietnamese 3. the syllables, consonants, semivowels, vowels/diphthongs, and tones within the major dialects of Vietnamese 4. the clinical application of differences between Vietnamese dialects for speech-language pathologists and educators.</td>
<td>-</td>
<td>Literature review</td>
</tr>
<tr>
<td>3</td>
<td>Aim 2: To present an overview of tone languages.</td>
<td>Paper 2: Tone languages and communication disorders (Pham &amp; McLeod, 2017, in press)</td>
<td>To provide a review of literature to describe the features of tones in association with communication disorders across tone languages.</td>
<td>-</td>
<td>Literature review</td>
</tr>
<tr>
<td>4</td>
<td>The Vietnamese context: Education and speech-language pathology</td>
<td>The Vietnamese context: Education and speech-language pathology</td>
<td>To provide an overview regarding the education system and speech-language pathology in the country. Laws and policies related to these fields are highlighted.</td>
<td>-</td>
<td>Literature and policy review</td>
</tr>
<tr>
<td>Part Two</td>
<td>Vietnamese children’s speech acquisition</td>
<td>Childrend’s speech acquisition: Definitions, theories and methodological considerations.</td>
<td>To review literature regarding typical speech acquisition, phonological theories, and research designs and methodologies for studying speech acquisition in order to apply in this doctoral research.</td>
<td>Literature review</td>
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<tr>
<td>7</td>
<td>Aim 4: To investigate children’s acquisition of Northern Vietnamese phonemes (speech accuracy, phoneme acquisition, non-adult realisations, and phonological patterns).</td>
<td>Paper 4: Vietnamese-speaking children’s acquisition of consonants, semivowels, vowels, and tones in Northern Viet Nam (Pham &amp; McLeod, 2017)</td>
<td>To describe 1. the percentage of correct Vietnamese consonants, semivowels, vowels/diphthongs, and tones at different ages; 2. the unique effects of age, sex, and socio-economic status on the percentage of correct Vietnamese consonants, vowels/diphthongs, and tones; 3. the age of acquisition of Vietnamese consonants, semivowels, and tones; 4. the typical non-adult realisations of Vietnamese consonants, semivowels, and tones; and 5. typical phonological patterns for typically-developing Vietnamese-speaking children.</td>
<td>195 typically-developing Northern Vietnamese-speaking children.</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Literature review</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td><strong>Aim 5:</strong> To investigate Northern Vietnamese-speaking children’s intelligibility.</td>
<td>Paper 5: Validation and norming of the Intelligibility in Context Scale in Northern Viet Nam (Phạm, McLeod, &amp; Harrison, 2017).</td>
<td>To describe internal consistency of the Intelligibility in Context Scale: Vietnamese (ICS-VN, McLeod et al., 2012) in comparison with other international studies using the ICS; criterion validity of the ICS-VN with other measures of speech and language status, including a direct assessment measure of speech production; 3. the mean scores for Vietnamese-speaking preschool children on the ICS-VN based on age and sex; and 4. the effect of child and family demographic characteristics (age, sex, and parents’ occupation and educational level) on the ICS-VN scores for Vietnamese-speaking preschoolers.</td>
<td>(181) Northern Vietnamese-speaking children.</td>
<td>○ Literature review ○ Descriptive statistics ○ Analyses of inter-correlations (nonparametric), Cronbach’s alpha, analyses of variance (ANOVAs), and bivariate correlations in SPSS (IBM, 2017).</td>
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</tr>
<tr>
<td>9</td>
<td><strong>Conclusions and contributions of this doctoral research</strong></td>
<td>To summarise the key contributions of this doctoral research associated with the research aims, to literature, theory and its implications to policies and laws.</td>
<td>-</td>
<td>Literature and policy review</td>
<td></td>
</tr>
</tbody>
</table>

**Appendices**
Theoretical Framework of this Doctoral Research

This doctoral research used the *International Classification of Functioning, Disability and Health - Children and Youth version* (ICF-CY, World Health Organization, 2007) as the theoretical framework to examine the interaction between Body Structures, Body Functions, Activities and Participation, and Environmental and Personal Factors regarding children’s speech acquisition. The ICF-CY is derived from the *International Classification of Functioning, Disability and Health* (ICF, World Health Organization, 2001) focussing on children aged from birth to 17 years in terms of the constantly changing nature of their health and development that differs from adults (McLeod & Threats, 2008). The ICF-CY provides a holistic understanding of the characteristics of the childhood functioning and development and the influence of environmental contexts (World Health Organization, 2007).

The structure of the ICF-CY shares the main components and codes with the ICF with the addition of 237 new codes relevant to children and youth (McCormack, McLeod, Harrison, & McAllister, 2010; McLeod & Threats, 2008). As shown in Figure II, the ICF-CY consists of two parts, each comprising different components. Part 1 of the ICF-CY describes Functioning and Disability and includes three components, namely Body Structures, Body Functions, and Activities and Participation. Body Structures refers to anatomical parts of the body such as organs, limbs, and their components. Body Functions refers to the physiological functions of body systems. Activities and Participation describes an individual child’s ability to perform tasks and actions in daily life and to participate in social situations. Part 2 of the ICF-CY describes Contextual Factors and contains the Environmental Factors and Personal Factors. Environmental Factors (i.e., physical, social, and attitudinal) are considered as the external factors. Personal Factors are referred as the particular background of an individual’s life and living including: race, age, gender, lifestyle, education, habits, and
socio-economic status, etc. Personal Factors are considered as the internal factors. The Contextual Factors can have positive and negative influences on functioning and disability.

Figure II. The International Classification of Functioning, Disability and Health: Children and Youth Version (World Health Organization, 2007, p. 17). Reprinted with permission.

Each component (except for the Personal Factors component) is further divided into domains, which are classified by qualifiers to define the severity of impairment or restriction. However, “it is assumed that the severity is related to an established decrement in function compared to normative or criterion referenced data… with the significant complication that in children there is a moving target in terms of what is considered within normal limits” (McLeod & Threats, 2008, p. 95). There is limited normative data about Vietnamese children’s communication. The ICF-CY also provides the perspective that each component is equal in significance and interacts with all other components in the framework as illustrated by the bidirectional arrows (Dempsey & Skarakis-Doyle, 2010).
The ICF-CY has been recognised as a statistical tool, a research tool, a clinical tool, a social policy tool, and an educational tool (World Health Organization, 2007). In other words, the ICF-CY is applicable across settings, disciplines, and countries for multiple purposes (Ellingsen, 2011). With respect to children’s communication, the ICF-CY has been applied as a theoretical framework by many researchers. The discrete components of the ICF-CY have been described (Howe, 2008; McCormack & Worrall, 2008; O’Halloran & Larkins, 2008; Threats & Worrall, 2004; Washington, 2007; Westby, 2007) as well as the interrelationships between the components (Dempsey & Skarakis-Doyle, 2010). This framework has also been applied to a range of children including: children with typical speech acquisition (McLeod & Bleile, 2007), children with communication disabilities (McLeod & Threats, 2008; Simeonsson, 2003), children with speech sound disorders (McCormack et al., 2010; McLeod, 2004, 2006; McLeod & Bleile, 2004), children with developmental language disorders (Dempsey & Skarakis-Doyle, 2010; Washington, 2007), and children who stutter (Yaruss, 2010).

Using the lens of the ICF-CY as the theoretical framework to undertake this doctoral research on Northern Vietnamese children’s speech acquisition, all the components (i.e., Body Structures, Body Functions, Activities and Participation, Environmental Factors, and Personal Factors) and the interactions between these components are considered. Table II below presents a summary of the ICF-CY components that are investigated throughout the chapters and papers of this doctoral research. The ICF-CY guides the classification of foundational aspects relating to children’s speech acquisition, to identify factors influencing children’s speech performance, as well as to direct the choice of instruments for data collection, and analysis and interpretation of the data.
Table II.

Summary of ICF-CY Components Investigated throughout this Doctoral Research

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Research aim or chapter title</th>
<th>Paper</th>
<th>ICF-CY components addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction and orientation to this doctoral research</td>
<td>-</td>
<td>All ICF-CY components</td>
</tr>
<tr>
<td>2</td>
<td>Aim 1: To identify the consonants, semivowels, vowels/diphthongs, and tones of the Northern dialect compared with the Standard, Central, and Southern dialects of Vietnamese.</td>
<td>Paper 1: Consonants, vowels, and tones across Vietnamese dialects (Phạm &amp; McLeod, 2016).</td>
<td>Body Functions and Environmental Factors</td>
</tr>
<tr>
<td>3</td>
<td>Aim 2: To present an overview of tone languages.</td>
<td>Paper 2: Tone languages and communication disorders (Phạm &amp; McLeod, 2017, in press)</td>
<td>Body Functions, Environmental and Personal Factors</td>
</tr>
<tr>
<td>4</td>
<td>The Vietnamese context: Education and speech-language pathology.</td>
<td>-</td>
<td>Environmental Factors</td>
</tr>
<tr>
<td>5</td>
<td>Children’s speech acquisition: Definitions, theories, and methodological considerations.</td>
<td>-</td>
<td>Environmental Factors</td>
</tr>
<tr>
<td>6</td>
<td>Aim 3: To develop a speech assessment to elicit speech samples from Vietnamese-speaking children.</td>
<td>Paper 3: Development of the Vietnamese Speech Assessment (Phạm, McLeod, et al., 2016)</td>
<td>Body Functions and Environmental Factors</td>
</tr>
<tr>
<td>9</td>
<td>Conclusions and contributions of this doctoral research</td>
<td>-</td>
<td>All ICF-CY components</td>
</tr>
</tbody>
</table>
Research Methodology

This doctoral research is driven by a post-positivist research paradigm (Creswell, 2009). The post-positivist paradigm is an extension of positivism paradigm (Bryman, 2012). Post-positivist researchers consider that reality cannot be discovered perfectly due to the researchers’ limitations; however, a clearer understanding of what is happening in reality can be gained by using different methodological approaches (Creswell, 2009). Objectivity can be seen in multiple perspectives rather than a single reality to find relationships between variables. According to the post-positivist paradigm, what is observed and measured in reality can be influenced by the researcher’s background, knowledge, and values (Harrison & Wang, 2018).

The research methods include steps to formulate research questions and to define criteria for participant recruitment, as well as procedures and techniques to collect, analyse, and interpret observed data in alignment with the sample and measures (Harrison & Wang, 2018). Northern Vietnamese-speaking children’s speech acquisition described in this doctoral research is addressed by a multi-faceted investigation. Children’s speech is an observed and measured behaviour and associated with internal- and external-child factors that may influence their speech performance.

To address the five research aims of this doctoral research, two main research methods are employed including (1) reviews of existing literature and (2) research studies using quantitative methods. Each of the research methods was taken into account regarding its purpose, procedures, and techniques to collect reliable information and data.

Reviews of Existing Literature

Reviews of existing literature was a part of all chapters including publications embedded in the chapters throughout this doctoral research (see the Method column in Table I above). After formulating the research questions, reviewing existing literature
was used to get started on the research involving searching, reviewing, and writing a literature review (Bryman, 2012). Within this doctoral research, reviews were undertaken from both white and grey literature documents. White literature refers to sources of scientific information that are controlled by commercial publishers and indexed by major databases. Grey literature refers to materials that are not published commercially and which therefore maybe more difficult to access. The literature that was written in Vietnamese and published in Viet Nam was thus difficult to access through databases but was an important source of information about policy and historical aspects of this doctoral research. Reviewing existing literature employed to contextualise this doctoral research was very important because Hopf (2018) suggested that gathering information from literature, policy, and the community are the first stages to develop communication specialist services in a Majority World country in the Communication Capacity Research program.

**Quantitative Methods**

A quantitative design provides the capability to describe a population in terms of the frequency and distribution of features of that population (Greasley, 2008). Quantitative research “relies on quantification in collecting and analysing data and uses descriptive and inferential statistical analyses” (Liamputtong, 2010, p. 4). It helps the researcher to investigate the objective nature of phenomena using a positivistic paradigm. A quantitative research design uses an ontological standpoint of objective reality to ensure that the research process is free from bias, and assumes that reality can be accurately captured. Data are so-called “hard” evidence obtained in quantitative study and are presented in the form of numbers (Liamputtong, 2010).

This doctoral research uses quantitative methods common to descriptive epidemiological studies that focus on events (e.g., age of acquisition) and their distribution. Epidemiological studies include longitudinal and cross-sectional designs.
Longitudinal designs provide in-depth descriptions and characteristics of a variable over time; whereas, cross-sectional designs provide a snapshot of the frequency and characteristics of a variable at a particular point in time (Liamputtong, 2010; McMillan & Schumacher, 2014; Plichta & Kelvin, 2013). The participants participating in cross-sectional studies can be selected randomly from the entire population or can be sampled purposively. This current doctoral research used a cross-sectional purposive design to examine speech acquisition of Northern Vietnamese-speaking children. Details of methodological considerations within the cross-sectional design applied in this doctoral research are presented in Chapter 5.

Rigour in quantitative research is achieved by considering reliability and validity. Reliability refers to “the consistency and trustworthiness of research findings in relation to the issue of whether a finding is reproducible at other times by other researchers” (Kvale, 2007, p. 22). In order to ensure reliability within this doctoral research the children’s speech samples were audio and video recorded and the author of this doctoral research re-transcribed 10% of the data using the recordings for calculating intra-judge reliability. Additionally, a second Vietnamese speech-language pathologist who had expertise in phonetic transcription transcribed 10% of the data to calculate inter-judge reliability.

Validity bears upon measurement and is “concerned with integrity of the conclusions that are generated from a piece of research” (Bryman, 2012, p. 32). Internal validity is related to “the issue of whether a method investigates what it purports to investigate” (Kvale, 2007, p. 22) and external validity relates to whether the results of a study can be generalised beyond the specific research context (Bryman, 2012). In order to ensure validity of the protocols (e.g., assessment tool and parent questionnaire), they were piloted and reviewed by experts in Vietnamese children’s speech to determine the suitability and relevance to Vietnamese culture, children, and families.
The Statistical Package for Social Sciences version 25.0 (SPSS, IBM, 2017) was used to analyse the data for this doctoral research. Both descriptive and inferential statistics that were relevant to each of the chapters were used. Statistical techniques used within this doctoral research included: analysis of variance (ANOVA), correlations, and regression analysis. According to Harrison and Wang (2018), the use of these statistical techniques was the most relevant to the broad research themes of “identifying groups” (p. 314) and “identifying mechanisms” (p. 314) currently found in research of early childhood education. Details of methods of data analysis used for each of the research studies are described within the respective chapters.

**Conclusion**

Chapter 1 provided an introduction and orientation to this doctoral research. A general introduction was described followed by the research aims. The structure of this doctoral research was described in the synopsis to orient readers to the whole doctoral research. This chapter also included a description of the theoretical framework and the research methodology employed.

**References**


Part One: Vietnamese Language and Context

Part One consists of Chapters 2, 3, and 4 providing information about the Vietnamese language and context. Chapter 2 is formatted in the style of a published journal article (Paper 1) providing information about consonants, semivowels, vowels, and tones of the Northern Vietnamese in comparison with the Standard, Central, and Southern dialects of Vietnamese. Chapter 3 is an invited encyclopaedia entry describing tone languages and communication disorders. Due to the requirements of the encyclopaedia regarding minimal references included in this entry, all of the additional references that were informed the entry are included in a section entitled “Full reference list for this paper” at the end of Chapter 3. Chapter 4 highlights an introduction about the Vietnamese context including Vietnamese education, a description of the Development Standards for 5-year-old children in Viet Nam, and the emerging profession of speech-language pathology.
Chapter 2  
Consonants, Vowels, and Tones across Vietnamese Dialects

Paper 1


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Note. Since publication of this article, new information about the population of Viet Nam has been released. There are now over 92 million people in Viet Nam (General Statistics Office of Viet Nam, 2016).
Consonants, vowels and tones across Vietnamese dialects

BEN PHAM & SHARYNNE MCLEOD

Charles Sturt University, Bathurst, Australia

Abstract

Purpose: Vietnamese is spoken by over 89 million people in Vietnam and it is one of the most commonly spoken languages other than English in the US, Canada and Australia. This study defines between one and nine different dialects of Vietnamese spoken in Vietnam. In Vietnamese schools, children learn Standard Vietnamese which is based on the northern dialect; however, if they live in other regions they may speak a different dialect at home.

Method: This paper describes the differences between the consonants, semivowels, vowels, diphthongs and tones for four dialects: Standard, northern, central and southern Vietnamese.

Result: The number and type of initial consonants differs per dialect (i.e. Standard = 23, northern = 20, central = 23, southern = 21). For example, the letter "r" is pronounced in the Standard and central dialects as the retroflex /r/; northern dialect as the voiced alveolar fricative /s/ or the trilled /r/ and in the southern dialect as the voiced velar fricative /ʃ/. Additionally, the letter "v" is pronounced in the Standard, northern and central dialects as the voiced labiodental fricative /v/; the southern dialect as the voiced palatal approximant /j/ and in the lower northern dialect (Ninh Binh) as the voiceless labiodental fricative /f/. Similarly, the number of final consonants differs per dialect (i.e. Standard = 6, northern = 10, central = 10, southern = 8). Finally, the number and type of tones differs per dialect (i.e. Standard = 6, northern = 6, central = 5, southern = 5).

Conclusion: Understanding differences between Vietnamese dialects is important so that speech-language pathologists and educators provide appropriate services to people who speak Vietnamese.

Keywords: Vietnamese, dialect, speech, assessment, analysis, consonants, vowels, semivowels, tones

Introduction

Vietnamese is widely spoken around the world. It is the official language of Vietnam and is spoken by most of the population (over 89 million people from 54 ethnic groups) as their first or second language (Vietnam General Statistics Office, 2013). Vietnamese is also spoken in many predominantly English-speaking countries, such as the US, Australia, Canada and the UK. For example, in the 2011 US Census, Vietnamese was the fourth most common language other than English spoken at home, following Spanish, Chinese and Tagalog (Ryan, 2013). In Australia, Vietnamese is the sixth most commonly spoken language other than English, with 1.1% of the population speaking it as a home language (Australian Bureau of Statistics, 2013). In Canada, Vietnamese is one of the top 25 languages spoken, spoken by 3.6% of people in Montréal, 4.7% of people in Calgary, 2.6% of people in Vancouver, 4.0% of people in Edmonton and 3.7% of people in Ottawa (Statistics Canada, 2012). It is also recognised as a minority language in many other countries across the world including France, Germany, the Czech Republic, Slovakia, Slovenia and Korea. For example, in the Czech Republic, Vietnamese people are the third largest foreigner group (Czech Statistics Office, 2009).

Many Vietnamese speakers throughout the world are likely to be multilingual. Due to the high proportion of Vietnamese speakers throughout the world, information about Vietnamese is useful for speech-language pathologists and educators who work with monolingual and multilingual Vietnamese children and adults in many different countries. Furthermore, the Vietnamese language has considerable dialectal variation and the effects of dialectal variants are important to determine correct or acceptable speech productions in normative acquisition data, assessment and intervention (Goldstein & Iglesias, 2001; Phoon, Abdullah, Lee, & Murugaiah, 2014). Clinical decisions need to be made with an awareness of language and dialectal differences. Therefore, it is important for professionals working with Vietnamese speaking clients in...
Vietnam and in other countries to distinguish between underlying speech and/or language disorder and language variants.

The aims of this paper are to provide a review of Vietnamese and English literature to describe:
(1) the different dialects of Vietnamese;
(2) the standardisation of Vietnamese;
(3) the syllables, consonants, semivowels, vowels, diphthongs and tones within the major dialects of Vietnamese; and
(4) the clinical application of differences between Vietnamese dialects for speech-language pathologists and educators.

This review was undertaken by examining books and journal articles about Vietnamese language, linguistics and phonetics that were available in the Ha Noi National University of Education library and the National Library in Ha Noi, Vietnam. The majority of these books were written in Vietnamese, but this review draws on books and journal articles written in Vietnamese, English, French and Russian. It was not possible to undertake a systematic review of Vietnamese literature, since Vietnamese manuscripts are not systematically included within databases such as EBSCO Host, Medline, SCOPUS and ERIC.

**Vietnamese dialects**

There are many terms to describe regional variants of pronunciation within Vietnam. Dialect (*phương ngữ*) is the most common term used by Vietnamese linguists to describe the characteristics of the language that is spoken in a city/province or in a group of cities/provinces when compared to Standard Vietnamese (*Cao, 2006; Hài Dân, 1982; Hồ, 1992; Huỳnh, 1995, 1996a,b, 1997, 1998, 1999, 2013; Nguyễn, 1983; Nguyễn, N. B. 1992; Nguyễn, T. B. N. 1981; Nguyễn, T. N. 1981; Nguyễn, V. A. 1981; Nguyễn & Trân, 1983; Phạm, 1985, 1988; Trân, 1986, 1992, 1993, 1995; Trương & Nguyễn, 1985; Võ, 1985, 1991; Vũ, 1986). Additional terminology includes: regional variants, local language (*phường ngôn* or *ngôn ngữ địa phương*), semi-dialect (*bân phương ngữ*), regional language (*tiếng địa phương*), regional voice (*giọng địa phương*), local dialect (*thổ ngữ*), local pronunciation (*thổ âm*), phonological variants (*biên thể ngữ âm*) and accent (*tiếng, e.g. tiếng Quảng Nam, tiếng Sài Gòn*). These terms differ in the focus (e.g. phonology, lexicon), geography and cultural usage (e.g. literature, songs). In this paper, the term dialect has been selected because of its frequent use in both English and Vietnamese literature and conversation. As noted by Alves (2007) and Huỳnh (2014), the main differences between the Vietnamese dialects are phonological, with some differences in vocabulary.

As a result of the varying terminology to describe dialects within and between authors, contexts and times, there has been much discussion about the number of dialects within Vietnam. Authors writing in Vietnamese, English, French and Russian have described between one and nine Vietnamese dialects (see Supplementary Appendix A). However, the most common descriptions of Vietnamese dialects are the northern, central and southern dialects. According to Hoang (2004), these three dialects are differentiated through tonal features and are easily recognised. Although each dialect includes local varieties, the division of three dialects generally reflects the geography, everyday usage and cultural beliefs. Furthermore, characteristics of these three dialects have been described by several researchers (Dinh & Nguyễn, 1998; Đoàn, 2003; Hoang, 2004; Hwa-Froelich, Hodson, & Edwards, 2002; Nguyễn, 1997; Vũ, 1982). Therefore, in the remainder of this paper, three Vietnamese dialects (northern, central and southern) are described and are compared with Standard Vietnamese. Supplementary Appendix B provides the geographical divisions corresponding to the three dialects.

Standard Vietnamese is the common language used by the Vietnamese government in politics, the military, economy, society, culture, science and the arts (Huỳnh, 1999; Phan, 2000; Trân, 2010). It is primarily formulated from the northern dialect spoken in Ha Noi (the capital city), with additional key features from other regions (Huỳnh, 1999). The role of regional variants in the Vietnamese standardisation process has been a long-term focus for a number of Vietnamese researchers (Hồ, 1992; Hoang, 1986; Hồng Dân, 1981; Huỳnh, 1997, 2014; Nguyễn & Trân, 1983; Nguyễn, T. B. N. 1981, Nguyễn, T. C. 1981, Nguyễn, V. A. 1981; Pham, 1981; Trương & Đặng, 1981; Võ, 1981; Vũ, 1980). The Vietnamese government has implemented Vietnamese standardisation (*chữ nhận hóa tiếng Việt*) since 1945 to create this national (*ngôn ngữ quốc gia*), standard (*tiếng chuẩn*), common language (*tiếng phổ thông*) that is used by the entire population (*ngôn ngữ toàn dân*). The campaign slogan to promote standardisation encouraged "conservation of the clarity of the Vietnamese language" (*Gửi giữ sự trong sáng của tiếng Việt*) (Phạm, 1966, p. 1). Standard Vietnamese is officially used in schools and other institutional education settings throughout the country. Standardisation of Vietnamese also has implications for written orthography (i.e. the same spelling of the same word across regions) which can facilitate the development of technological applications such as library searches, language corpus analysis and text scanning.

**Vietnamese syllables: Structure and shape**

Vietnamese is classified as a syllabic and tonal language. The syllable is considered to be the smallest unit of pronunciation and each syllable is pronounced and written separately (Đỗ, 1981; Đỗ & Lê, 2005; Lã, Phan, & Nguyễn, 2011). Vietnamese
syllables can include five components: the initial consonant singleton, the medial semi-vowel, the main vowel, the final phoneme (either a consonant or semi-vowel) and the tone (see Table I) (Cao, 2006; Đặng & Lê, 2005; Đoàn, 2003; Nguyễn, 2011; Vườn & Hoằng, 1994).

The syllable shape for Vietnamese can be described as $C_1(w)\text{V}C_2(w)T$, where $C_1$ is the initial consonant, $w$ is the semi-vowel, $\text{V}$ is the vowel, $C_2$ is the final consonant and $T$ is the tone. There are 12 possible syllable shapes in Vietnamese (Đặng & Lê, 2005; Hậu & Vườn, 1980) (see Table II). When the initial component is considered, there are four syllable types: light ($V$, $wV$, $VC_2$), partly light ($wV$, $wVw$, $wVC_2$), partly heavy ($C_1V$, $C_1Vw$, $C_1VC_2$) and heavy ($C_1wV$, $C_1wVw$, $C_1wVC_2$) (Đặng & Lê, 2005; Lả et al., 2011). Light refers to no initial consonant or semi-vowel and heavy refers to an initial consonant and semi-vowel before the vowel. When the final component is considered, there are four syllable types: open ($C_1V$, $C_1wV$), partly open (ending in a semi-vowel, $C_1wVw$), partly closed (ending in a nasal consonant) and closed (ending in a voiceless unreleased plosive) (Dinh & Nguyễn, 1998; Đặng & Lê, 2005; Đoàn, 2003; Lả et al., 2011).

At the segmental level, while Cao (2006) groups the initial consonant and the medial semi-vowel as the initial onset ($thành的主要或 thay âm$) and the main vowel and final phoneme as the rime ($sổ的主要或 âm$), most other linguists combine the medial semi-vowel, main vowel and final consonant/semi-vowel as the rime ($vấn$). The main vowel and tone are compulsory and the remaining components are either present or absent in a Vietnamese syllable. According to Đoàn (2003), every syllable has all five components because the absent initial consonant is a glottal stop /ʔ/ and the absence of medial and final sounds are considered to be zero phonemes.

**Consonants, vowels and tones that are shared across dialects**

**Consonants.** Vietnamese syllables may include initial consonants ($phù âm đầu$) and final consonants ($phù âm cuối$) (Cao, 2006). In Standard Vietnamese, the number of initial consonants reported ranges from 21–24 (see Table III). There is controversy regarding three consonants /p, t, t/ (Hậu and Vườn, 1980) and Đặng and Lê (2005) do not consider these three phonemes as Vietnamese initial consonants, while other authors accept /p/ (Hoằng, 2004; Lả et al., 2011; Nguyễn, 2011) and accept /p/ (Đoàn, 2003; Hoằng, 2004; Nguyễn, 2011; Phạm, 2009) as initial consonants. The trilled consonant /r/ is included as a Vietnamese initial consonant by one author (Hoằng, 2004), but it is considered to be a variant identified in some local areas and in foreign loan words by others (Đặng & Lê, 2005; Đoàn, 2003). Therefore, in the current paper, two phonemes /r, p/ will be included as initial consonants in Standard Vietnamese and the phoneme /r/ will be excluded. This paper, thus, describes 23 Standard Vietnamese initial consonants.

Most authors describe 16 initial consonants that are shared across the three dialects (see Table IV). However, Nguyễn (1997) states that only 11 initial consonants are indisputably shared across dialects, stating that /r, t, ɾ, p, ɾ/ have some differences between dialects. Nasal phonemes /m, n, p, ŋ/ are
Table III. Standard Vietnamese consonants and semivowels.

<table>
<thead>
<tr>
<th>Initial consonants</th>
<th>Bilabial</th>
<th>Labiodental</th>
<th>Alveolar</th>
<th>Retroflex</th>
<th>Palatal</th>
<th>Velar</th>
<th>Glottal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plosive</td>
<td>p⁺ b</td>
<td>p⁺</td>
<td>l d</td>
<td>c</td>
<td>k</td>
<td>?⁺</td>
<td></td>
</tr>
<tr>
<td>Nasal</td>
<td>m</td>
<td>n</td>
<td>a</td>
<td>a</td>
<td>η</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trill</td>
<td>f v</td>
<td>f⁺</td>
<td>s x z</td>
<td>g z</td>
<td>x y k</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fricative</td>
<td>w</td>
<td>l</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Semivowel**</td>
<td>w</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lateral approximant</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Final consonants</td>
<td>Plosive</td>
<td>p</td>
<td>t</td>
<td>k</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nasal</td>
<td>m</td>
<td>n</td>
<td></td>
<td></td>
<td>η</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Semivowel**</td>
<td>w</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*These consonants /p/, /t/, /k/ are controversial between authors.

**In Vietnamese, approximants are called semivowels.

Table IV. Vietnamese consonants and semivowels in Standard Vietnamese and across three dialects.

<table>
<thead>
<tr>
<th>Graphemic(s)</th>
<th>Standard Vietnamese</th>
<th>Northern dialect</th>
<th>Central dialect</th>
<th>Southern dialect</th>
</tr>
</thead>
<tbody>
<tr>
<td>p</td>
<td>/p/</td>
<td>/p/</td>
<td>/p/</td>
<td>/p/</td>
</tr>
<tr>
<td>b</td>
<td>/b/</td>
<td>/b/</td>
<td>/b/</td>
<td>/b/</td>
</tr>
<tr>
<td>th</td>
<td>/θ/</td>
<td>/θ/</td>
<td>/θ/</td>
<td>/θ/</td>
</tr>
<tr>
<td>t</td>
<td>/t/</td>
<td>/t/</td>
<td>/t/</td>
<td>/t/</td>
</tr>
<tr>
<td>d</td>
<td>/d/</td>
<td>/d/</td>
<td>/d/</td>
<td>/d/</td>
</tr>
<tr>
<td>tr</td>
<td>/tr/</td>
<td>/tr/</td>
<td>/tr/</td>
<td>/tr/</td>
</tr>
<tr>
<td>ch</td>
<td>/ch/</td>
<td>/ch/</td>
<td>/ch/</td>
<td>/ch/</td>
</tr>
<tr>
<td>k</td>
<td>/k/</td>
<td>/k/</td>
<td>/k/</td>
<td>/k/</td>
</tr>
<tr>
<td>q</td>
<td>/q/</td>
<td>/q/</td>
<td>/q/</td>
<td>/q/</td>
</tr>
<tr>
<td>m</td>
<td>/m/</td>
<td>/m/</td>
<td>/m/</td>
<td>/m/</td>
</tr>
<tr>
<td>n</td>
<td>/n/</td>
<td>/n/</td>
<td>/n/</td>
<td>/n/</td>
</tr>
<tr>
<td>nh</td>
<td>/ŋ/</td>
<td>/ŋ/</td>
<td>/ŋ/</td>
<td>/ŋ/</td>
</tr>
<tr>
<td>ng</td>
<td>/ŋ/</td>
<td>/ŋ/</td>
<td>/ŋ/</td>
<td>/ŋ/</td>
</tr>
<tr>
<td>ngh</td>
<td>/ŋ/</td>
<td>/ŋ/</td>
<td>/ŋ/</td>
<td>/ŋ/</td>
</tr>
<tr>
<td>ph</td>
<td>/ph/</td>
<td>/ph/</td>
<td>/ph/</td>
<td>/ph/</td>
</tr>
<tr>
<td>w</td>
<td>/w/</td>
<td>/w/</td>
<td>/w/</td>
<td>/w/</td>
</tr>
<tr>
<td>x</td>
<td>/x/</td>
<td>/x/</td>
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</tr>
<tr>
<td>s</td>
<td>/s/</td>
<td>/s/</td>
<td>/s/</td>
<td>/s/</td>
</tr>
<tr>
<td>d</td>
<td>/d/</td>
<td>/d/</td>
<td>/d/</td>
<td>/d/</td>
</tr>
<tr>
<td>gi</td>
<td>/gi/</td>
<td>/gi/</td>
<td>/gi/</td>
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</tr>
<tr>
<td>r</td>
<td>/r/</td>
<td>/r/</td>
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<td>/r/</td>
</tr>
<tr>
<td>kh</td>
<td>/kʰ/</td>
<td>/kʰ/</td>
<td>/kʰ/</td>
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</tr>
<tr>
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<td>/g/</td>
<td>/g/</td>
<td>/g/</td>
<td>/g/</td>
</tr>
<tr>
<td>gh</td>
<td>/ɡ/</td>
<td>/ɡ/</td>
<td>/ɡ/</td>
<td>/ɡ/</td>
</tr>
<tr>
<td>h</td>
<td>/h/</td>
<td>/h/</td>
<td>/h/</td>
<td>/h/</td>
</tr>
<tr>
<td>i</td>
<td>/i/</td>
<td>/i/</td>
<td>/i/</td>
<td>/i/</td>
</tr>
<tr>
<td>Total</td>
<td>23</td>
<td>20</td>
<td>23</td>
<td>21</td>
</tr>
</tbody>
</table>

Initial semivowel

<table>
<thead>
<tr>
<th>a</th>
<th>/a/</th>
<th>/a/</th>
<th>/a/</th>
<th>Omission, /a/</th>
</tr>
</thead>
<tbody>
<tr>
<td>o</td>
<td>/o/</td>
<td>/o/</td>
<td>/o/</td>
<td>Omission, /o/</td>
</tr>
</tbody>
</table>

Final consonants

<table>
<thead>
<tr>
<th>-p</th>
<th>/pʰ/</th>
<th>/pʰ/</th>
<th>/pʰ/</th>
<th>/pʰ/</th>
</tr>
</thead>
<tbody>
<tr>
<td>-t</td>
<td>/tʰ/</td>
<td>/tʰ/</td>
<td>/tʰ/</td>
<td>/tʰ/</td>
</tr>
<tr>
<td>-c</td>
<td>/cʰ/</td>
<td>/cʰ/</td>
<td>/cʰ/</td>
<td>/cʰ/</td>
</tr>
<tr>
<td>-ch</td>
<td>/chʰ/</td>
<td>/chʰ/</td>
<td>/chʰ/</td>
<td>/chʰ/</td>
</tr>
<tr>
<td>-m</td>
<td>/mʰ/</td>
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<td>/mʰ/</td>
</tr>
<tr>
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</tr>
<tr>
<td>-gh</td>
<td>/ɡʰ/</td>
<td>/ɡʰ/</td>
<td>/ɡʰ/</td>
<td>/ɡʰ/</td>
</tr>
</tbody>
</table>

Total 6 10 10 8

Final semivowels

<table>
<thead>
<tr>
<th>-i</th>
<th>/i/</th>
<th>/i/</th>
<th>/i/</th>
<th>/i/</th>
</tr>
</thead>
<tbody>
<tr>
<td>-y</td>
<td>/y/</td>
<td>/y/</td>
<td>/y/</td>
<td>/y/</td>
</tr>
<tr>
<td>-u</td>
<td>/u/</td>
<td>/u/</td>
<td>/u/</td>
<td>/u/</td>
</tr>
<tr>
<td>-a</td>
<td>/a/</td>
<td>/a/</td>
<td>/a/</td>
<td>/a/</td>
</tr>
</tbody>
</table>

Total 2 2 2 2

Shading indicates that the consonants and semivowels are different from Standard Vietnamese.
Table V. Vietnamese vowels in Standard Vietnamese and three dialects.

<table>
<thead>
<tr>
<th>Grapheme(s)</th>
<th>Standard Vietnamese</th>
<th>Northern dialect</th>
<th>Central dialect</th>
<th>Southern dialect</th>
</tr>
</thead>
<tbody>
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<td>i</td>
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<td>/ɨ/</td>
<td>/ɨ/</td>
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<td>o</td>
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<td>/ɔ/</td>
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<tr>
<td>u</td>
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<td>uɔ</td>
<td>/uɔ/</td>
<td>/uɔ/</td>
<td>/uɔ/</td>
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<td>/a/</td>
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<tr>
<td>á</td>
<td>/â/</td>
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<td>/â/</td>
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<td>ya</td>
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<td>/ya/</td>
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<tr>
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<td>/uə/</td>
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<tr>
<td>uə</td>
<td>/uə/</td>
<td>/uə/</td>
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<td>/uə/</td>
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<tr>
<td>uə</td>
<td>/uə/</td>
<td>/uə/</td>
<td>/uə/</td>
<td>/uə/</td>
</tr>
</tbody>
</table>

Shading indicates that the vowels are different from Standard Vietnamese.

Presented in all three dialects, as is the lateral approximant /l/, although in some regions in the northern dialect, /l/ is switched with /n/ (Kirby, 2011; Pham, 2013). Plosive and fricative phonemes are more ambiguous. For example, /p/ is considered as a shared phoneme in three dialects by some authors (Hoang, 2004), but it is not included as an initial consonant in the central and southern dialects by others (Huyenh, 1999; Hwa-Froelich et al., 2002). As another example, /j/ is a shared phoneme in three dialects (Hwa-Froelich et al., 2002), but does not commonly occur in the northern dialect (Hoang, 2004; Huyenh, 1999; Nguyen, 1997).

There are six final consonants in Standard Vietnamese including three plosives /p, t, k/ and three nasals /m, n, ng/ (Doan, 2003). Most authors describe six final consonants that are shared across the three dialects, as found in Standard Vietnamese. However, there are different variants of the two final velars /k, ng/ in each dialect.

Semivowels. Approximants are called semivowels in the Vietnamese language. There are two semivowels in Vietnamese syllables and the transcription conventions use either /w, j/ or /u, y/ (Doan, 2003). Although /u, y/ are popularly used in Vietnamese linguistics literature, within this manuscript we have chosen to use /u, y/ to be consistent with the International Phonetic Alphabet. The semivowel /w/ may be either the medial component of the syllable (medial semivowel, âm đệm or tiệm chính âm) or the final component (final semivowel, bàn âm cuối); whereas, the semivowel /j/ may only be the final component of Vietnamese syllables. In syllable final positions, the three dialects share the same two semivowels found in Standard Vietnamese (Cao, 2006; Hoang, 2004). In the medial position, the northern and the central dialects generally share the same semivowel found in Standard Vietnamese; however, there are variants in the southern dialect.

Vowels. Vowels are obligatory in all Vietnamese syllables. Only one vowel is allowed within a Vietnamese syllable, so it is known as the main, primary or nucleus vowel (ngụyên âm chính). Most authors indicate that, in Standard Vietnamese, there are a total of 14 vowels including nine long singleton vowels /i, e, e, u, o, a, ñ, u/, two short singleton vowels /o, s/ and three diphthongs /ie, uo, ur/ (see Table V). However, Doan (2003) includes two additional short vowels in Standard Vietnamese: /i/, ñ/. Most authors indicate that there are no triphones in Vietnamese syllables (Cao, 2006; Dô, 1981; Dô & Lê, 2005; Doan, 2003); however, Pham (2009) has suggested that Vietnamese triphones are phonetic units when there are "combinations of the prevocalic /w/ and a diphthong, or a diphthong and a final glide, or the prevocalic and a vowel with a final glide" (p. 14). Within open syllables, the northern, central and southern dialects use the same long vowels and diphthongs as found in Standard Vietnamese (Cao, 2006; Hoang, 2004). In cases of semi-open, semi-closed and closed syllables; there are variants in the three dialects compared to Standard Vietnamese.

Tones. Tones are compulsory in Vietnamese syllables. A change of tones in a Vietnamese syllable might indicate a change in word meaning (Cao, 2006; Doan, 2003; Tang & Barlow, 2006). Commonly, six Vietnamese tones have been
described and are found in Standard Vietnamese: (1) level (thanh hằng dâu or thanh ngang), (2) falling (thanh huyện), (3) creaky (thanh ngũ), (4) dipping-rising (thanh hỏi), (5) rising (thanh sắc) and (6) constricted (thanhnika) (Cao, 2006; Đỗ & Lê, 2005; Đoan, 2003; Lã et al., 2011; Nguyễn & Edmondson, 1998; Phạm, 2003; Tang & Barlow, 2006). Two additional tones (7) and (8), which can be phonologically considered as allophones of tones (5) rising and (6) constricted, are contained in syllable final voiceless stop positions (e.g. kát câp) (Brunelle, Nguyen, & Nguyen, 2010; Phạm, 2003, 2006). The tones have been shown to vary by dialects (Hoàng, 1989, 2004; Kirby, 2010; Vũ, 1982). In general, the three dialects share the following tones: (1) level, (2) falling, (5) rising and (6) constricted. Additionally, some linguistic descriptions of Vietnamese tones describe differences in the fundamental frequency (F0), shape and voice quality (Brunelle et al., 2010; Hoàng, 1989).

In Vietnamese linguistics literature, the most common convention for transcribing the tone is to place a superscript number within the slashes (e.g. /[tʰwien]/). Other descriptions of the tone include use of the International Phonetic Alphabet symbols for tones (e.g. /[tʰwien]/) (Kirby, 2011; Shimizu, 2013) or tone marks over or under the vowel (e.g. /[tʰwien]/) (Hoàng, 2004). Within this manuscript we have chosen to use the superscript within the slashes to be consistent with conventions used in Vietnam and other Asian nations such as Hong Kong (e.g. Tô, Cheung, & McLeod, 2013).

Northern dialect

Consonants. There are 20 initial consonants in the northern dialect (Hoàng, 2004; Huyễn, 1999, 2014; Kirby, 2011) (see Table IV), although Hwa-Froelich et al. (2002) count 23 initial consonants in their study, they list three phoneme pairs (ŋ and ñ; ʒ and ʒ; and ʒ and ʒ) that could be considered to be equivalent to /ɲ, ʒ, ʒ/. Phạm (2009) lists 19 initial consonants excluding /p/, but suggests that /p/ is identified in several loan words from French (e.g. pin (battery) /pin/; pê-dan (pedal) /pê-dan/) in all authors. There are no retroflex phonemes in the northern dialect because /l/ is pronounced as either /l/ (Dô & Lê, 2005; Huyễn, 1999), /ʃ/ (Hoàng, 2004), /k/ (Kirby, 2011) or /ʃ/ (Hwa-Froelich et al., 2002) and /s/ /z/ are pronounced as /s/, /z/ respectively. The trilled phoneme /r/ is considered to be a local variant identified in coastal areas (Dô & Lê, 2003) or in foreign loan words (Kirby, 2011).

Final consonants in the northern dialect include the six consonants in Standard Vietnamese plus four variants of the two velars /k, -n/. There are restrictions between which vowels and which final consonants can co-occur (Pham, 2006). When following the front vowels /i, e, e/, /k, q/ are described as prevowels /b, g/ (Kirby, 2011, palatals /c, p/ (Hoàng, 2004; Huyễn, 1999) or as /k, q/ (Cao, 2006). When following back rounded vowels /u, o, ñ/ they are described as labial-velar phonemes /k, q/ (Hoàng, 2004; Huyễn, 1999; Kirby, 2011). The final stops /p, t, k/ are unreleased (Michaud, Vũ, Amelot, & Roubleau, 2006) and are not accompanied by a glottal stop (Michaud, 2004).

Semivowels. The northern dialect includes the medial semivowel /w/ and the two final semivowels /n̩, ɲ̩/ (Hoàng, 2004; Huyễn, 1999).

Vowels. The northern dialect shares the same vowels and diphthongs as found in Standard Vietnamese, including nine long singleton vowels /i, e, e, u, u, o, o, ñ, ñ, ñ/ four short singleton vowels /a, ñ, i, ñ, ñ/, and three diphthongs /ie, uo, ur/ in all syllable shapes (i.e. open, semi-open, semi-closed and closed syllables). In particular syllabic constraints, there are variants for the vowel /u/ and the diphthong /uv/. The main vowel /u/ following the final semivowel /-w/ is pronounced as /i/, for example, /hû(u) (pomegranate) is produced as /hiû/ in the northern dialect, but /huw/ in Standard Vietnamese. When the diphthong /iue/ is followed by the final semivowel /-w/, it is pronounced as the diphthong /ie/, for example, /reɪ̯wu (wine) is pronounced as /reɪ̯w/ in the northern dialect, but /reɪ̯w/ in Standard Vietnamese (Đoan, 2003; Huyễn, 1999).

Tones. The northern dialect uses all six tones that are included in Standard Vietnamese (Brunelle, 2009a; Brunelle et al., 2010; Cao, 2006; Hoàng, 1989, 2004; Huyễn, 1999, 2014; Hwa-Froelich et al., 2002; Kirby, 2010, 2011; Nguyễn & Edmondson, 1998; Vũ, 1982). The six tones in the northern dialect "combine pitch and voice quality contrasts" (Brunelle, 2009a, p. 49).

Central dialect

Consonants. The central dialect has been posited to have archaic linguistic features by many researchers, since it has the highest number of consonants (23 initial and 10 final) compared to the two other dialects (Alves, 2007; Đinh & Nguyễn, 1998; Hoàng, 2004; Huyễn, 1999; Hwa-Froelich et al., 2002; Shimizu, 2013; Thompson, 1965) (see Table IV). The graphemes "d" and "g" are described as the phoneme /d/ and the grapheme "v" is described as the phoneme /v/ in the northern-central regions (e.g. Nghe An, Hà Tĩnh) and these three graphemes "d", "g" and "v" are described as the phoneme /j/ in the southern-central regions (e.g. Quang Nam) (Alves, 2007; Huyễn, 1999; Shimizu, 2013). In
the northern-central region, all final consonants are pronounced the same as the northern dialect, whereas in the southern-central region all final consonants are pronounced the same as the southern dialect (Alves, 2007; Shimizu, 2013).

Semitwovels. The central dialect includes the medial semivowel /w/ and the two final semivowels /w, y/ (Hoang, 2004; Huyhn, 1999).

Vowels. The central dialect shares the same vowels and diphthongs, as found in Standard Vietnamese, including nine long singleton vowels /i, e, o, u, a, o, ò, u, a/ and three diphthongs /ie, uo, ure/ in open syllable shapes. However, these vowels can differ according to the regions within the centre of Vietnam. Short vowels within the central dialect differ according to phonotactic constraints (for an explanation see Cao, 2006; Hoang, 2004).

Tones. There are five tones in the central dialect (Doan, 2003; Hoang, 1989, 2004; Huyhn, 1999, 2013, 2014; Hwa-Frolich et al., 2002; Kirby, 2010, 2011; Tang & Barlow, 2006; Vu, 1982); however, some central regions such as Nghe An only have three or four tones (Pham, 2005). Creaky tone (3) does not exist in the central dialect because it is changed to the constricted tone (6) in the middle central regions (e.g. Nghe An, Ha Tinh) or the dipping-rising tone (4) in southern central regions (e.g. Hue) (Dinh, 1984; Gordina & Bystrov, 1984; Hoang, 2004; Huyhn, 1999). It is also noted that creaky (3) and dipping-rising (4) tones are substituted in the northern central regions (e.g. Thanh Hoa).

Southern dialect

Consonants. There are 21 initial consonants in the southern dialect including two approximants /w, y/ (see Table IV). The approximant /w/ is produced as the initial semivowel due to the omission of the original initial consonant in syllables commencing with /k, g, ə, b/ (e.g. quà (gift) is pronounced as /wàʔ/ in the southern dialect but as /kwàʔ/ in Standard Vietnamese). The phoneme /y/ is substituted for two Standard Vietnamese phonemes /u, ŋ/; for example, voi (elephant), già (old), and dao (knife) are pronounced as /jɔ̄ʔ/, /jã̄ʔ/ and /jawʔ/ in the southern dialect, but as /uɔ̄ʔ/, /uã̄ʔ/ and /uwɔ̄ʔ/ in Standard Vietnamese, respectively (Hoang, 2004; Huyhn, 1996a, 1999, 2014; Hwa-Frolich et al., 2002; Tang & Barlow, 2006). According to Hoang (2004), the trilled phoneme /r/ occurs in the southern dialect, but it may also be substituted by /z, ʒ, y/ (e.g. nhỏ (turtle) may be pronounced as /nɔ̄ʔ/, /zəʊʔ/, /ʒuəʔ/ or /yuəʔ/).

Final consonants in the southern dialect include the six consonants from Standard Vietnamese plus two variants of the two velars /-k, - anál/. When following back rounded vowels /a, o, ñ/ they are produced as labial-velar phonemes [-kã̄, -nã̄], but when following the front vowels /i, e, u, a/ and the short vowel /ã̄/ /-k, -nã̄/ are described as /-ã̄, -nã̄/. For example, chanh (lemon) is pronounced as /çɔ̄nã̄/ in the southern dialect, but as /çɔ̄nã̄/ in Standard Vietnamese (Hoang, 2004; Huyhn, 1999).

Syllables ending with the grapheme “n” are pronounced as either of two phonemes: /-n/ (occurring after front vowels; for example, tin (belief) /tin n/ and /-n/ (occurring after back vowels or diphthongs; for example, tin (eat) /ðin n/ and tên (money) /tẽn n/). Syllables ending with the grapheme “i” are pronounced as either of two phonemes: /-i/ (occurring after front vowels; for example, it (less) /it in/ and /-i/ (occurring after back vowels or diphthongs; for example, mót (one) /mok in/ and rôt (wet) /ruet in/). Therefore, they create homonyms when speaking, but there are differences in the written forms. For example, the two words rôt (wet) and rôc (wish) have the same pronunciation /ruet in/ in the southern dialect (Huyhn, 1999).

Semitwovels. The southern dialect differs from the northern and central dialects regarding semivowels. While the southern dialect does include the medial semivowel /w/ and the two final semivowels /w, y/ (Hoang, 2004; Huyhn, 1999), there are two different realisations of the medial semivowel that have been described as a “simplification process” (Pham, 2009, p. 6).

First, the medial semivowel /w/ is omitted in heavy syllables (C₁wV, C₂wV, C₁wVC₂) that contain front and central vowels /i, e, o, ŋ, ie/ (Huyhn, 1999) or in syllables that begin with alveolar or palatal initial consonants /i, ɛ, s, ʃ, ʒ, l, l̩, c̩/ (Pham, 2009). For example, the syllable shape C₁wV, thiêc (tax) is pronounced as /iɛc in/ in the southern dialect, but /iweč in/ in Standard Vietnamese, the northern and central dialects (Hoang, 2004; Huyhn, 1999). The addition of the semivowel also changes the two main vowels: /a, ñ/ becomes /ə, u/, respectively (e.g. laut (law) is pronounced as /luət in/ in the southern dialect but /luuət in/ in Standard Vietnamese, the northern and central dialects. The omission of the medial semivowel /w/ also occurs in heavy syllables beginning with the consonant /c̩/, where the surviving consonant /c̩/ becomes /ʃ/. For example, khóc (sickly) is pronounced as /ʃkɔ̄ in/ in the southern dialect, but /ʃwek in/ in Standard Vietnamese, the northern and central dialects. However, this particular situation is observed only in rural areas that speak the southern dialect and does not occur with educated speakers (Cao & Lê, 2005; Huyhn, 1999; Nguyễn, 2005).
Second, the medial semivowel /w/ becomes the initial semivowel due to the omission of the original initial consonant in syllables commencing with velars or glottals /k, g, ʔ, h/. For example, /tምняә/ (trousers) is pronounced as /wҮә/ in the southern dialect, but as /k渭ә/ in Standard Vietnamese, the northern and central dialects (Hoăng, 2004; Huỳnh, 1999). Commencing words /w/ by deleting the initial consonant /k/ is very noticeable among speakers from Hồ Chí Minh City, even in the speech of television and radio announcers, regardless of their educational background (Nguyễn, 2005); whereas, the loss of the initial consonant /n/ is common in rural areas in the south.

Vowels. The southern dialect has the number of vowels and diphthongs as found in Standard Vietnamese and two other dialects, including nine long singleton vowels /ɨ, ɛ, ə, w, u, o, ɔ, ɔ̄, ʌ/; three short singleton vowels /a, ɔ, ɔ̄/ and three diphthongs /iɛ, uo, urv/. In the southern dialect, there are four variants in vowel production compared with Standard Vietnamese. First, the main vowel /e/ following the final consonants /n, ɲ, -t, c/ is pronounced as /ɛ/; for example, bɛn (side) is pronounced as /bɛn/ instead of /bɛɛn/. Second, the diphthong /ie/ following the final phonemes /m, -p, -ŋ, -k, -w/ is pronounced as the single vowel /ɪ/; for example, tìm (inject) is pronounced as /tɪɪ/ instead of /tɪɛɪ/. Third, the diphthong /ur/ following the final phonemes /mɛ, -pɛ, -ŋɛ, -kɛ, -wɛ/ is pronounced as the single vowel /uɛ/; for example, dulɛng (sugar) is pronounced as /dʌnɛ/ in the southern dialect instead of /dʌnɛɛ/ in Standard Vietnamese. Finally, the diphthong /uo/ following the final phonemes /ɛm, -ɛn, -ɛŋ, -ɛk, -ɛw/ is pronounced as the single vowel /uɛ/; for example, muɛn (want) is pronounced as /mʊɛɛ/ instead of /mʊɛʊɛ/ in Standard Vietnamese.

Tones. There are five tones in the southern dialect (Brunelle, 2009a; Đoan, 2003; Hoăng, 1989, 2004; Huỳnh, 1999, 2013, 2014; Hwa-Froelich et al., 2002; Kirby, 2010, 2011; Tang & Barlow, 2006; Vũ, 1982). The five tones in the southern dialect “rely exclusively on pitch” (Brunelle, 2009a, p. 49) and do not differ according to voice quality as in the northern dialect. In the southern dialect, the merger of creaky (3) and dipping-rising (4) tones becomes either a creaky (3) tone (Đinh & Nguyễn, 1998; Hoăng, 2004), a dipping-rising (4) tone (Hoăng, 1989) or a medial tone so-called the creaky-dipping-rising (3–4) tone (Huỳnh, 1999).

Orthography: Phonemes to graphemes across dialects

Consonants. The orthography of the initial and final consonants is mostly presented by one grapheme; for example, /vɨ/ is illustrated as “ʰv”. There is an exception for nine consonants /r, z, ʂ, ɕ, x, l, y, ñ, p/ illustrated by a group of two or three graphemes (see Table IV); for example, /ŋ/ is illustrated as “ng” or “ngh”. The consonants /k, ɲ, ʔ, h/ are illustrated by more than one grapheme; for example, /k/ is written as “c”, “k” and “q” (see Table IV). The final consonant /-k/ is illustrated by three graphemes “c”, “ch” and “t”: “ch” occurs after the main vowels /i, ɛ, ɜ/ (e.g. in the rimes /ɪʃ, ɛʃ, ɜʃ/) in Standard Vietnamese, and “t” occurs after back vowels (e.g. in the rimes /ɑ, ɔ, o/) in the southern dialect. The final consonant /-ŋ/ is illustrated by three graphemes “ng”, “nh” and “n”; “nh” occurs after the main vowels /i, ɛ, ɜ/ (e.g. in the rimes /ɪɲ, ɛɲ, ɜɲ/) in Standard Vietnamese, and “n” occurs after the back vowels (e.g. in the rimes /ɑn, ɔn, oŋ/) in the southern dialect (Đỗ & Lê, 2005; Đoan, 2003) (see Table IV).

Semivowel /w/. The orthography of the medial semivowel /w/ is illustrated by two graphemes:

- “u” occurring after the initial consonant /k/ (grapheme “q”) or prior to the main vowels /i, æ/ (grapheme “j”), /ɛ/ and /ɜ/ (e.g. quy (mandarin) /kwɨj/ and “o” occurring after the main vowels /e, ə, ɔ/ (e.g. hoa (flower) /hwəj/).

The orthography of the final semivowel /w/ is illustrated by two graphemes:

- “u” after the main vowels /i, ɛ, u, ə, ɔ, ɜ/ and two diphthongs /iɛ, uʊ̯/ and “o” after the main vowels /i, ɪ, ə, ɔ, ɜ/ (e.g. ᆿiɩ (circuit breaker) /kɪwɨzʊ/).

The orthography of the final semivowel /j/ is illustrated by two graphemes:

- “i” after the back vowels /u, o, ʊ, ɔ, ɜ, ə/ and the diphthong /uə/ (e.g. tai (ear) /tai/) and “y” after the short vowels /a, ʊ/ (e.g. tuy (hand) /tai/) (Đỗ & Lê, 2005; Đoan, 2003; Lả et al., 2011).

Vowels. The orthography of the main singleton vowel is mostly presented by one grapheme; for example, /ɨ/ is illustrated as “e”. There is an exception for the main vowel /i/ that is illustrated by two graphemes “i” and “ɨ” in open syllables that begin with the consonants /m, k, ɲ, h, ʔ, l/. The main vowels /o, ə, ɜ/ are illustrated by one grapheme “a”; for example, /ə/ in the rime /ən, əʊ/ in the rimes /an, ay, eʔ/ in the rimes /ən, əŋ, aŋ, aɔ, aɾ/ in the rimes /əʊ, əɨ, aɪ/.

The orthography of the diphthong /iɛ/ is illustrated by four graphemes:

- “iɛ” in open syllables (e.g. mia (sugar cane) /miɛ/),
- “yɛ” in open syllables with the medial semivowel (e.g. bêgoa (latex) /bɛwɛə/),
- “iɛ̆” in semi-closed and closed syllables without the medial semivowel (e.g. tiɛn (money) /tien/),
- “yɛ” in semi-closed and closed syllables with the medial semivowel and syllables beginning with the
The orthography of the diphthong /au/ is illustrated by two graphemes:
- "ua" in open syllables (e.g. mau (buy) /muau/)
- "avo" in semi-open, semi-closed and closed syllables (e.g. main (wann) /muavo/).

The orthography of the diphthong /uv/ is illustrated by two graphemes:
- "uv" in open syllables (e.g. mura (rain) /muuv/)
- "uov" in semi-open, semi-closed and closed syllables (e.g. maroh (borrow) /muuv/).

Tones. The orthography of the tones (thanh điệu) is illustrated by diacritics (đâu thang) marked above or below the main vowels in the syllables. The tones are described and named according to the shapes of the diacritics. Six tones include: (1) level, no mark illustrated (thanh không đối or thang ngang), (2) falling, illustrated as ' (thanh biểu), (3) creaky, illustrated as " (thanh ngoáy), (4) dipping-rising, illustrated as ' (thanh đối), (5) rising, illustrated as ' (thanh sóc) and (6) constricted as . (thanh nồng) (Cao, 2006; Bôi & Lê, 2005; Đoàn, 2005; Lã et al., 2011; Nguyễn & Edmondson, 1998; Tang & Barlow, 2006).

Difficulties with determining the Vietnamese phonetic symbols

One of the difficulties with reading and interpreting the phonetic symbols within Vietnamese literature relates to the written transmission of the symbols. Some Vietnamese authors have selected to use orthography rather than phonetic symbols, possibly due to the limitations of technology. Books written before computerized typesetting (without access to typewritten phonetic symbols) and some authors inserted written symbols by hand. For example, there is confusion between some phoneme pairs such as: /b/ and /v/.

Another difficulty relates to inconsistency in using Vietnamese phonetic symbols within an author’s writing and between authors. For example, the grapheme “th” has been transcribed as following phoneme symbols: /tʰ, þ, ð/. The grapheme “tr” has been transcribed as following phoneme symbols: /tɾ, ðɾ, ðɾ/. Therefore, it is ambiguous as to whether these should be counted as separate phonemes, variants or allophones.

Clinical implications for the assessment of Vietnamese children’s speech

Due to the differences between consonants, vowels, semivowels and tones across Vietnamese dialects, the Vietnamese Ministry of Education and Training (MOET) and some Vietnamese authors have indicated that dialect is an important consideration when conducting speech and language assessments with children speaking Vietnamese (Nguyễn, 2011; Tang & Barlow, 2006; The Vietnamese Ministry of Education and Training, 2006). First, it is essential to review case history information about the dialect of family members. Determine the dialect spoken by family members living at home (including parents, grandparents, aunts, uncles and house assistants or dò-sinh). If the children are no longer living in Vietnam, determine whether they learned Standard Vietnamese at school. Discuss with the parents the relevance of the prestige and political importance of different dialects to their family. There are three points to consider: (1) similar to English dialects, there are dialects that carry more prestige and others that are more stigmatised, (2) perceptions about dialect could influence how parents and families interact with interpreters and Vietnamese-speaking professionals when there is a dialectal mismatch or when the professional speaks a stigmatised dialect, and (3) parents may vary in their attitudes about having their child learn a more standard form of Vietnamese vs their own regional dialect(s).

Table VI. Vietnamese articulation and phonology tests according to dialect.

<table>
<thead>
<tr>
<th>Name</th>
<th>Author</th>
<th>Dialect</th>
<th>Areas assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evaluation of the Ability to Articulate (pronounce)</td>
<td>Nguyễn (2011)</td>
<td>Southern</td>
<td>Consonants, semi-vowels, vowels, tones, syllable shape</td>
</tr>
<tr>
<td>Syllables of Vietnamese-Speaking Children in Kindergarten (Đánh giá khả năng phát âm âm tiết của trẻ mua giáo nơi tiếng Việt)</td>
<td>Tam and Barlow (2006)</td>
<td>Southern</td>
<td>Consonants, vowels, tones</td>
</tr>
<tr>
<td>Operation Smile Vietnamese Articulation Screening Test</td>
<td>Dueote (2015)</td>
<td>Northern, Central, and Southern</td>
<td>Consonants</td>
</tr>
</tbody>
</table>
Second, choose an assessment tool that is appropriate for the child's dialect. Currently there are a few non-standardised word lists that are available for assessing Vietnamese children's speech sounds (see Table VI). Many are designed for children who use the southern dialect. It is important to check with the parents whether the vocabulary items are relevant for their dialect (e.g. a pig is called hee in the southern dialect, but ịn in the northern dialect). If the speech-language pathologist speaks Vietnamese or has a Vietnamese interpreter available, it is important to determine the match between their dialect and the dialect of the child. For example, some researchers suggest that listeners may misidentify tones if they do not speak the same dialect (Brunelle, 2009b).

Third, when analysing Vietnamese children's speech, the target pronunciation should be informed by considering the child's dialects and the way that their parent(s) pronounce each target word. For example, consider a child who speaks Standard Vietnamese at school, his mother speaks central Vietnamese, father speaks southern Vietnamese and grandfather speaks northern Vietnamese at home. If this child is asked to produce the word rau (vegetable), then he could be expected to pronounce the word as /ruəw/ (standard and central), /ɾaw/ (northern), or as /ɾaw/ (southern). Therefore, any of these pronunciations would be considered to be correct. However, if he omitted the initial consonant [ɾaw] or produced it as [ɾaw], then these would be considered an error. In this child's case, consideration of dialect is essential for calculation of percentage of consonants correct (PCC) and when analysing phonological processes and undertaking an analysis of substitutions, omissions, distortions and additions (SODA). Parents could assist with determining the accuracy of the child's pronunciation of each word to estimate the proportion of Whole Word Correctness (PWC, Ingram & Ingram, 2001).

Fourth, assess children's vocal quality since this may impact their production of tones. For example, research about teachers with muscle tension dysphonia who spoke the northern dialect has shown that restriction in the ability of the laryngeal muscles to vary tonal pitch can affect their production of high-pitch targets in tones 1, 3 and 5 that can result in increased vocal fatigue (Nguyễn & Kenny, 2009a, b, c; Nguyễn, Kenny, Trần, & Livesey, 2009).

Finally, it is important to determine whether the Vietnamese children are monolingual or multilingual. If they speak more than one language, then there may be interference between the perception and production of languages and dialects spoken (Nguyễn, Ingram, & Pensalfini, 2008; Pittam & Ingram, 1992). When considering resources that provide contrastive analyses between languages such as Vietnamese and English, ensure that the Vietnamese and English dialects (e.g. Standard American English, Australian English) match the child's dialect in each language. For example, Hwa-Frolich et al. (2002) and Tang (2007) compare Vietnamese with Standard American English.

Differential diagnosis of speech sound disorder vs speech difference must include consideration of the dialects spoken by the child and family members (McGregor, Williams, Hearst, & Johnson, 1997). Once a diagnosis is made, then the family should be involved in determining appropriate intervention goals.

Summary and conclusions

Five characteristics of Vietnamese language that differ between dialects should be considered by speech-language pathologists and educators when working with Vietnamese speakers. These characteristics are:

1. The number, distribution and type of consonants across initial and final syllable positions (e.g. initial consonants: Standard = 23, northern = 20, central = 23, southern = 21; final consonants: standard = 6, northern = 10, central = 10, southern = 8);
2. The use of semivowels in the medial position (e.g. the southern dialect omits the semivowel);
3. The use of vowels in specific word contexts;
4. The distribution of diphthongs in specific word contexts; and
5. The number of tones (e.g. Standard = 6, northern = 6, central = 5, southern = 5).

This review of Vietnamese and English literature provides guidelines for the assessment and analysis of Vietnamese speech. Future study is needed to document Vietnamese children's speech acquisition across dialects and to determine the impact of learning additional languages (e.g. English) on Vietnamese speech acquisition.

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Supplementary material available online
Appendix A and Appendix B
### Supplementary Appendix A. Number of Vietnamese dialects

<table>
<thead>
<tr>
<th>Number of dialects</th>
<th>Dialects described</th>
<th>Author (year)</th>
<th>Additional information</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>(1) Standard Vietnamese</td>
<td>Thompson (1965)</td>
<td>Transitional status in speaking from regions to regions</td>
</tr>
<tr>
<td>2</td>
<td>(1) northern (2) central</td>
<td>Maspéro (1912)</td>
<td>Central dialect differentiates from the northern because of its historical fossilisation. Southern dialect is similar to the northern.</td>
</tr>
<tr>
<td></td>
<td>(1) northern (2) central</td>
<td>Giordina and Bustrov</td>
<td>Geographical region for central dialect is broader to the south. Pronunciation in Hue city is considered a sub-dialect in the “medial region”.</td>
</tr>
<tr>
<td></td>
<td>(2) southern</td>
<td>Hoàng (1976)</td>
<td>A series of dialects in the central region is transitional between the northern and the southern regions.</td>
</tr>
<tr>
<td>3</td>
<td>(1) northern (2) central (3) southern</td>
<td>Dinh and Nguyễn</td>
<td>Used frequently in research and everyday usage/folklore. Distinguished through description of the differences in syllable components, e.g., initial consonants, main vowels, final sounds, and tones.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1998); Đỗ (1981);</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Doãn (2003); Hoàng</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1989); Hoàng</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(2004); Hwa-</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Froelich, Hodson,</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>and Edwards (2002);</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Nguyễn (1997); Nguyễn</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(2009); Vũ (1982);</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Võ (1981); Võ (1991)</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>(1) northern (2) northern central (3) southern central (4) southern</td>
<td>Nguyễn, Nguyễn and Nguyễn (1982)</td>
<td>The central dialect is divided into two: northern and southern central dialects.</td>
</tr>
<tr>
<td>5</td>
<td>(1) northern (2) upper central (3) middle central (4) lower central (5) southern</td>
<td>Nguyễn (1961)</td>
<td>The central dialect is divided into three: upper, middle, and lower central dialects.</td>
</tr>
<tr>
<td>9</td>
<td>(1) northern border curving area (2) Ha Noi and surroundings (3) lower Red River</td>
<td>Hoàng (2004) Nguyễn</td>
<td>The north, the central and the south regions all have three dialects.</td>
</tr>
<tr>
<td></td>
<td>Quang Ngai (8) Quy Nhon-Thuan Hai (9) Southern</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Chapter 3

Tone Languages and Communication Disorders

Paper 2

Tone Languages and Communication Disorders

Definition of tones

Tones are compulsory elements of syllables in many of the world’s languages and contrast word meanings using differences in pitch (fundamental frequencies). For example, tones may be flat, rising, falling, or moving (contour tones). Tone languages are described as either simple or complex. Simple tone languages have two-way contrasts often differentiating between high or low tones; whereas, complex tone languages have more than two-way contrasts. Tones are different from intonation; tones relate to syllables whereas intonation relates to phrases and sentences.

Tone languages

Tone languages are predominantly found in Asia and Africa with some tone languages found in the Americas and Scandinavia. There are few tone languages in Europe and tones are not used in Indigenous languages in Australia. There are at least 132 languages that use simple tones and 88 languages that use complex tones. Languages using simple tones include: Cherokee, Ewe, Igbo, Japanese, Latvian, Maasai, Norwegian, Somali, Tibetan, and Zulu. Languages using complex tones include: Burmese, Cantonese, Dinka, Karen, Mandarin, Thai, Vietnamese, Wu, and Yoruba. Languages such as English, Hindi, Korean, Arabic, Persian, and Spanish do not use tones. Three examples of languages that use tones are provided below.

Norwegian

Norwegian is a simple tone language with two tones that contrast in pitch typically in words that have more than one syllable. The two tones differ between dialects. In eastern Norway, there are: (1) low flat and (2) high falling tones; whereas, in western and northern Norway, there are: (1) falling and (2) rising-falling tones.

Vietnamese
Vietnamese is a complex tone language with six tones that contrast in pitch, shape and voice quality. The six tones are: (1) level (*thanh không dấu* or *thanh ngang*), (2) falling (*thanh huyền*), (3) creaky (*thanh ngã*), (4) dipping-rising (*thanh hỏi*), (5) rising (*thanh sắc*), and (6) constricted (*thanh nặng*). Tones (7) and (8) are allophones of tones (5) and (6) in syllables with a final voiceless stop /p, t, k/. An example of an amusing sentence that illustrates six Vietnamese tones is: “Bấy nay bây bầy bầy bảy bẫy bậy” /bɤ̆j nɑ̆j bɤ̆j1 bɤ̆j2 bɤ̆j3 bɤ̆j4 bɤ̆j6/ (translation: All along you’ve set up the seven traps incorrectly).

The six Vietnamese tones differ between dialects. In northern Viet Nam, there are six tones; whereas, in central and southern Viet Nam there are five tones (tones 3 and 4 are merged).

**Cantonese**

Cantonese is a complex tone language. It has nine tones that contrast in pitch and shape. The nine tones are: (1) high-level, (2) mid-low to high, (3) mid, (4) mid-low to low, (5) mid-low to mid, and (6) mid-low. Tones (7), (8) and (9) are allophones of tones (1), (3) and (6) in syllables with a final voiceless stop /p, t, k/.

**Transcription of tones using International Phonetic Alphabet and other systems**

There are a number of ways to transcribe tones. The International Phonetic Alphabet (IPA) provides two systems to describe tones and word accents including tone letters and diacritics. Additionally, people in some countries use numerals (superscript or subscript) or digits to indicate the tone number.

**Tone letters**

Tone letters are commonly used for the languages in which the pitch movement on each syllable conveys lexical differences (e.g., Cantonese and Thai) and are often used to indicate the tone movement on the preceding syllable. Tone letters are represented by a vertical stroke with a line marked on the left. The vertical stroke indicates the possible range of pitch heights, and the preceding line, acting as an icon, shows the pitch height
and movement. For example, in Chinese, the tone letter for /ma˥/ (mother) represents the highest level, and /ma˩/ (hemp) indicates rising tone.

**Diacritics**

Diacritics are often used for the languages in which the pitch height on each syllable conveys lexical meanings (e.g., Yoruba). Tone diacritics are used to indicate three pitch heights including high, mid, and low and these three diacritics are placed above the segment. For example, the three tone diacritics are symbolized as: [é, ē, è]. Tone diacritics indicate different meanings in these Yoruba phrases: /ó bá/ (he/she met), /ó bā/ (he/she hid), and /ó bà/ (it perched).

**Numerals and digits**

Many languages adopt a system of numerals (superscript or subscript) to describe tones. In Norwegian, the tone is marked by a superscript number placed at the left of a syllable; for example, /²tɑŋkǝn/ for tanken (the thought). In Vietnamese, the tone is marked by a superscript number placed at the right of a syllable; for example, /tʰwien²/ for thuyênn (boat). In Cantonese, the tone is marked as by a subscript number placed at the right of a syllable, for example, /sy¹/ for 書 (book).

Tones can also be written using tone digits. For example, in Cantonese: (1) 55, (2) 25, (3) 33, (4) 21, (5) 23, (6) 22, (7) 5, (8) 3, and (9) 2, and in Vietnamese: (1) 55, (2) 32, (3) 325, (4) 323, (5) 45, and (6) 31.

**Children’s acquisition of tones**

There are few studies of children’s acquisition of tones. Infants living in tonal language environments (e.g., Chinese) attune to lexical tones at 4 months and can discriminate the lexical tones at the age of 6 and 9 months old and their discrimination remains constant; whereas, infants living in non-native tonal languages (e.g., English and French) can discriminate the lexical tones at the age of 6 months but reduce their ability
to discriminate tones at the age of 9 months. Most studies of tone acquisition for older children have been undertaken about Cantonese. Most typically-developing 3-year-old Cantonese-speaking children can correctly identify and produce tones. Most typically-developing Vietnamese-speaking 3- to 4-year-old children can correctly produce tones and to date there are no data regarding age of accurate identification of Vietnamese tones.

**Impact of communication disorders on tone perception and production**

Within tone languages, perception and production of tones are essential for understanding and producing conversational speech. There is limited research considering the impact of human communication disorders on tone perception and production. Human communication disorders that have been documented to impact perception and production of tones include: hearing loss, specific language impairment (SLI), dyslexia, cerebral palsy, dysarthria, Parkinson’s disease, and brain lesions. The majority of research has been undertaken with Cantonese-speaking people in Hong Kong.

**Children and adults with hearing loss**

Cantonese-speaking children with hearing loss perform significantly poorer on tone perception compared to typically hearing children and their tone acquisition follows different patterns. Tone perception has been found to be impacted by children’s age, intervention, and usage of hearing aids and cochlear implants. For example, the use of a hearing aid assists tone perception for children with moderate-to-severe hearing loss but not for children with profound (>90dB) hearing loss. Cantonese-speaking children with cochlear implants are able to discriminate tones using pitch contrasts; however, they are not as successful for tones in the lower fundamental frequency range. Mandarin-speaking adults with cochlear implants show a significant improvement in their ability to discriminate tones between the time of their first fitting and 6 months later.
**Children with specific language impairment**

It has been found that Cantonese-speaking children with specific language impairment (SLI) have poorer performance in tone identification and discrimination than children of the same age with typical speech and language development but have similar skills to children who are matched on vocabulary knowledge. Researchers have hypothesized that difficulties in tone identification and discrimination may be due to a deficit in processing the fundamental frequency.

**Children with dyslexia**

It has been found that Cantonese-speaking children with dyslexia have poorer performance perceiving tone contrasts than their age-matched peers.

**Children with speech sound disorders**

Some researchers reported that Vietnamese-speaking children with phonological disorders do not have difficulty producing tones.

**Children with Down syndrome**

Some researchers reported Cantonese-speaking children with Down syndrome do not have difficulty producing tones.

**Adults with cerebral palsy**

It has been found that Cantonese-speaking adults with dysarthria associated with cerebral palsy have some difficulties producing tones. Adults with dysarthria always substituted another tone, and most substitutions involved a change of contour.

**Adults with Parkinson’s disease**

It has been found that Cantonese-speaking adults with Parkinson’s disease have difficulty producing tones.

**Adults with brain damage**
Researchers have reported that Cantonese-speaking adults with aphasia have difficulty with production and perception of tones, but experience greater difficulty with tone perception. In Africa, Shona-speaking adults with brain damage have been found to have difficulty with perception and production of tones compared with typical adults. Adults with right hemisphere damage had more difficulty on tone identification tasks than those with left hemisphere damage. Both groups performed similarly on tone production tasks.

**Assessment of tones**

There are a few tests that have been created to assess perception and production of tones. Tests that assess perception of tones include:

- Cantonese Basic Speech Perception Test consists of a 42-item short form version and a 137-item full form version. It has been standardized with 140 typically-developing children (3 years), and 83 children with hearing loss.

- Hong Kong Cantonese Tone Identification Test consists of a 30-item version for clinical use and a 75-item version for research use. It has been standardized with 200 typically-developing children (3-10 years), 25 adults, and 141 children with hearing loss.

- Cantonese Disyllabic Lexical Tone Identification Test in Noise (CANDILET-N) consists of 60-items displayed using four alternative choices.

Tests that assess production of tones include:

- Cantonese Segmental Phonology Test consists of 31 items in a picture-naming task and 5 pictures in a story retell task to assess 17 consonants, 2 consonant clusters, 13 vowels and 9 tones. It has been standardized with 272 typically-developing children (2-6 years).
- Hong Kong Cantonese Articulation Test consists of 51 items to assess 19 initial consonants, 6 final consonants, 11 vowels, 11 diphthongs, and 9 tones. It has been standardized with 1,726 typically-developing children (2-12 years).
- Putonghua Segmental Phonology Test consists of 44 items in a picture-naming task and 10 pictures in a story retell task to assess 21 consonants, 39 vowels, and 4 tones. It has been standardized with 600 typically-developing children (2-6 years).
- Vietnamese Speech Assessment consists of 77 items to assess 29 consonants, 2 semivowels, 18 vowels, 3 diphthongs, and 6 tones. It is currently undergoing standardization.

**Intervention for tones**

There is limited literature on provision of intervention for tones. In one of the few studies, Cantonese speakers with Parkinson’s disease were provided with intensive voice therapy. They demonstrated an increase in loudness, pitch, pitch range, and intonation; however, they did not improve their lexical tone production. In another study, Vietnamese-speaking children have been taught to produce tones by breaking one syllable into two syllables. For example, in order to scaffold teaching creaky tone (3), they were instructed to produce a syllable with a constricted tone first followed by a syllable with a rising tone, then join these two syllables to become one containing a creaky tone. More research is required to document intervention for tones.

See also: Intonation, prosody, speech sound disorders, hearing loss, perception

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*Sharynne McLeod*

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**Further readings**


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This chapter contains two sections that describe the Vietnamese context regarding education and speech-language pathology. The first section outlines information about the educational structure, early childhood education, and the Vietnamese government’s Developmental Standards for 5-year-old children, and special education. The second section provides an overview about speech-language pathology in Viet Nam including terminology, history of the profession, related policies and laws, and education and services for speech-language pathology. The chapter summarises knowledge from policy, literature, and the community. Information presented in this chapter was obtained through reviewing white and grey literature, the majority of which was written in Vietnamese and published in Viet Nam. Consequently, this chapter addresses stage 1 (gathering knowledge from policy and literature) and stage 2 (gathering knowledge from the community) for the development of communication specialist services in Majority World countries as recommended by Hopf (2018) in the Communication Capacity Research program.

**Education in Viet Nam**

Viet Nam’s education system has developed and undergone many changes over a long history. From the tenth to the nineteenth century, the education system was built and developed following Confucian philosophy serving the wealthy classes and intellectual elite in a feudal society. During the French colonial period (before August 1945), the Vietnamese education system used French as the main language of instruction and was directed towards the goal of training people “to serve the French colonial rulers” (Viet Nam Ministry of Education and Training, 2015, p. 6). The majority of the population was illiterate (95%) during this period.
After the revolution in August 1945, the government of Viet Nam stated that the first national priority was education, and this priority remains the strong focus of the government of Viet Nam today. The Declaration of Independence of the Democratic Republic of Viet Nam was declared by president Ho Chi Minh on 2\textsuperscript{nd} September 1945, and three days later, the 5\textsuperscript{th} September 1945 was the first day of the first school year throughout the independent country. From that day since, the 5\textsuperscript{th} September was chosen to be the national official commencement day for each school year. The school year lasts 9 months, beginning in September and finishing at the end of May of the following year. In 1945, a key task in education was to fight against illiteracy through night classes. The government also issued several ordinances for the establishment of basic education in the country, compulsory use of the national language in education, and ensuring that education is provided at no cost for the entire population (Viet Nam Ministry of Education and Training, 2015).

During the war against the French colonists and the American army (1945-1975), general education systems were implemented differently across regions. For example, between 9 and 11 years of general education was provided in the liberated zones in the north (e.g., Viet Bac), 12-year general education was provided in the temporarily-occupied and the guerrilla zones in the north (e.g., Ha Noi), and 12-year general education was provided in the south (e.g., Sai Gon). After the end of the war in 1975, unification of education systems between North and South Viet Nam (with the 17\textsuperscript{th} parallel as a demarcation line) was undertaken. The unified education system was then reformed in 1981 to meet the need of the national industrialisation and modernisation processes (Phâm, 1998; Tran & Nguyen, 2000) and aimed “to care for and educate the younger generation from childhood to maturity” (Tran & Nguyen, 2000, p. 223). The government strived to encourage young children to attend
kindergartens and crèche classes, from six years of age to follow the entire program of
the 12-year general education.

The Education Law and other basic related regulations regulate all issues in the
education system such as principles, national education goals, administration and
management and structure (Viet Nam National Assembly, 2005). The new Education
Law was approved in June 2005 at the 7th session of the National Assembly of the
Socialist Republic of Viet Nam, Legislature XI and came into effect in 2006 (and
amended in 2009). Article 2 of the 2005 Education Law stipulates that the goals of
education in Viet Nam are to:

[Đ]ào tạo con người Việt Nam phát triển toàn diện, có đạo đức, trí thức, sức khoẻ, thẩm mỹ và
ngành nghề nghiệp, trung thành với lý tưởng độc lập dân tộc và chủ nghĩa xã hội; hình thành và bồi
dưỡng nhân cách, phẩm chất và năng lực của công dân, đáp ứng yêu cầu của sự nghiệp xây dựng
và bảo vệ Tổ quốc
[Education the Vietnamese into comprehensively developed persons who possess ethics,
knowledge, physical health, aesthetic sense and profession, loyalty to the ideology of national
independence and socialism; and shape and cultivate one’s dignity, civil qualifications and
competence, satisfying the demands of the construction and defence of the fatherland] (Viet Nam

The current decree of the national educational reform was approved in
November 2013 at the 8th session of the National Assembly of the Socialist Republic of
Viet Nam, Legislature XIII and came into effect in February 2014 (Viet Nam
Government, 2014). At this time the national committee chaired by the Prime Minister
implemented a fundamental and comprehensive educational reform (Đổi mới căn bản
và toàn diện nền giáo dục). The reform has been seen across educational levels and
disciplines to renovate the colossal, fundamental and urgent issues from educational
ideology and perspectives to educational goals, contents, methods, mechanism, policies
and facilities.

The Structure of the Vietnamese Education System

The structure of the Vietnamese education system consists of both formal and
informal education (Figure III). Schools and other educational institutions are
comprised of three types: public, community, and private. Schools can cover a discrete education level or multi-education levels (e.g., schools can include students from grade 1 to grade 12). Every school including preschool institutions follows the national educational curriculum and uses the same textbooks in general education; however, modifications are accepted and encouraged for the use in special schools.

Figure III. Structure of the Viet Nam national education system. Adapted from the Viet Nam National Assembly (2005).

Universal education has been implemented for primary education (typically for students aged 6 to 11) in Viet Nam since 1991 (United Nations Educational Scientific and Cultural Organization, 2011). As a result of the campaign of universal education, the percentage of children enrolled in primary schools has increased, for example, from 94% in 2001 to 97% in 2011 (Vũ, 2011) and 98% in 2013 (Viet Nam Ministry of Education and Training, 2015). Recently, universal education has been extended for students in upper secondary education and for children aged five in early childhood education.
Early Childhood Education

Early childhood education in Viet Nam is called education for the “young sprout” (*giáo dục mầm non*), comparing young children with a young sprout or young bamboo shoot. According to the 2005 Education Law, early childhood education accommodates children from 3 months to 6 years old. Institutions of early childhood education include crèches/nursery (*nhà trẻ*) for children aged from 3 months to 3 years, kindergarten schools and classes (*trường và lớp mẫu giáo*) for children aged 3 to 6 years, and preschools (*trường mầm non*) for children from 3 months to 6 years of age. Early childhood education aims to support children to develop physically, emotionally, intellectually, and aesthetically in order to shape the initial elements of their personality and to be ready for school (Viet Nam National Assembly, 2005).

Although early childhood education in Viet Nam is not compulsory, the government has recognised the importance of early childhood education and made it a core element of its education sector development agenda to commit the government’s precept “Hãy dành cho trẻ em những gì tốt đẹp nhất” (Giving the best to young children). The government has increased significantly the focus on the quality and availability of preschool education. In addition to the 2005 Education Law, a number of policies regarding preschool education have been adopted. The Prime Minister’s Decision 161/2002/QD-TTG regulates several fundamental issues for preschool education development in terms of tasks and orientation towards types of preschool education sectors, curriculum development, human resource development, investment policies, and planning development (Viet Nam Government, 2002). The Decision also stipulates the responsibilities of line ministries and People’s Committees at different levels regarding the fulfillment of preschool education goals. The Decision 31/2005/QD-BGD&DT issued by the Minister of Education and Training regulates the
conditions to establish kindergarten and crèche classes in places where there are no preschools (Viet Nam Ministry of Education and Training, 2005).

Early childhood education provision has been required to expand over the years to meet a high demand as a result of a high birth rate and a situation that the majority of mothers return to work outside the home after their maternity leave (Shwalb et al., 2010). The gross enrolment ratio has been increasing and this figure varies between ages, families, regions, and school type. The gross enrolment ratio is 20% for children younger than 3 years, 79% for 3-5 years, and 99% for 5 years (United Nations Educational Scientific and Cultural Organization, 2011). Children from ethnic minority groups represent 13.7% of enrolment. The majority of children from the wealthiest families attend preschools and there is a low attendance rate of children from the poorest families. The majority of children (73.3%) attend public preschools; whereas, those attending private and other types of preschools are 18.5% and 8.2%, respectively (General Statistics Office of Viet Nam, 2010). According to national estimates, the total of enrolled children was approximately 4.4 million, the ratio between teachers and children was 1:18, and average class size was 29 children in the 2016/17 school year (General Statistics Office of Viet Nam, 2016).

The majority of preschool teachers (96%) reach the national standard qualification that requires at least a 2-year college diploma (Viet Nam Ministry of Education and Training, 2015). The number of preschool teachers who possessed 3-year diplomas or 4-year university degrees has increased significantly due to nation-wide reform and expansion of higher education system including preschool teacher training (Harman, Hayden, & Pham, 2009). Almost all preschool teachers are female; for example, the percentage of female teachers remained consistent at 99% from the school year 2000/01 to 2012/13 (Viet Nam Ministry of Education and Training, 2015).
As part of the Vietnamese national education system (Figure III) preschools, including both public and private sectors across Viet Nam, are required to follow a national education curriculum monitored by the Viet Nam Ministry of Education and Training. The program of care and education for preschool children was issued in the early 1980s as the national education curriculum to foster the development of children in physical, cognitive, moral, aesthetic, and ethics areas. Teaching focusing on discrete learning areas (e.g., language, maths) was predetermined based on a day-to-day schedule for a whole academic year for children of each age group. Developing and piloting a new national curriculum was initiated in 1998 and was officially issued in 2009 (Viet Nam Ministry of Education and Training, 2009). The renovated curriculum, which is an integrated theme-based curriculum, concentrates on child-oriented activities, children’s experience, the importance of play, activity consequences, individual differences, and creating friendly learning environment for children (Viet Nam National Assembly, 2005). The curriculum and pedagogical reforms have brought a radical shift to move away from the previous fragmented and subject-based curriculum, teacher-centered pedagogy, and long-standing educational beliefs. However, from a cultural historical analysis, Phan (2018) points out that the current early childhood education implemented in Viet Nam has faced challenges because of confusion in understanding and disagreement in implementing the new holistic integrated curriculum among early childhood education professionals and other related stakeholders.

Promotion of universal preschool education to create extensive preschool services for every child also has been a focus within the preschool education reform. One of objectives in the Education Development Strategy 2011-2020 was to complete universal preschool education for children aged five and to target universal preschool education for children aged four by 2020. The Prime Minister’s Decision 239/2010/QD-
TTg complemented by the Minister of Education and Training’s Decision 60/2010/QD-BGD&DT regulates the implementation of universal education for children aged 5 from 2010 to 2015 (Viet Nam Government, 2010). In order to support 5-year-old children to access preschool education, particularly those who are most vulnerable, the Viet Nam government has promoted a number of projects nationwide. For example, the Vietnam School Readiness Promotion Project (SRPP) funded by the World Bank resulted in significant gains as “[b]y the end of the project all 63 provinces and municipalities had achieved universal preschool” (World Bank, 2017, p. 13) for 5-year-old children. As a result of the universal preschool education campaign, there has been a significant increase in enrolment rate, the provision of full day preschools, physical infrastructure, material supplies, and teacher qualifications.

**Developmental Standards for 5-Year-Old Children**

Promotion of the Developmental Standards for 5-year-old children (*Chuẩn phát triển trẻ em 5 tuổi*) in Vietnamese preschools is part of the goals within the campaign for universal preschool education for the 5-year-old children issued in the Education Development Strategy 2011-2020. The Developmental Standards for 5-year-old children (hereinafter referred to as the Developmental Standards) refer to the expectations that children aged 5 years (60-72 months) know and are able to function in four main domains: physical health, emotional and social relationships, language and communication, and cognition in the current Vietnamese context (Viet Nam Ministry of Education and Training, 2013). Children aged 5 years in Viet Nam are supported and expected to meet the Developmental Standards to be ready for school. The process of developing of the Developmental Standards in Viet Nam commenced in 2005, as part of the Global project for the South-East Asian countries funded by UNICEF (Viet Nam Ministry of Education and Training, 2013). The Developmental Standards were conceptualised and operationalised to consist of four developmental areas, 27 standards
and 120 items (Figure IV) that were regulated in the Circular Decision No.23/2010/TT-BGDDT (Viet Nam Ministry of Education and Training, 2010).

Figure IV. The Developmental Standards for children aged 5 years. Adapted from the Viet Nam Ministry of Education and Training (2010). The shading indicates the Developmental Standards areas relevant to this doctoral research.
While the Developmental Standards have been initially implemented throughout the country, a research project funded by the Viet Nam Ministry of Education and Training was undertaken to evaluate the appropriateness and relevance of the Developmental Standards (Phan, 2012). The study collected data by evaluating 92 out of 120 items on 448 children in 12 preschool sites located in four provinces and municipalities that represent urban, rural and remote rural areas in the country. Additional qualitative data were collected from 440 parents and 32 teachers. The conclusion of the study supported the current Developmental Standards. However, there were major concerns about the research project due to the lack of robust statistical analysis, since only descriptive data were presented. For example, children participating in the study were required to be 5 years old (60 to 71 months); however, the children’s ages were not calculated and reported except for a brief description that the data collection was undertaken in April in classes of the oldest groups of children in preschools. Since being issued in 2010, the Developmental Standards have faced much criticism by early childhood education professionals on their validity, reliability and feasibility (e.g., Mai Minh, 2009).

One of the four areas in the Developmental Standards is language and communication development. Since this doctoral research investigated Vietnamese preschool children’s speech acquisition, information within the language and communication area provided in the Developmental Standards was reviewed and described in detail in the next subsection.

**Developmental Standards regarding language and communication.**

The area of language and communication development in the Developmental Standards includes six standards (Standard 14 to Standard 19) that comprises 30 indicators (Item 61 to Item 91) (Table III).
Table III.

Standards and Items in the Area of Language and Communication Development (Viet Nam Ministry of Education and Training, 2010, pp. 36-37)

<table>
<thead>
<tr>
<th>Standard</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>14. The child understands speech</td>
<td>61. To identify speech intonation for expression of happy, sad, angry, surprised and scared feelings</td>
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<td></td>
<td>62. To understand and follow 2 and 3 action instructions</td>
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<td></td>
<td>63. To understand the meanings of general words about simple and familiar objects and actions</td>
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<td></td>
<td>64. To understand the content of stories, poems, and folklore poems for children</td>
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<td>15. The child uses speech to communicate</td>
<td>65. To speak clearly</td>
</tr>
<tr>
<td></td>
<td>66. To use vocabulary regarding names, actions, characteristics and feelings in daily activities</td>
</tr>
<tr>
<td></td>
<td>67. To use different sentence structures in communication</td>
</tr>
<tr>
<td></td>
<td>68. To use speech to express feelings, needs, thoughts and experiences</td>
</tr>
<tr>
<td></td>
<td>69. To use speech to exchange and instruct friends in activities</td>
</tr>
<tr>
<td></td>
<td>70. To narrate an event or a fact intelligibly to others</td>
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<tr>
<td></td>
<td>71. To retell a story in the right order</td>
</tr>
<tr>
<td></td>
<td>72. To know how to initiate a conversation</td>
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<tr>
<td>16. The child performs common rules in communication</td>
<td>73. To adjust the voice appropriately to the situation and communicative need</td>
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<td></td>
<td>74. To pay attention to listening to others and respond through appropriate gestures, facial and eye expressions</td>
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<tr>
<td></td>
<td>75. Not to interrupt others while they are talking</td>
</tr>
<tr>
<td></td>
<td>76. To ask again or express through gesture, posture, facial expressions when they do not understand what is said</td>
</tr>
<tr>
<td></td>
<td>77. To use polite greetings and words appropriate to the situation</td>
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<td></td>
<td>78. Not to swear</td>
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<tr>
<td>17. The child expresses the interest in reading</td>
<td>79. To enjoy reading known letters in the surrounding environment</td>
</tr>
<tr>
<td></td>
<td>80. To show an interest in books</td>
</tr>
<tr>
<td></td>
<td>81. To show behaviours to care for books</td>
</tr>
<tr>
<td>18. The child expresses emergent behaviours of reading</td>
<td>82. To understand some basic signs and symbols</td>
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<tr>
<td></td>
<td>83. To have behaviours of book readers</td>
</tr>
<tr>
<td></td>
<td>84. To “read” known picture books</td>
</tr>
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<td></td>
<td>85. To narrate the story from pictures</td>
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<tr>
<td>19. The child expresses emergent understanding of writing.</td>
<td>86. To know that letters can be read and replaced by speech</td>
</tr>
<tr>
<td></td>
<td>87. To use symbols and drawings to express feelings, needs, thoughts, and experiences</td>
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<tr>
<td></td>
<td>88. To imitate writing behaviour and copy words, and letters</td>
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<td></td>
<td>89. To know how to “write” their name in their own way</td>
</tr>
<tr>
<td></td>
<td>90. To know how to “write” from left to right, from top to bottom</td>
</tr>
<tr>
<td></td>
<td>91. To identify letters of the Vietnamese alphabet.</td>
</tr>
</tbody>
</table>

Note. The shading indicates the items relevant to this doctoral research.
Regarding speech competence, as shown from Item 65 to Item 72, by the age of 5, Vietnamese-speaking children are expected to “Nói rõ ràng” (To speak clearly) (Item 65) and to “Kể về một sự việc, hiện tượng nào đó để người khác hiểu được” (To narrate an event or a fact intelligibly to others) (Item 70). Item 70 comprises two skills: narrative discourse and intelligibility. However, by reviewing available documents related to the Developmental Standards, information about how these standards and items were formulated and assessed was not described, although the Viet Nam Ministry of Education and Training (2013) reported that the Developmental Standards were developed based on evidence from research, professional judgment and current practice.

In research undertaken by Phan (2012), the language and communication development domain in the Developmental Standards was evaluated by requiring children to complete six testing tasks. These six tasks included: (1) Listening and speaking clearly based on the participants introducing/describing themselves, their family and friends; (2) Retelling stories clearly; (3) Identifying the Vietnamese letters of the alphabet; (4) Using books, pens, and other studying materials; (5) Knowing some basic signs such as traffic, rubbish bin, and toilet; and (6) Paying attention. The study concluded that 20 out of 31 items could be completed independently and satisfactorily by children in the sample, 5 out of 31 items could not be fully completed, and 6 out of 31 items were unable to be examined due to the research’s time restraints. Performance of the six tasks also showed that children got relatively lower scores on speaking and retelling tasks compared to those of other tasks. However, the study would appear to be over ambitious in its claims because it failed to fully conceptualise and operationalise the testing constructs, define the testing measures and administration procedures, and quantify data obtained from 448 participants of the sample.

Resources including testing tools published in Vietnamese are provided to assist preschool teachers to assess 5-year-old children in their classes in alignment with the
Developmental Standards (Phan & Trần, 2015). However, these tools are lacking evidence about validity and reliability. Preschool teachers have been encouraged to observe and communicate with children in their classes to determine whether they meet the Developmental Standards or not. This doctoral research provides key data to assist with the enactment and understanding of the Developmental Standards for Standard 15 “The child uses speech to communicate” and acts as a model for future research to underpin other Developmental Standards. This doctoral research also provides data to assist professionals working in the field of special education that was overviewed in following subsection.

**Special Education**

Special education in Viet Nam is defined as a series of programs and approaches that are developed based on modifications of the national education curriculum to support students with special educational needs (Nguyễn, Phạm, & Đỗ, 2011). Article 10 of the 2005 Education Law states that learning is the right and obligation for every citizen as everyone has equal rights of access to learning opportunities. Priority is given to disadvantaged people including children with special educational needs to ensure social equity in education (Viet Nam National Assembly, 2005).

Special education in Viet Nam accommodates children with disabilities who have physical, sensory, mental, and emotional difficulties and cannot follow the national educational curriculum without additional educational support (Nguyễn, Phạm, & Lê, 2006). People with disabilities (including children) are defined by the Law on Persons with Disabilities of 2011 (Viet Nam National Assembly, 2010) as having impairment in body structure(s) or functional limitations that impact the individuals’ capacities to work, learn and undertake daily activities. According to the law, six types of disabilities are officially recognised: (1) physical disability, (2) hearing and speaking disability, (3) visual disability, (4) mental/psychiatric disability, (5) intellectual
disability and (6) other disabilities. Hearing and speaking disability commonly refers to people with hearing loss; potentially excluding people with communication disabilities such as speech sound disorders or developmental language disorders of unknown origin.

In accordance with Article 63 of the 2005 Education Law, the State shall establish and encourage organisations and individuals to establish schools and classes for children with disabilities to enable them to restore their functions, to receive education and vocational training, and to integrate into the community. The State shall give priority in allocating teachers, infrastructure, equipment, and budget to schools and classes established by the State for children with disabilities and give incentives to schools and classes for children with disabilities established by organisations or individuals (Viet Nam National Assembly, 2005). Institutions providing special education include special, integrated, and inclusive schools (Viet Nam National Assembly, 2010).

In Viet Nam, special education has been implemented for over a century since the first special school for children with hearing impairment was established in Binh Duong province in 1866 (Nguyễn et al., 2011). The main focus of special education for a long time has been for children with hearing and visual impairment (Nguyễn, 2005). Recently special education has extended its focus to provide support for children with intellectual disabilities and children with autism spectrum disorders (Nguyễn, 2016; Nguyễn & Đỗ, 2014; Trần, 2002). Despite not being included in the law, children with communication disorders who do not have a hearing impairment, intellectual disability, or autism spectrum disorders do receive some special education provisions.

The first teacher training in special education in Viet Nam began in 1995 at Ha Noi National University of Education, where the first faculty of special education in the country was established in 2001 (Nguyễn et al., 2011). Currently there are about ten universities and colleges in the country with departments of special education that
provide teacher training programs (university and college degrees) in special education. The training programs commonly are specialised based on the types of disabilities that are recognised in the 2011 Law on Persons with Disabilities (Viet Nam National Assembly, 2010); for example, special education for children with hearing impairment, visual impairment, intellectual disability, or autism spectrum disorders (Ha Noi National University of Education, 2013; National College of Education, 2012). Teacher training programs in special education specialising in children with speech, language, and communication needs has yet to be provided. Speech, language, and communication needs are seen as consequences of the primary disabilities recognised in the law; therefore, assessment and intervention of speech, language, and communication for children with the recognised disabilities is a part of the teacher training programs in special education. However, children with speech, language, and communication difficulties of unknown causes are not included, despite their high prevalence reported in other countries (Law, Boyle, Harris, Harkness, & Nye, 2000; McLeod, McAllister, McCormack, & Harrison, 2014).

Inclusive education for children with disabilities is a recent focus (UNESCO, 2011). The Viet Nam Ministry of Education and Training (2006) issued the Decision No.23/2006/QD-BGD&DT that guides the implementation of inclusive education for children with disabilities. Inclusive education is implemented in early childhood education (Lã, Bùi, & Hoàng, 2016), primary education (Lê, 2006), and secondary education (Bùi, Phạm, & Lê, 2012). Children who have a certificate of disability are given priority to access to inclusive education. However, children who have disabilities that are not recognised in the law (e.g., children with speech sound disorders or children with developmental language disorders) do not officially receive any additional educational support.
A number of laws and policies regarding special education have been adopted to promote education for children with disabilities in addition to the laws mentioned previously (i.e., the 2005 Education Law, the 2011 Law on Persons with Disabilities and the Decision No.23/2006/QD-BGD&DT). These laws include the 1991 Law on Child Protection, Care, and Education (Luật bảo vệ và chăm sóc trẻ em) (Article 6, item 3) (Viet Nam National Assembly, 1991a) and the 1991 Law on Universal Primary Education (Luật phổ cập giáo dục tiểu học) (Article 11) (Viet Nam National Assembly, 1991b). These policies include the Policies on the Handicapped (Pháp lệnh về người tàn tật) (Chapter 3, Article 16) (Viet Nam National Assembly, 1998). The National Steering Committee of Education for Children with Disabilities was established in 2002. The National Action Plan to support people with disabilities extends from 2012 to 2020 (Viet Nam Government, 2012). One of the objectives is to promote research on the development of a unique sign language system to be used nationwide. The inter-Ministerial Circular No.58 on Resource Centres Supporting for Inclusive Education was approved by the Viet Nam Ministry of Education and Training and Ministry of Labour Invalids and Social Affairs (2012). This document provides guidelines for establishing and operating the resource centres nationwide. To date, there are 14 resource centres established and monitored by the Ministry of Education and Training. The resource centres have provided support for early detection and intervention, training for parents and inclusive teachers, and provision of services for children regarding skills for school readiness. Recently, the Viet Nam Ministry of Education and Training and Ministry of Home Affairs (2016) has stipulated an inter-ministerial circular on professional career code and standards for assistant teachers who provide support for education of people with disabilities in public educational sectors.

In conclusion, special education in Viet Nam has made great efforts to increase the availability of support for children with disabilities, particularly related to hearing,
vision, intellect, and autism. However, there is more work to be done to support children with disabilities of no known cause including speech, language, and communication disabilities.

**The Profession of Speech-Language Pathology in Viet Nam**

Compared with the speech-language pathology professions developed in other countries in the world and in the Asia-Pacific region, speech-language pathology in Viet Nam is an emerging profession and is an under-served service (Atherton, Nguyễn, & Võ, 2013). The profession has yet to be officially established since the codes representing the profession and the career title have yet to be approved by the Vietnamese government. A formal college/university degree program in speech-language pathology has yet to be provided in the country (Eitel, Tran, & Management Systems International, 2017). A description of terminology, history, related policies and laws, and education and services of speech-language pathologists is presented below to capture an overview of this profession in Viet Nam.

**Speech-Language Pathology Terminology in Viet Nam**

The use of terminology indicating the profession and services of speech-language pathology in Viet Nam is inconsistent both in the English and Vietnamese literature. Within the white and grey literature written and published in English, a number of terms have been used: “communication therapy” (Winterton, 1998, p. 108), “communication rehabilitation” (Hammer, 2015, p. 1), speech-language therapy (Bowen, 2017, n.p), speech and language therapy (Eitel et al., 2017, p. 8; Trinh Foundation Australia, 2017, p. 1), speech-language pathology (Atherton, Davidson, & McAllister, 2017, p. 109; Atherton et al., 2013, p. 42; Tang & Barlow, 2006, p. ), speech therapy (Bowen, 2017, n.p; Ducote, 2016, n.p; McAllister et al., 2013, p. 75; Trinh Foundation Australia, 2017, p. 1), and speech pathology (Landis, 1973, p. 342). According to Eitel et al. (2017), the use of these terms is interchangeable and different
terms are used by professional associations in different English-speaking countries (e.g., *speech pathologist* in Australia, *speech-language pathologist* in Canada and US, and *speech and language therapist* in Ireland, New Zealand and UK). This doctoral research has chosen to use the term *speech-language pathology* consistently throughout all the chapters. One of the reasons is to be consistent with the published papers embedded within this doctoral research and the requirements of international journals. This doctoral research defines speech-language pathology to indicate a profession that provides support for people with communication disorders and swallowing difficulties through delivering diagnosis, assessment, and intervention services, training clinical practitioners, conducting research, and raising public awareness.

Within the literature written and published in Vietnamese, a number of different terms also have been used to indicate the profession of speech-language pathology in Viet Nam. Many terms have been directly translated from English into Vietnamese and differences in the Vietnamese translated terms are due to the inconsistent use of the original terms in English literature and are dependent on translators. For example, the term speech-language pathology can be translated into Vietnamese as: “bệnh học ngôn ngữ và lời nói”, “âm ngữ trị liệu”, or “trị liệu âm ngữ”. In medical settings, the term “trị liệu ngôn ngữ” or “ngữ âm trị liệu” (speech therapy) has been used commonly, particularly to indicate services providing for children with cleft palate. “Ngôn ngữ trị liệu” or “trị liệu ngôn ngữ” (language therapy) has also been used; for example, in a medical legislative document (Viet Nam Ministry of Health, 2013). In education settings, there have been a number of terms used to indicate services for supporting children with communication disorders. “Chỉnh âm” (speech correction) has been used to particularly indicate speech-language pathology services for children with hearing loss and children with cleft palate (Phạm, 2014; Trần, Hoàng, & Trần, 2014). “Giáo dục sửa chữa tật ngôn ngữ” (education and correction for language disability) has been used as a
research focus by researchers in special education at the Viet Nam National Institute of Educational Sciences (Lê, 2012). “Phát triển ngôn ngữ, lời nói, và giao tiếp” (development of speech, language, and communication) has also been used by special educators to indicate services to reduce difficulties related to speech, language, and communication that are caused by primary disabilities (e.g., hearing loss). Among the all above terms, the term “âm ngữ trị liệu” (speech-language therapy) has most widely been used in both medical and educational settings by many authors although it has been not defined conclusively in Vietnamese literature (e.g., Vũ & Đặng, 2004). This Vietnamese term has also been used consistently in this doctoral research within publications (found in Appendix A) disseminating findings to Vietnamese audiences in Viet Nam (e.g., Phạm, McLeod, & Le, 2018; Phạm, Phạm, & Đào, 2017).

History of Speech-Language Pathology in Viet Nam

The profession of speech-language pathology in Viet Nam has undergone various stages of development although the profession has not officially been established. From a broader perspective, the speech-language profession in Viet Nam could be considered to have begun in 1866 when the first special school for hard of hearing and deaf children was established (Eitel et al., 2017). However, reviewing literature related to rehabilitation services, speech-language pathology in Viet Nam was recognised in the 1970s when Pat Landis, an American speech-language pathologist, went to Sai Gon (now called Ho Chi Minh City) to provide diagnosis and speech interventions for children with cleft lip and palate after surgery (Atherton et al., 2017; Atherton et al., 2013; Landis, 1973). Landis also provided a 6-month professional training course for local health professionals to provide speech services for patients at the local hospitals (Landis, 1973; Landis & Pham, 1975).

During the 1980s and 1990s, speech-language pathology in Viet Nam continued to develop during the implementation of the national community-based rehabilitation
program. The program provided short training workshops for local professionals. After the training the local professionals became key stakeholders to provide direct support for children and to train families and communities about rehabilitation including speech-language pathology (Winterton, 1998).

Since the 1990s, various non-government organisations, agencies (e.g., charities, religions, and professionals), and individual clinicians and surgeons from outside of Viet Nam have been involved in professional activities to support people with communication disorders in Viet Nam. For example, Charlotte Ducote, an American speech-language pathologist, worked with the Operation Smile, an organisation from US began in Viet Nam in 1989. Janella Chrisite, an Australian speech pathologist, worked with the Bridge the Gap project from Australia in 1998. Sue Woodward, an Australian speech pathologist, worked with the Operation Boomerang project from Australia in 2008. These projects provided post-surgical interventions for children with cleft lip and palate. Larry Hammer, a speech-language pathologist from US, operated the Viet Nam Laryngectomee Humanitarian project to provide support for people with a laryngectomy of low socio-economic status in different cities in Viet Nam from 2000 to 2016 (Hammer, 2015). In addition to providing speech-language pathology services for patients, the projects also supported numerous professional development workshops for local professionals (Ducote, 1998).

Since 2008, Trinh Foundation Australia, a voluntary, non-profit, and non-government organisation under the mission of supporting the establishment of speech therapy as a profession in Viet Nam, has made huge strides in the development of speech-language pathology in Viet Nam (Ducote, 2016). Trinh Foundation Australia has committed to improving the quality of life of Vietnamese people with communication and swallowing disorders (Trinh Foundation Australia, 2017). Together with the Pham Ngoc Thach University of Medicine in Ho Chi Minh City, Trinh
Foundation Australia offered the first and the most comprehensive speech-language pathology training in the country via a 2-year post-graduate diploma (discussed later in this chapter). The organisation also has provided numerous continuing professional development workshops for the graduates, and has facilitated the development of culturally and linguistically appropriate resources. Although speech-language pathology is an emerging profession in the country, significant achievements regarding training and services have been recognised in the profession compared to the first time it was introduced in the 1970s.

**Laws and Policies Related to Speech-Language Pathology in Viet Nam**

There are a number of laws and policies related to the speech-language pathology profession and people with speech, language, and communication needs in Viet Nam. These laws and policies that have been ratified and used in speech-language pathology include international and national legislation.

With respect to international legislation documents, in December 2014, the Vietnamese government ratified the United Nations Convention of the Rights of Persons with Disabilities (CRPD, United Nations, 2006). Ratification of the CRPD as a signatory demands a commitment from the Vietnamese government to improve the lives of people with disability in the country. There are a number of articles (e.g., Articles 4, 9, 21, and 24) of the CRPD relating to people with communication disabilities and speech-language pathology (Eitel et al., 2017). Particularly Article 21 of the CRPD includes a right to “freedom of opinion and expression” that was originally enunciated in Article 19 of the Universal Declaration of Human Rights (United Nations, 1948) and highlights the importance of a fundamental human right to communication (McEwin & Santow, 2018; McLeod, 2018). The rights and advancement of persons with disabilities in society and development is continually promoted by the United Nations as stated in
their recent overview report of the 70 years working on disability (United Nations, 2018).

The second international legislation documents that have been used in Viet Nam relating to people with disabilities and speech-language pathology are the International Classification of Functioning, Disability and Health (ICF, World Health Organization, 2001) and the International Classification of Functioning, Disability and Health - Children and Youth version (ICF-CY, World Health Organization, 2007). The ICF (WHO, 2001) was used to classify disability in the 2006 Viet Nam Household Living Standards Survey, in which a countrywide prevalence of disabilities was quantified at 15.3% of the country population (General Statistics Office of Viet Nam, 2006). The 2009 national census on population and housing used the ICF and identified a 7.8% prevalence of physical, visual, hearing, or cognitive disabilities within the country’s population (General Statistics Office of Viet Nam, 2010). The ICF-CY has been introduced as a theoretical framework in speech-language pathology training programs provided at the Pham Ngoc Thach University of Medicine in Ho Chi Minh City in collaboration with Trinh Foundation Australia (McAllister et al., 2013). It has also been applied in services for children with communication disorders (e.g., cleft palate) in medical and educational settings (Hoàng, Trà, & Cao, 2014; Phạm et al., 2017). In addition, this doctoral research also used the ICF-CY as a theoretical framework as described in Chapter 1 of this thesis.

In addition, the World Health Organization (2017) has recently promoted the need to scale up rehabilitation in the report titled: Rehabilitation 2030: A Call for Action Meeting. The report highlights the importance of strengthening rehabilitation in health systems to reduce disability in individuals with health conditions and optimise their function in interaction with environment.
There are three key comprehensive national legislation documents issued by the Viet Nam Ministry of Health that may facilitate the development of speech-language pathology in Viet Nam. First, the Viet Nam Ministry of Health (2013) issued the Circular No.46/2013/TT-BYT on regulations of specific functions, duties, and organisational structure of rehabilitation facilities. This legislation document recognises professionals specialising in speech-language pathology as a member of a rehabilitation team working along with rehabilitation specialists, rehabilitation nurses, professionals with a bachelor of medical technology, physiotherapists, occupational therapists, and orthopaedic instrument specialists. The roles and responsibilities of each member working in the rehabilitation team are defined in the document. According to this document, professionals working in speech-language pathology are divided into two categories: (1) professionals with a bachelors degree and (2) speech-language pathology technicians. The professionals with a bachelors degree are required to graduate from a higher education training program in speech-language pathology and are responsible for undertaking assessment, diagnosis, and rehabilitation of people with speech and language disorders. The speech-language pathology technicians are required to graduate from a vocational training program in speech-language pathology. The technicians also can be nurses who have attended additional training in speech-language pathology for at least three months at medical facilities designed by the Viet Nam Ministry of Health and has obtained a practicing certificate for medical examination and treatment as regulated by the law on medical examination and treatment (Viet Nam Ministry of Health, 2013). Second, the Viet Nam Ministry of Health (2014) approved the National Plan on Rehabilitation Development phase 2014-2020. This National Plan gives directions to develop rehabilitation in the country with the 2020 targets regarding sufficient quantity and quality of rehabilitation professionals specified by the Circular No.46/2013/TT-BYT (Viet Nam Ministry of Health, 2013). This document is
considered as a facilitator for establishment of facilities that provide training programs in speech-language pathology at undergraduate and postgraduate degrees. The third legislative document is the national policy on health insurance coverage (Viet Nam Ministry of Health, 2015). The document listed 33 rehabilitation services relating to speech-language pathology provided by registered speech-language pathology professionals within medical settings that are covered by insurance. However, the country has not yet regulated a registration process for medical professionals specialising in speech-language pathology. Currently, registered speech-language pathology professionals mentioned in the national policy on health insurance coverage refer to medical professionals currently working in rehabilitation units (e.g., physiotherapists, rehabilitation technicians, and orthopaedic instrument specialists) who have obtained a practicing certificate regulated by the law on medical examination and treatment in rehabilitation (Viet Nam Ministry of Health, 2017). These professionals have received unofficial training (e.g., 2-year post-graduate programs or short courses ranging from 3 to 10 months) in speech-language pathology and have been required to provide services in speech-language pathology as their extended duties at work. Since speech-language pathology has not yet been part of a broader registration program for medical professionals, recognition of speech-language pathology professionals in these legislative documents is of importance for the establishment and development of speech-language pathology profession in Viet Nam.

**Education and Services of Speech-Language Pathology in Viet Nam**

The need for formal training program in speech-language pathology is one of emerging issues for the development of speech-language pathology in Majority World countries (Cheng, 2010; Hopf & McLeod, 2015). This pressing need for the field in Viet Nam was discussed and resulted in a 2-year formal program that was approved in 2002 by the Ministry of Health and Ministry of Education and Training in collaboration with
the Ha Noi Medical University, Operation Smile, and the Vietnam Association for Rehabilitation. However, this training program did not take place (Eitel et al., 2017).

Until 2010 there were no comprehensive or fulltime clinical training courses for in speech-language pathology in Viet Nam despite the high demand identified for speech-language pathology services in the country. Trinh Foundation Australia has made significant contribution to the education of speech-language pathologists in the country by offering the Viet Nam’s first ever 2-year post-graduate diploma program in speech-language pathology in 2010 (McAllister, Atherton, Wylie, Woodward, & Winkworth, 2011; McAllister et al., 2013). This program was coordinated within the Pham Ngoc Thach University of Medicine in Ho Chi Minh City. The first cohort of 18 speech-language pathologists graduated in 2012 followed by the second cohort of 15 graduated in 2014. The third program specialising in paediatric speech-language pathology was a 10-month program and 32 have graduated in 2017 and are certified as speech-language pathologists to work with children. To date, 65 graduates who completed the speech therapy training programs offered by Trinh Foundation and Pham Ngoc Thach University of Medicine, serve as the pioneer speech-language pathologists in the country. These graduates are working in different settings throughout the country. Currently Trinh Foundation Australia is coordinating with the Medical Committee Netherlands-Viet Nam to develop a masters degree in speech-language pathology to be taught at the University of Medicine and Pharmacy in Ho Chi Minh City and a bachelors degree at the Da Nang University of Medical Technology and Pharmacy by a USAID funded project (Armstrong, E., Phạm, D., Nguyễn, T. T. T. & Koster, S., 2018; Trinh Foundation Australia, 2018). In addition to the clinical training programs offered by Trinh Foundation, another 10-month post-graduate training program specialising in paediatric speech-language pathology is currently undergoing at Pham Ngoc Thach University of Medicine in Ho Chi Minh City between September 2017 and July 2018.
In addition, Hue University of Medicine and Pharmacy in collaboration with Chonbuk University, Korea offered a 9-month clinical training course in speech-language pathology in 2016. This program was funded by the Korea International Cooperation Agency. There were 26 students who participated in this training. Additionally, there have been a few Vietnamese nationals who have obtained either a bachelors or masters degree in the field of speech-language pathology in other countries (e.g., Australia, New Zealand, UK and US). However, most have not returned to work in Viet Nam at this stage.

**Conclusion**

Chapter 4 describes the Vietnamese context regarding the education system and the profession of speech-language pathology. Great efforts have been made in early childhood education, special education, and speech-language pathology to support children with communication difficulties. Some speech-language pathology training programs are beginning to emerge, but the profession is not yet regulated. Communication disorders including speech sound disorder and developmental language disorder have not been recognised. Therefore, there is more work to be done to raise public awareness, train clinical practitioners, develop culturally and linguistically appropriate resources, and provide evidence-based assessment and intervention services in the country.

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Part Two: Vietnamese Children’s Speech Acquisition

Part Two consists of Chapters 5, 6, 7, 8, and 9 providing information obtained from the research studies to capture Vietnamese children’s speech acquisition in Northern Viet Nam. Chapter 5 presents information regarding typical speech acquisition, phonological theories, and research design and methods that were reviewed and incorporated into this doctoral research. Chapters 6, 7, and 8 are formatted in the style of submitted manuscripts. Chapter 6 (Paper 3) provides information about the conceptualisation and operationalisation of the Vietnamese Speech Assessment that was a key assessment tool used to elicit speech samples for two research studies reported in Chapters 7 and 8. Chapter 7 (Paper 4) presents results gained from a research study that examined Northern Vietnamese children’s acquisition of consonants, semivowels, vowels, and tones. Speech acquisition data presented in Chapter 7 were considered by relational and prosodic analyses. In addition to the relational and prosodic analyses used, another main analysis of speech acquisition data used in this current study was children’s intelligibility since intelligibility is the outcome of correctly producing consonants, vowels, and tones. Speech acquisition data regarding Northern Vietnamese children’s intelligibility was presented in Chapter 8 (Paper 5).
Chapter 5
Children’s Speech Acquisition: Definitions, Theories, and Methodological Considerations

This chapter is structured into three sections to present information about children’s speech acquisition with regard to definitions, theories, and methodological considerations. In the first section, an introduction of typical speech acquisition is presented including definitions of typical speech acquisition and reasons to examine children’s typical speech acquisition. The second section describes a number of theories to provide a multi-faceted perspective on children’s speech acquisition and identifies the Emergence Approach (Davis & Bedore, 2013) as the theory underpinning this doctoral research. The final section of this chapter outlines methodological considerations including research designs for studying speech acquisition and speech acquisition measurement protocols for cross-sectional studies. Each section of this chapter is described in general then applied to the current doctoral research.

Typical Speech Acquisition

Definitions of Typical Speech Acquisition

In this subsection, the terms speech, acquisition, and typical are defined individually towards providing an inclusive definition of what is typical speech acquisition. Firstly, speech is a prominent component of human communication. It is “the means by which we communicate messages orally” (McLeod & McCormack, 2015, p. 4) and involves the mechanisms of perception, storage, planning, and production of speech sounds. Perception refers to the ability to discriminate between language and non-language sensory information and the ability to recognise sounds and words that are associated with meaning (Stackhouse & Wells, 1997). Storage refers to the ability to maintain phonemes efficiently in short- and long-term memory (Wagner &
Torgesen, 1987). Planning and production refer to the ability to “plan and implement motor movements required to produce the sound combinations” (McLeod & McCormack, 2015, p. 6) to convey a message. Phonology involves the knowledge and skills to understand the sound system of languages and the rules of how those sounds can combine and are pronounced in order to use these sound combinations appropriately in languages. Phonetics is about the articulation or physical production of speech sounds. The term *speech* is thus used throughout this doctoral research incorporating both phonetic and phonological elements.

Being considered as a “journey from unintelligible to intelligible speech” (McLeod & Baker, 2017, p. 176), children’s speech develops towards adult-like production through the school years. Description of the process in which children acquire or develop their speech is called *acquisition*. From a cognitive view in a learning context, Ausubel (2012) defines *acquisition* to be a process by which humans gain possession “of new meanings (knowledge) that were not previously comprehended or were non-existent” (p. 10). In other words, it describes the status of growth in children’s ability or children’s mastery of new skills.

Therefore, from a multi-faceted perspective, *speech acquisition* can be defined as a process by which children acquire the capacity to perceive, process, store, and organise the phonological knowledge of their ambient language and the ability to plan and implement articulatory movements in compliance with the knowledge of phonological rules to produce intelligible speech to interact with their environment (Davis & Bedore, 2013; McLeod & Baker, 2017; Menn, Schmidt, & Nicholas, 2013). The term *speech acquisition* has been used widely within the speech-language pathology literature. However, from the list of over 250 speech acquisition studies compiled by McLeod (2016) on the Multilingual Children’s Speech website, other
terms have been used interchangeably such as: *phonological development, phonological acquisition, and articulation development*.

The term *typical* can be understood in two ways as described within literature about children’s development and children’s speech acquisition (McLeod & Baker, 2017; Thomas, 2000). Firstly, it means the similarity between statistical data regarding children’s speech competency using categories such as age, sex, and socioeconomic status. Secondly, it includes an understanding of “how closely a child’s condition matches the value system of the person making the judgement about normality” (Thomas, 2000, p. 101). Within this view, Thomas (2000) uses the term *typical* to refer to “approved, admirable, satisfactory, proper, acceptable, and the like” (p. 101). In this current doctoral research, which investigated speech acquisition of children who speak the Northern Vietnamese dialect, the term *typical speech acquisition* was used in its broadest sense to refer to both characteristics of statistical similarity and acceptability and desirability in children’s speech productions. For example, due to dialectal variants, both [p, b] were counted as acceptable productions for the target sound /p/ in the initial syllable position for typically-developing Vietnamese-speaking children.

When children’s speech acquisition is not typical, they may have *speech sound disorders*. According to a definition provided by the International Expert Panel on Multilingual Children's Speech (2012, p. 1) speech sound disorders are defined “as an umbrella term for the full range of speech sound difficulties of both known (e.g., Down syndrome, cleft lip and palate) and presently unknown origin”. Children with speech sound disorders “can have any combination of difficulties with perception, articulation/motor production, and/or phonological representation of speech segments (consonants and vowels), phonotactics (syllables and word shapes) and prosody (lexical and grammatical tones, rhythm, stress, and intonation) that may impact speech intelligibility and acceptability” (International Expert Panel on Multilingual Children’s
Speech, 2012, p. 1). To date, there has been very little information about speech acquisition of Vietnamese-speaking children without or with speech sound disorders (Hwa-Froelich, Hodson, & Edwards, 2002; Tang & Barlow, 2006). Indeed over 15 years ago Hwa-Froelich et al. (2002) indicated “there is a great need for research, including studying a larger sample of speakers with the different regional dialects and obtaining developmental informational (sic) about typical phonological acquisition in Vietnamese children” (p. 272) and this need is still unmet.

**Reasons for Examining Children’s Typical Speech Acquisition**

The importance of understanding the typical course of speech acquisition has been well explained in many studies of children speaking English and other languages. One of reasons to examine children’s typical speech acquisition relates to its important role in clinical application in speech-language pathology. Being considered as a “powerful clinical tool” (Davis, 2007, p. 50), knowledge of typical speech acquisition has been applied in the practice of speech-language pathology for a long time. The first studies that reported ages of acquisition for particular speech sounds were published in the 1930s (Poole, 1934; Wellman, Case, Mengert, & Bradbury, 1931). The understanding of children’s typical speech acquisition has equipped many professionals to make decisions at different service phases such as referral, assessment, analysis, diagnosis, choosing intervention goals, intervention, and dismissal (Bernthal, Bankson, & Flipsen, 2013; McLeod & Baker, 2017; Smit, Hand, Freilinger, Bernthal, & Bird, 1990). Children’s speech acquisition data have assisted classification/diagnosis of children who have typically-developing speech and those who do not during clinical assessments (Davis, 2007; Dodd, Holm, Hua, & Crosbie, 2003; Phoon, Abdullah, Lee, & Murugaiah, 2014).

Being used as a benchmark during speech assessments, data about typical speech acquisition have been used to determine the current functional level of children who are
at risk of speech sound disorders and determine the type and the severity of children’s disorder (Waring & Knight, 2013). Also, typical data regarding children’s speech acquisition has been used to identify whether children may require speech intervention services or not (Broomfield & Dodd, 2004).

Understanding children’s typical speech acquisition has been essential to other fields relating to child phonology, phonetics, and education. Exploring descriptive data about speech acquisition can reveal developmental trends in phonology. These data have not only illustrated the cross-linguistic differences in phonological development for specific languages but also contributed to the view of universal trends in children’s speech acquisition across languages, the idea initially introduced by Jakobson (1968). Universal trends in children’s speech acquisition across languages are supported by cross-linguistic studies presenting data about speech acquisition that outline similar developmental paths in their results. To date, researchers have published speech acquisition data about 60 languages in the world (McLeod, 2016). The universal trends evident from comparisons of available speech acquisition data across languages may provide preliminary insights into for the languages that have not had available speech acquisition data (McLeod & Crowe, 2018).

Undertaking research to detail typical speech acquisition in a variety of languages is also important because it portrays diversity of children’s speech acquisition across languages. Each language has its own phonological characteristics; thus, it is necessary to investigate how children acquire specific phonological features of the language(s) surrounding them. Even though there are a number of similar speech sounds shared across languages, individual variations are seen in acquiring these same sounds for specific languages (Hua & Dodd, 2006).

There are about 7,000 languages in the world (Simons & Fennig, 2017), and it is impossible to undertake research to make speech acquisition data available for every
language and dialect. It is important to consider a number of criteria related to the use of a specific language (e.g., Vietnamese) in order to make decisions about investigations of speech acquisition.

The popularity of a language could be examined based on criteria that it is spoken as the first language of a large portion of the world’s population and/or is spoken in many other countries as one of the most common home languages. Typical data regarding children’s speech acquisition of the most common spoken languages will be representative of a large population and therefore are used widely and frequently. Vietnamese is in the top 20 languages spoken in the world so is worthy of study.

In addition, it is essential to consider sociolinguistic contexts where the specific language is spoken. According to Henrich, Heine, and Norenzayan (2010), research about human behaviour predominantly has been undertaken in democratic, educated, industrialised, rich, and western countries that are not representative of diverse cultures. For example, according to the comprehensive cross-linguistic review describing typical speech acquisition in 27 languages undertaken by McLeod and Crowe (2018), speech acquisition of English has been described in the largest number of studies compared to the other 26 languages. However, the sociolinguistic contexts in which English is spoken are mostly representative for the Minority World rather than the Majority World countries. Therefore, there is an obvious call to undertake speech acquisition research on Vietnamese since it is a candidate for one of the most commonly spoken languages in the world, is the official language of a Majority World country, is spoken in contexts representative of diversity (e.g., multiple dialects), and does not have available comprehensive data about speech acquisition.

**Theoretical Background for Studying Vietnamese Children’s Speech**

Being a key area in children’s overall development, speech acquisition has attracted a number of influential theorists and researchers over the last fifty years. Many
theories about speech acquisition from different disciplines such as linguistics, psychology, education, biology, and bilingualism have been introduced contributing understanding of the mechanism and complexity of children’s speech acquisition. Some theories have evolved autonomously and some have built on existing theories. These theories are of use in typical speech acquisition and disorders in both monolingual and multilingual contexts (Ball, 2016; Fabiano-Smith & Goldstein, 2010). The use of these theories is important for studying children’s speech as they are the groundwork influencing assumptions about children’s typical speech acquisition and disorders as well as influencing research designs used to investigate children’s typical speech acquisition and disorders.

Vihman (2014) summarised three main theoretical approaches to theories of speech acquisition: formalist, perception, and functionalist/emergentist. Within this doctoral research, the most common theoretical approaches that account for phonological production are outlined in order to provide a theoretical background to describe and explain monolingual data about Vietnamese-speaking children’s speech acquisition. A brief overview about the theories within the formalist approach including classic theories (i.e., generative phonology, and natural phonology) and contemporary theories (i.e., nonlinear phonology, optimality theory, and psycholinguistic theories) is provided followed by the Emergence Approach, the theoretical framework adopted for this doctoral research.

Classic Theories

Generative phonology.

Generative phonology emerged from the classic work Sound Patterns of English by Chomsky and Halle (1968) and is a frequently studied phonological theory. The goals of generative phonology are to (1) “describe phonological patterns in natural languages”, (2) “formulate the rules that account for these systems”, and (3) “identify
universal principles that apply to phonological systems” (Kent, 2013, p. 55). Generative phonology introduces different phonological concepts (e.g., phoneme versus allophone, realisations of phonemes as allophones), and addresses the transition/changes between underlying phonological representations (phonemes) and surface phonetic representations (allophones) in particular contexts according to linguistic rules. The rules describe the conditions under which allophones occur and these allophones can be categorised as either in complementary distribution or free variation (Grunwell, 1987). For example, in Northern Vietnamese the voiceless velar consonant /k/ is coarticulated with /p/ to create the allophone /kp/, and the nasal consonant /ŋ/ is coarticulated with /m/ to create the allophone /nm/ in the syllable final position as indicated below:

\[
/k/ \rightarrow [kp] / V \_\_ \#
\]

\[
/ŋ/ \rightarrow [nm] / V \_\_ \#
\]

By using the phonological concepts such as phoneme and distinctive features, generative phonology describes the systematic changes that happen between the underlying phonological representations and surface phonetic representations (Ingram, 1997). Generative phonology supports the idea that speech acquisition is an innate process and universal across languages; a statement that was initially hypothesised by Jakobson (1968). It further highlights on the role of the ambient language input such as factors influencing speech acquisition (e.g., position of speech sounds), and differences between children’s speech compared to adult realisations. Generative phonology has been used as a theoretical framework in both children’s speech acquisition and disorders (Gierut, 1992; Ingram, 1997). It has also been applied in different service phases of children with speech sound disorders including assessment, analysis, target selection, and intervention (McLeod & Baker, 2017). However, one of the weakness of generative phonology is that children’s underlying phonological representations of sounds are
assumed to be adult-like (Chomsky & Halle, 1968). It also does not account for the role of the sociocultural context.

**Natural phonology and phonological processes.**

Another classic phonological theory within the formalist approach is natural phonology. This theory was proposed by Stampe (1979) to offer an alternative account for children’s speech acquisition. Natural phonology uses the concepts of *naturalness, markedness*, and *features* based on the phonological rules originating in the theory of generative phonology. The theory is based on evidence of naturalness taken from acquisition studies across languages to indicate that children exhibit similar simplification processes in their pronunciations. Stampe (1979) proposed that less mature or easier ways of producing speech found in children’s realisations of words (compared to adults’ realisations) are natural phonological processes. These natural phonological processes simplify the adult target word thus are acquired early and easily by children. Stampe (1979) defined these processes as a “mental operation that applies in speech to substitute for a class of sounds or sound sequences presenting a common difficulty to the speech capacity of the individual, an alternative class identical but lacking the difficult property” (p. 1). The natural phonological processes are viewed as innate in children and are produced as the result of a set of mental processes.

Natural phonology befits professionals’ awareness of the influence of “phonological forces that occur commonly enough to be called natural” (Kent, 2013, p. 55) in the process of children’s speech acquisition. The concept of phonological processes (or phonological patterns) has been used as a way of describing speech acquisition of typically and atypically-developing children in research and clinical practice (Demuth, 2011; Hua & Dodd, 2006; McLeod & Baker, 2017). The contemporary definition of phonological processes has been extended from what that was originally proposed by Stampe (1979). It now commonly refers to the consistent
differences between children’s realisations and adult targets (Bernthal et al., 2013; Hua & Dodd, 2006). An example of an assimilation process seen in Vietnamese-speaking children’s speech occurs when a child pronounces the word *thang* (ladder) as [ŋɑŋ¹] instead of /tʰɑŋ¹/, where the production of the initial consonant /tʰ/ is assimilated with the final consonant /ŋ/ of the syllable. Phonological patterns/processes have been well represented within the speech acquisition literature (e.g., Cohen & Anderson, 2011; Dodd, 2013; Edwards & Shriberg, 1983; Grunwell, 1987; Shriberg & Kwiatkowski, 1986; Stoel-Gammon & Dunn, 1985). However, natural phonology has been criticised because it is lacking in psychological reality and language-specific phonological processes (Hua & Dodd, 2006).

The two classic theories of phonology described above (i.e., generative phonology and natural phonology) share a similar assumption that speech acquisition is a linear innate process. Over the years, different researchers have moved away from this way of thinking. Consequently, contemporary theories that consider the role of other features such as syllable structures, words and phrases, prosody, or constraints, rather than single phonemes have been introduced to provide additional accounts for children’s speech acquisition. The subsection below provides a brief overview of nonlinear phonology, optimality theory, and psycholinguistic theories to be representative of some of the contemporary phonological theories of speech acquisition.

**Contemporary Theories**

**Nonlinear phonology.**

Nonlinear phonology was developed to provide an alternate account of children’s speech acquisition because of the perceived inadequacy of previous theories such as the linear generative phonology (Bernhardt & Stoel-Gammon, 1994; Kent, 2013). There are several versions of nonlinear phonology but the three most influential
are: autosegmental theory, metrical theory, and feature geometry (Goldsmith, 1990; Hayes, 1988; McCarthy, 1988). These theories representing nonlinear phonology all focus on “the hierarchical nature of the relationships among phonological units” (Bernhardt & Stoel-Gammon, 1994, p. 123). In other words, proponents of nonlinear phonology indicate that phonology is governed by a hierarchy of different phonological units. Phonological units including phrases, words, feet, syllables, onsets and rimes, timing units (mora), segments, and features are hierarchically organised on two separate levels of representation called prosodic and segmental tiers (Bernhardt & Stemberger, 2000; McLeod & Baker, 2017). In the hierarchy, each phonological unit is evaluated autonomously as well as in association with other phonological units within and between tiers.

In contrast to previous theoretical views where phonological operations were constrained on linear sequences of segments, nonlinear phonology accommodates interactions across various sizes and types of phonological units to offer further explanation of the patterns in children’s speech for which the earlier theories failed to account for (Dinnsen, 1997). An example is provided for the assimilation process seen in Vietnamese-speaking children’s speech when a child pronounces the phrase lăi máy bay (drive/navigate an airplane) as [mɑ̆j̚ mɑ̆j̚ mɑ̆j̚] instead of /lɑ̆j̚ mɑ̆j̚ bɑ̆j̚/, where the production of the initial consonants /l, b/ of the first and third syllables in the phrase are assimilated with the initial consonant /m/ of the middle syllable. Another perspective that nonlinear phonology contributed is to assume that development in children’s speech is a positive progression where “nonmatches are simply a consequence of a developing system that differs from that of adult speakers of the language” (Bernhardt & Stoel-Gammon, 1994, p. 126). Thereby proponents of nonlinear phonology view the phonological system as a system to be learned. Furthermore, the concept of default (unmarked) and non-default (marked) elements and the idea of constraints and repair
processes in nonlinear phonology provide a concise description and explanation of children’s non-adult productions (Bernhardt & Stoel-Gammon, 1994; McLeod & Baker, 2017). For example, the concept of the default element can be explained for the patterns of loss of phonemic contrast seen in Vietnamese-speaking children’s speech when a young child pronounces following Vietnamese words thóc /tʰɔ̆k p5/ (rice), cóc /kɔ̆k p5/ (toad), khóc /xɔ̆k p5/ (cry), and góc /ɣɔ̆k p5/ (corner) as a non-adult realisation [tʰɔ̆k p5].

Nonlinear phonology provides a helpful explanation of typical speech acquisition and disorders; however, like other linear theories, it has been criticised for not taking biological and environmental factors into account.

**Optimality theory.**

Optimality theory was developed by Prince and Smolensky (1993/2008). In optimality theory, constraints are innate mechanisms that are involved in the selection of the most optimal output (surface) representation for a given input (underlying) representation through a set of possible output forms (Barlow & Gierut, 1999; Kent, 2013). Constraints govern the limitations or boundaries for the range of potential output representations that match the input representation and are generated by a mechanism called the **generator**. Among these potential output options, only the most appropriate harmonious option or the most appropriate optimal option should be selected by another mechanism called the **evaluator** that functions based on language-specific or dialect-specific constraints. For example, for the input form /tʰo̞j/ of the Vietnamese word thổi (blow), the generator is supposed to supply the following potential output forms: [tʰo̞j], [hoj], [tʰo̞j], [soj], [tʰo̞j], [o̞j], and [tʰo̞j] based on the constraint bank, and the most optimal option for the Vietnamese language thereby is selected by the evaluator.

In optimality theory, the two types of universal constraints are: markedness constraints and faithfulness constraints. Markedness constraints enable the child to
produce the output in a simpler form and it is assumed that marked sounds are difficult
to perceive or produce. In contrast, faithfulness constraints refer to the requirement that
the output produced should be authentic to the input. The most optimal output form in
the child’s production is seen as the winning candidate output as a result of the conflict
between markedness, where unmarked forms are preferred over marked forms, and
faithfulness, where the candidate outputs should be as close as possible to the input. By
re-ranking these two innate universal constraints of the ambient language, children’s
speech productions progressively become adult-like during the process of acquiring the
phonology. Although optimality theory hypothesises the constraints and ranking of
constraints to be universal, it also notes that constraints are ranked differently in the
phonological system across languages (Prince & Smolensky, 2008). From this view, the
optimality theory provides an alternative account for developmental changes in
phonology. Differences between children’s realisations and adult targets can be
explained by the cooperating properties of different constraints.

Optimality theory has been used as a theoretical framework by many
phonologists. Detailed description and clinical application of optimality theory to both
typical speech acquisition and disorders in children has been well presented (Barlow,
2001; Barlow & Gierut, 1999; Bernhardt & Stemberger, 1998; Dinnsen & Gierut,
2008). However, the clinical relevance of optimality theory in daily clinical practice is
still to be broadly embraced. Also, optimality theory fails to fully explain constraints
occurring in every language since these constraints are unlimited (Vihman, 2014). An
additional critique is that optimality theory does not account for biological and
environmental factors.

The four theoretical frameworks described above all use phonological concepts
to maintain a shared view that phonological decisions are driven by internal or innate
mechanisms. These mechanisms are: distinctive features that are universal across
languages in generative phonology, *phonological processes* in natural phonology, *hierarchical relationships between phonological units* in nonlinear phonology, and *constraints* in optimality theory. Sharing the same view on mental representations of language knowledge proposed from the described theories, the psycholinguistic speech processing model is another theoretical framework that includes the importance of language input (e.g., grammatical and orthographic/written representations) for phonological development.

**Psycholinguistic speech processing model.**

The psycholinguistic speech processing model aims to explain children’s linguistic behaviour at a cognitive level through psychological processes that are involved in the perception, storage, planning and production of speech. The psycholinguistic model was first introduced by Smith (1973) in his single-lexicon model to propose that children have one lexicon for their underlying adult-like representations. The psycholinguistic model was further developed by a number of researchers (e.g., Hewlett, 1990; Menn, 1983) in the two-lexicon models (i.e., input lexicon and output lexicon) to address the variability in children’s speech and the underlying non-adult-like representations. Hewlett (1990) proposed the one- and two-lexicon model to describe how children’s output lexicon becomes more adult-like.

Stackhouse and Wells (1997) proposed the psycholinguistic speech processing model to “capture the full range of processes involved in the perception (input), storage, and production of speech (output)” (McLeod & Baker, 2017, p. 172). It is depicted using a box-and-arrow diagram. Each box in the diagram stands for a process which is described as a mental step taken to perceive, store, and produce speech (Ball, 2016). The order of the processes is indicated by the arrows, beginning from a sound being heard (input) and finishing by producing the sound as the last process (output). The model introduces different phonological concepts within each process (e.g., peripheral
auditory processing, speech/non-speech discrimination, phonological recognition, phonological representations, semantic representations, motor program, motor planning, and motor execution), and provides a description to illustrate how each process functions.

The clinical application of the psycholinguistic speech processing model for understanding the difficulties underlying children’s speech and literacy has been described by a number of researchers (e.g., Snowling & Stackhouse, 2006; Stackhouse & Wells, 1997). It also has influenced assessment and intervention of children’s speech sound disorders as the model provided a new way to view articulation and phonology, to relate speech with language impairment, and to see children with speech sound disorders “as an active learner, involved in the process of generating and applying rule-governed strategies to the task of learning to talk” (Baker, Croot, McLeod, & Paul, 2001, p. 700).

Many different theoretical frameworks developed within the formalist approaches have offered valuable linguistic perspectives regarding children’s speech acquisition; however, they have been subjected to criticism. These theories function autonomously and do not take into account the cultural context, communication and social interaction, and the child’s physical capacities (Ambridge & Lieven, 2011). A recent theory, the Emergence Approach that was proposed by Davis and Bedore (2013), incorporates insights from previous theories as well as cognition and the sociocultural context to explain the complexity of speech acquisition in children. A description and the clinical relevance of the Emergence Approach is briefly presented in the following subsection.

**Emergence Approach**

The Emergence Approach (Davis & Bedore, 2013) is a recent theoretical framework of speech acquisition to consider the whole speech acquisition process. The
approach describes the complex phonological capacities in young children arising from a dynamic interplay between biological, psychological, and social domains. Davis and Bedore (2013) described three reasons for developing their theory. First, phonological acquisition provided a good example to illustrate complexity. Second, individual variation in children’s pathways to achieving phonological knowledge and a behavioural repertoire (Vihman, 2014) could be observed and interpreted; thereby the Emergence Approach can “potentially encompass both central tendencies and individual variations into the complex system underlying acquisition” (Davis & Bedore, 2013, p. 5). Third, the Emergence Approach provides an explanation of the relationship between individual variation and central tendencies in phonological acquisition.

The Emergence Approach comprises three main components termed “intrinsic capacities”, “interaction capacities”, and the “extrinsic context” (Davis & Bedore, 2013, p. 46). The interactions and the interconnectivity between these three components in the model are depicted by the three intersecting circles and the single- and bi-directional arrows (Figure V).
Figure V. The Emergence Approach Model (Davis & Bedore, 2013, p. 46)

The overlapping inner circles in the Figure V represent the first component termed the children’s “intrinsic capacities”. This component is biologically motivated and described as child-internal. This child-internal component includes children’s physical abilities for production, perception, and cognition involved in speech acquisition and the intertwined relationship between these abilities (Davis & Bedore, 2013).

“Production capacity” refers to the anatomical structures and functions required for the child to be able to produce adult-like speech. Anatomical and physiological structures include respiratory, phonatory, and articulatory systems that grow, change, and operate interactively with each other thereby enable the child to undergo a variety of functions such as vocalisation, babbling, and word production. The emphasis given to the production capacity is the important role of the physical articulatory or oromotor skills for speech acquisition and this was previously addressed in the biologically-based models (e.g., Kent, 1984; Locke, 1983).

“Perception capacity” comprises the biological perceptual abilities through the auditory system (e.g., ear) and the full range of psychoacoustic skills (e.g., speech/non-speech discrimination). Perceptual skills enable the children to detect patterns in the language input and to form the input into perceptual categories. Davis and Bedore (2013) share a similar focus regarding perceptual skills being influenced by the frequency of the ambient language input for speech acquisition that was previously discussed in the psycholinguistic speech processing model (Stackhouse & Wells, 1997) and the cognitive/usage-based theories (e.g., Bybee, 2003; Menn et al., 2013). In other words, the children develop and refine the perceptual patterns through the input from environment (i.e., the ambient language input) and increasingly acquire a complex phonological knowledge background (Davis & Bedore, 2013).
“Cognition capacity” is defined as the child-internal abilities of processing, storing, planning, and retrieving mentally-stored phonological patterns for manipulating their phonological output forms (Davis & Bedore, 2013). Cognition is hypothesised to scaffold the child’s ideas being expressed behaviourally and the “code-categorize-manipulate continuum” (Davis & Bedore, 2013, p. 53) being functionally used within the phonological knowledge base. The model proposes that these three child-internal capacities (production, perception, and cognition) function reciprocally with each other. A growth in one system is intimately interconnected with the two other systems and reciprocity in development contributes to speech acquisition.

The second component of the Emergence Approach that is illustrated by the middle circle in the model (Figure V). It is termed the “social interaction capacities” (Davis & Bedore, 2013, p. 46) and describes socially motivated interaction capacities. Within an emergence viewpoint, social interaction is seen as a bridge, represented by the bidirectional arrows in the model, to maintain consistent connections between the child-internal physical abilities and the child-external environment aspects (Davis & Bedore, 2013). Social interaction capacities include “joint-attention”, “turn-taking”, and “intention-reading”.

Joint-attention is broadly defined as the child’s ability to maintain mutual attention with an interlocutor. In the Emergence Approach, joint-attention plays a crucial role in speech acquisition as well as language acquisition. The “child’s attention is accompanied by linguistic input from communication partners” (Davis & Bedore, 2013, p. 61) providing a basic mechanism for the child to interact with the external environment; for example, an adult could provide a label for something the child pointed to.

Turn-taking generally refers to interchanges within the conversation between the child and the interlocutor. Turn taking is hypothesised to enable the child to act as both
an initiator and responder, to enable the emergence of content in interchanges, and to scaffold didactic interchanges. Building on a shared attention required for joint-attention, intention-reading refers to a skill that further enables the child to recognize and understand the interlocutor’s perspective through phonological input within the conversation.

Intention-reading is assumed to be “a motivator for intelligible communication” (Davis & Bedore, 2013, p. 63) as it requires the child to select their phonological outputs to become understood by the interlocutors. These social interaction capacities (joint-attention, turn-taking, and intention-reading) provide meaningful phonological input for children in their environment.

The last component of the Emergence Approach is illustrated by the outer circle in the model (Figure V) and is termed the “extrinsic context” (Davis & Bedore, 2013, p. 46). The component describes a child-external system where the child can receive linguistic input from the environment through varying communication partners. According to Davis and Bedore (2013), two important aspects of the child-external system are the “ambient language phonology” (p. 64) and the “social-cultural expectations” (p. 65). These aspects in the child’s external environment are integral to emergent complexity.

Ambient language phonology refers to the target forms produced by interlocutors in their environment that the child is required to perceive, segment, and reproduce appropriately to link with meaning. The child’s phonological development is hypothesised to be influenced by a variety of factors in the ambient language’s phonology, for example, articulatory complexity, ambient frequency, and functional load (Stokes & Surendran, 2005).

Social-cultural expectations refers to “the ways in which communication partners simplify speech input for children, the expectations for the child output, and the
reinforcement of aspects of this output” (Davis & Bedore, 2013, p. 65). Child-directed speech or “motherese” is an example of simplified speech that is characterised by higher overall pitch, longer pauses between phrases, shorter utterances and slow speech rate, or simpler word structures (Narayan & McDermott, 2016). Child-directed speech is important for phonological development because it attracts the child’s attention and provides emotionally and linguistically rich inputs (Cristia, 2013; McMurray, Kovack-Lesh, Goodwin, & McEchron, 2013).

The Emergence Approach was developed focussing on babies and very young children. However, it has been applied as a theoretical framework in a number of studies on speech acquisition and disorders of preschool-aged monolingual speakers (e.g., monolingual Danish-speaking children, Clausen, 2016) and older bilingual/multilingual children (e.g., Turkish-German bilingual children, Albrecht, 2017; McLeod & Crowe, 2018).

To summarise, the Emergence Approach incorporated and expanded aspects that were addressed previously by individual functionalist and formalist approaches. The Emergence Approach ascribes a strong interplay between the child-internal biological capacities and social-interactional capacities engaging with linguistic and cultural input from the external environment. In the Emergence Approach, phonological knowledge and behaviours are assumed to emerge from interaction between the complex and diverse human biological, cognitive, and social systems. The Emergence Approach also provides satisfactory explanations for the patterns found in children’s speech output, children’s realisations compared to the adult’s realisations, and variability across children and languages. Therefore, the Emergence Approach meets the majority of the requirements expected from a phonological theory to explain children’s speech acquisition. Aspects that the Emergence Approach can account for include: mismatches between children’s and adult-like speech; general speech patterns observable across
children and languages; inter- and intra-child variability during development; the relationship between phonetics and phonology; the role of ambient-language input; compatibility with other learning and perception theories; the inclusion of biological and social-interactional aspects; and testable and falsifiable hypotheses (Albrecht, 2017). Given these strengths, the Emergence Approach was chosen as the theoretical framework for this doctoral research to support the aim of examining how ambient language phonology (i.e., Vietnamese) influences the rate, order, and characteristics of speech sound acquisition by Vietnamese-speaking children.

The focus of speech acquisition in this doctoral research was on speech production, not speech perception, because of the unavailability of perception assessment tools in Vietnamese and the focus on the Vietnamese government’s Developmental Standards. Further information about the assessment of Vietnamese-speaking children’s speech in the current doctoral research is described in the following section about methodological considerations.

**Methodological Considerations for Studying Vietnamese Children’s Speech**

Studying children’s speech acquisition has attracted researchers for a long time, across languages and countries. McLeod (2010) summarized over 250 studies about children’s speech acquisition in nine dialects of English and 23 other languages in monolingual contexts. Recently, as part of a cross-linguistic review on consonant acquisition from 64 studies describing typical speech acquisition in 27 languages, McLeod and Crowe (2018) summarised research designs as well as data collection techniques and analyses. Methodological aspects of research are known to influence the data reported. Thus, it is essential to evaluate methodological differences as they can lead to misleading generalisations when comparing data across studies (Jimenez, 1987).

In this section, a brief review was undertaken to summarise information about research designs and children’s speech assessment measurements from previous studies.
of speech acquisition across languages including Vietnamese speech acquisition studies. Similarities as well as differences and limitations regarding methodological aspects between the studies of speech acquisition across languages are described. Finally their application to the current doctoral research is considered for each of the components of the research design.

**Research Designs in Studying Speech Acquisition**

There are four main research designs that have been used to elicit data regarding children’s speech acquisition, namely diary studies, longitudinal studies, comparative studies, and cross-sectional studies (McLeod, 2017). The advantages and popularity for the use in studying children’s speech acquisition for each design are varied.

Both diary and longitudinal studies require studying children over a long period of time. Typically, diary studies include one child or two children whose speech production is recorded in a diary to examine any changes in the individual child’s speech acquisition over time (Lleo, 1990; Lưu, 1996). Longitudinal studies typically investigate children to determine developmental tendencies or trajectories in a certain aspect of speech acquisition as well as to show variability within the child over time. In longitudinal studies, individual differences can be drawn precisely because data are obtained from a relatively small number of children. For example, Lleo and Prinz (1996) investigated the developmental sequence of word shape acquisition of 9 children. Another example was the study undertaken by McLeod, van Doorn, and Reed (2001) which explored consonant cluster development over six months in 16 children aged two years. Másdóttir and Stokes (2016) examined the growth of consonant inventories over a year by 28 typically-developing 2-year-old Icelandic-speaking children. Longitudinal data from 14 Cypriot-Greek-speaking typically-developing toddlers were obtained through four assessment sessions over a year to examine the acquisition of singleton consonants (Petinou & Theodorou, 2016). Kim, Ballard, and
McCann (2018) investigated age-related changes over a year of speech accuracy and error production in 16 preschool Korean-English bilingual children in New Zealand. Each of these studies included relatively small numbers of children.

Compared with diary and longitudinal studies, both comparative studies and cross-sectional studies typically are based on larger numbers of children. The sample children are examined at one time. Comparative studies can provide data for comparison between groups, cross-linguistic or linguistic factors. For example, a comparative analysis was presented across languages about children’s acquisition of consonant clusters containing /s/ in English, Hebrew, Dutch and Norwegian (Yavaş, Ben-David, Gerrits, Kristoffersen, & Simonsen, 2008) or children’s acquisition of consonants in English and Xhosa (Mowrer & Burger, 1991). Comparative studies provided data about the relationships between neighbourhood density and speech accuracy of typically-developing children (Sosa & Stoel-Gammon, 2012) or the relationships between language ability and phonological errors of typically-developing children (Roulstone, Loader, Northstone, & Beveridge, 2002). As such, “comparative studies enhance our understanding of the nuances of children’s speech acquisition” (McLeod & Baker, 2017, p. 190).

Cross-sectional studies are an important source of typical speech acquisition data for developmental norms, which typically are generated by examining a large number of children of the same age, sex, and socio-economic status. Sample children are examined at one specific point in time and by the same testing and analysis protocols which typically are single-word picture naming tasks (Hua & David, 2008; McLeod, 2013; McLeod & Crowe, 2018, in press). Information about the means, standard deviations, and average age of acquisition of speech sounds (e.g., consonants and vowels) are provided by scoring their speech accuracy and analysing their mismatches with adult pronunciation. Although there is a critique that techniques of data collection are less
naturalistic and data overlook individual variability, the cross-sectional design is a predominant method for studying speech acquisition because it is an efficient way to sample all speech sounds of a language in a variety of contexts. Many cross-sectional studies have been undertaken on speech acquisition of children who speak English (e.g., Arlt & Goodban, 1976; Chirlian & Sharpley, 1982; Dodd et al., 2003; Dodd & McIntosh, 2010; Kilminster & Laird, 1978; Monaghan, 2014; Pearson, Velleman, Bryant, & Charko, 2009; Poole, 1934; Prather, Hedrick, & Kern, 1975; Smit et al., 1990; Templin, 1957; Wellman et al., 1931). Cross-sectional studies have also been used to investigate speech acquisition of children who speak languages other than English such as Arabic (Amayreh & Dyson, 1998; Ayyad, Bernhardt, & Stemberger, 2016), Cantonese (Cheung, 1990; So & Dodd, 1995; To, Cheung, & McLeod, 2013), Danish (Clausen & Fox-Boyer, 2017), French (MacLeod, Sutton, Trudeau, & Thordardottir, 2011), Haitian-Creole (Archer, Champion, Tyrone, & Walters, 2018), Malay (Phoon et al., 2014), Putonghua (Hua & Dodd, 2000), and Turkish (Topbaş, 2006; Yalcinkaya, Muluk, & Budak, 2010). In addition, cross-sectional studies have been designed to examine speech acquisition of children who are bilingual or multilingual (Kim, Ballard, & McCann, 2016; Lim, 2015; Phoon, 2010). These cross-sectional studies are summarised in Appendix B and further detailed in the next section. Cross-sectional design also has been used in previous studies of speech acquisition of Vietnamese-speaking children (Lưu, 1996; Nguyễn, 2011; Nguyễn & Phạm, 2014) More details about these three studies are discussed in the next section and are summarised in Table IV.

**Application to the current doctoral research.**

Considering the aims of this doctoral research and the advantages of all four research designs using in studying speech acquisition across languages throughout the world, a cross-sectional design was chosen for undertaking research about children’s
speech acquisition of consonants, vowels, and tones in Northern Viet Nam. The cross-sectional design best aligned with the aims of this doctoral research because it enabled examination of accuracy and acquisition of all Northern Vietnamese sounds by a large number of the Northern Vietnamese-speaking preschool-aged children. The design also enabled the author to collect speech samples by using the same speech testing protocols (e.g., the Vietnamese Speech Assessment) at a specific time point within the two 2-month fieldtrips in Viet Nam. In addition, using a cross-sectional design enabled the author to compare findings with other international studies on speech acquisition of other languages that had used a cross-sectional design. Information regarding speech acquisition measurement protocols for cross-sectional studies is presented in the following subsection to direct the research protocol for this current doctoral research.

**Speech Acquisition Measurement Protocols for Cross-Sectional Studies**

Although over 250 studies have been written about children’s speech acquisition around the world (McLeod, 2010), many are written in languages other than English so the author of this doctoral research was not able to access these studies. Many of the speech acquisition studies have included only one or two participants, so these data are not able to be generalized. A review of speech acquisition measurement protocols was undertaken from 29 studies of consonant acquisition in the literature that used a cross-sectional design, examined more than 10 participants, and were published in English. The 29 studies described speech acquisition in 13 languages (i.e., Arabic, Cantonese, Danish, English, French, Hebrew, Haitian-Creole, Malay, Putonghua, Setswana, Swahili, Turkish, and isiXhosa) in which 13 studies were about English (Appendix B). This review mainly focused on methodological aspects of speech acquisition research using a cross-sectional design. This was different from the cross-linguistic review undertaken by McLeod and Verdon (2014) that focussed on evaluating 30 commercially published instruments designed to assess children’s speech production in 19 languages.
and McLeod and Crowe (2018) that focussed on consonant acquisition in 27 languages. In addition, the three studies of Vietnamese children’s speech acquisition that were undertaken in Viet Nam and published in Vietnamese (Lưu, 1996; Nguyễn, 2011; Nguyễn & Phạm, 2014) and were not included in the McLeod and Verdon (2014) and McLeod and Crowe (2018) reviews also were reviewed in comparison with the 29 international studies (Table IV). The methodological aspects of each study are summarised in Appendix B and Table IV, described below, and followed by a description of those aspects that were considered to be applied in the current doctoral research.

**Participant recruitment.**

Most of the 29 studies applied criteria to recruit participants as follows:

- approximately equal numbers of girls and boys in each age group
- participants were monolingual
- participants were from a range of socio-economic backgrounds
- participants had no intellectual or hearing impairment identified via screening tests or reported by teachers, nurses, day care providers, or parents.
- participants had no oral motor difficulties
- and participants had no history of speech or language disorders or were not currently receiving speech or language intervention services reported by parents, teachers, nurses, or day care providers.
Table IV.

**Methodological Aspects of Three Previous Vietnamese Speech Acquisition Studies**

<table>
<thead>
<tr>
<th>Authors</th>
<th>City</th>
<th>Language status</th>
<th>Participants</th>
<th>Speech sample</th>
<th>Speech Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Age range (y;m)</td>
<td>Sex (M/F)</td>
<td>Speech-language status</td>
</tr>
<tr>
<td>1. Lưu (1996)</td>
<td>Hà Nội</td>
<td>Northern Vietnamese/Monolingual</td>
<td>2;6-6;0</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>12 monthly intervals</td>
<td>62</td>
<td>-</td>
</tr>
<tr>
<td>2. Nguyễn (2011)</td>
<td>Hồ Chí Minh City</td>
<td>Southern Vietnamese/Monolingual</td>
<td>2;6-6;3</td>
<td>303</td>
<td>Typical and atypical (S) (Teacher’s report)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>6 &amp; 12 monthly intervals</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>3. Nguyễn and Phạm (2014)</td>
<td>Hồ Chí Minh City</td>
<td>Southern Vietnamese/Monolingual</td>
<td>2;0-4;0</td>
<td>635</td>
<td>Typical (Teacher’s report)</td>
</tr>
</tbody>
</table>

**Note.** Age range: (y;m) = (year;month). Sex: (M/F) = Male/Female. Design: Cr = Cross-sectional, L = Longitudinal. Technique: CS = Connected speech, SW = Single words. Recording: OL = Online. Transcription: Ortho = Orthography. Analysis: C = Consonant, I = Initial, M = middle, F = Final, V = Vowel, T = Tone, and SV = Semivowel. Measures: PCC = percentage of consonants correct, PVC = percentage of vowels and diphthongs correct, PTC = percentage of tones correct, PCE = Percentage of consonants in error, PSVE = percentage of individual semivowels in error, PVE = percentage of individual vowels in error, and PTE = percentage of individual tones in error. Symbol (-) indicates that information was not present.
Some exceptions to these generalisations were found. Participants’ in four studies lived in multilingual contexts and their first language was examined (Gangji, Pascoe, & Smouse, 2015; Mahura & Pascoe, 2016; Maphalala, Pascoe, & Smouse, 2014; To et al., 2013) and two studies included children who were at risk of or had reported speech and language difficulties in the sample (Ayyad et al., 2016; To et al., 2013). The McLeod and Crowe (2018) cross-linguistic review recommended that studies reporting age of acquisition of consonants should report participants’ demographic information including: location (e.g., country), language/dialect spoken, spoken language status (e.g., monolingual or first language), sex distribution, socio-economic status, and developmental status including hearing, speech, and language. The three previous studies of Vietnamese children’s speech acquisition (Lưu, 1996; Nguyễn, 2011; Nguyễn & Phạm, 2014) also applied criteria to recruit participants who were monolingual Vietnamese-speaking children, from a range of socio-economic backgrounds, and were typically developing as reported by teachers. However, sex distribution in each age group was not identified.

**Application to the current doctoral research.**

Within this doctoral research, criteria to recruit participants were clearly defined. The participants were recruited from **trường mầm non công lập** (‘state schools for the young sprout’ cf. public preschools) that have **lớp nhà trẻ** (crèches/nursery classes) for 2- to 3-year-old children, and **lớp mẫu giáo** (kindergarten classes) for 3- to 6-year-old children and typically include an enrolment of a large population of children living in the communes. A commune is an administrative subdivision in Viet Nam. Each commune has a public preschool and all children in the commune can attend. Therefore, the preschool enrolment is very diverse. The public preschools in Ha Noi ($n = 2$) and Hai Phong ($n = 2$) in Viet Nam where children speak the Northern Vietnamese were invited to participate in the current study. The invited preschools were located in the
suburbs and countryside of Ha Noi and Hai Phong, where the residents had a wide range of educational levels and occupations (General Statistics Office of Viet Nam, 2010). Therefore, the invited preschools included children from a diversity of socioeconomic backgrounds. Parents’ education level and parents’ occupation level (Inglebret et al., 2017) were used as a proxy to measure socioeconomic status of children.

In order to recruit typically-developing children, the invited preschool principals were sent a pack containing an information letter, preschool consent form and preschool questionnaire that was translated into Vietnamese (Appendices C, D, and E including versions in English and Vietnamese). Once the principals had given permission for the research to occur, only typically-developing children were recruited to increase the specificity of results (the ability to illuminate children with typical speech versus speech sound disorders more accurately) (McCauley & Swisher, 1984; Peña, Spaulding, & Plante, 2006). A pack containing an information letter, consent form and questionnaire that was translated into Vietnamese (see Appendices F, G, and H including versions in English and Vietnamese) was sent to parents and another similar pack (see Appendices I, J, and K including versions in English and Vietnamese) was sent to teachers of the invited preschools to obtain their informed consent and information about children’s developmental history. Parent and teacher reports about the children’s developmental history was used to identify typically-developing children for two reasons: (1) the majority of 29 studies reviewed identified typically-developing children based on parents’ or teachers’ reports; and (2) the few developmental screening tools in Vietnamese such as the Ages and Stages Questionnaires (ASQ-3, Squires, Twombly, Bricker, & Potter, 2009; Trần, 2016) were not available for the public use at the time of the study. Typically developing communication skills including speech and language were not screened by standardised direct testing due to the lack of normative data and
limited availability of speech and language assessment tools for Vietnamese-speaking children. Instead, parents’ and teachers’ concerns about the children’s communication were considered as an indicator of possible communication disorders (McLeod & Harrison, 2009; Restrepo, 1998). Within this doctoral research, children met the inclusion criteria for participating when their parents and teachers reported that: (1) they spoke Northern Vietnamese as their first language; (2) they were from the Kinh (Vietnamese) ethnic group; (3) their mother or father was from Viet Nam, not from another country; (4) their parents and teachers were not concerned about their development (e.g., cognition, behaviour, motor, speech, language, and communication); and (5) they did not have a disability that could affect their speech production, for example, a cleft lip or palate, cerebral palsy, a history of ongoing hearing loss, wearing hearing aids, or a cochlear implant. In addition, although children were identified by their parents and teachers as typically developing, they were excluded from participating when (1) they did not pass or complete the hearing screening test (Appendix M), or (2) they did not pass or complete the oromotor assessment.

**Participants.**

Across the 29 studies, there were a total of 11,948 participants, ranging between 12 and 1,756 participants ($M = 412.00$, $SD = 480.30$). The participants typically were described in 6 monthly age groups. Most studies considered children in the age range of 2;0 - 6;0 (year; month); however, the youngest children studied were 1;0 and the oldest were 12;4.

Across three previous Vietnamese studies (Table IV), there were a total of 970 participants, (each included 32, 303, and 635 participants respectively, age range = 2;0-6;3). The participants were described in 12 monthly age groups (Luu, 1996), 6 monthly age groups (Nguyen & Pham, 2014), and both 6 monthly and 12 monthly age groups (Nguyen, 2011). In the study of Nguyen and Pham (2014), participants included both
children with typical development and children with pronunciation difficulties (“có khó khăn về phát âm”, p. 13). However, there was inadequate information about the purposes of using this sample and how to identify pronunciation difficulties in the sample, except a description that the participants were living in an orphan house and two out of the five had a repaired cleft palate.

**Application to the current doctoral research.**

Within this doctoral research, there were a total of 980 children whose parents returned and completed the parent questionnaires. After the questionnaires were received, the inclusion criteria described in the previous subsection were applied to select eligible participants (see Figure VI below for the recruitment flow diagram and reasons for exclusion).

In the research study of Northern Vietnamese-speaking children’s speech acquisition presented in Chapter 7 (Paper 4), 195 participants who met the inclusion criteria participated. There were 67 participants from Ha Noi and 128 participants from Hai Phong. There were approximately equal numbers of girls (n = 101, 51.8%) and boys (n = 94, 48.2%) in this sample.

In the research study of Northern Vietnamese-speaking children’s intelligibility presented in Chapter 8 (Paper 5), there were 181 participants from Ha Noi who met the inclusion criteria and participated. The participants in Paper 5 included children whose parents had “no concern”, “a little concern”, and “concern” about their speech (Glascoe, 2013). The number of girls (n = 89, 49.2%) was relatively equal to the number of boys (n = 92, 50.8%) in this research study.

As described in the participant recruitment subsection above, participants were recruited from the public preschools in Viet Nam where typically had children aged between 2;0 and 6;6. There were more children aged between 3;0 to 5;11 than children aged 2;0 to 2;11 reflecting the varying enrolment ratio between children’s ages in the
Vietnamese preschool context (United Nations Educational Scientific and Cultural Organization, 2011) (see Chapter 4).

Figure VI. Participant recruitment diagram.
Participants in shaded boxes were included in this doctoral research. PEDS = Parents’ Evaluation of Development Status (Glascoe, 2013); OMA = oromotor assessment; VSA = Vietnamese Speech Assessment (Phạm, Le, et al., 2016); WNL = within normal limits.

Note. * Not assessed because parents did not provide consent (n = 53), children did not provide assent (n = 14), children were absent (n = 18), children were from a minority ethnic group (n = 4), children were <2;0 (n = 20), fieldwork trip ended, so were not assessed (n = 286).
Instruments.

The speech instruments used in majority of the 29 studies were single-word picture naming tasks that were either standardised tests, for instance, the Hong Kong Cantonese Articulation Test (HKCAT, Cheung, Ng, & To, 2006) used in To et al. (2013), or were developed for the purpose of the studies (e.g., Mahura & Pascoe, 2016). By using a set of target words to elicit the single-word productions, this mode of data elicitation has several advantages such as enabling assessment of all phonemes in the language, and that children produce the same set of words. The single-word tasks that were described in 25 out of 29 studies included between 28 and 123 words ($M = 62.12$, $SD = 23.50$). Most studies indicated that the majority of words were nouns, high frequency, easy to picture, and known by most of participants in the age range (Amayreh & Dyson, 1998; Gangji et al., 2015; Hua & Dodd, 2000; Phoon et al., 2014; Smit et al., 1990; So & Dodd, 1995; Topbaş, 2006). In parallel to using a single-word task, some studies also used connected speech tasks that were either a story retell using a sequence of pictures (Hua & Dodd, 2000; So & Dodd, 1995), a spontaneous conversation related to the pictures (Topbaş, 2006), or sentence completion (Ben-David, 2006). Yalcinkaya et al. (2010) also used connected speech tasks (spontaneous or imitated) with their youngest participants who were under 2 years old.

Within the three Vietnamese studies, Lưu (1996) elicited spontaneous connected speech that included 98,738 utterances collected during schooltime. Single-word picture naming tasks were used in the other studies, including 284 words (Nguyễn, 2011) and 50 words (Nguyễn & Phạm, 2014). According to Nguyễn (2011), and Nguyễn and Phạm (2014), the selected words covered most of the potential Vietnamese speech sounds and all Vietnamese syllable shapes. The words were picturable and monosyllables. The validity and reliability regarding how the assessment instrument
was created were not detailed (e.g., how to determine targeted words were appropriate for the children’s age).

**Application to the current doctoral research.**

In the current doctoral research, a Vietnamese speech test named the Vietnamese Speech Assessment (VSA, Pham, Le, & McLeod, 2016) was constructed to elicit children’s speech because there were no standardised speech assessment tools available in Vietnamese (McLeod & Verdon, 2014). The VSA comprised a stimulus book including 77 colourful drawings as well as instructions in a 4-step prompt hierarchy for elicitation of each target word, a stimulus book including four colourful drawings for elicitation of connected speech samples, and a recording sheet. The VSA has been conceptualised and partly operationalised and a detailed description of the development of the VSA is presented in Chapter 6 (Paper 3) titled Development of the Vietnamese Speech Assessment (Pham, McLeod, & Le, 2016).

**Procedure.**

Most of the 29 studies reported the testing administration procedure as follows. Each participant was assessed:

- individually at a familiar place (e.g., at home, nursery, or kindergarten)
- in a quiet room with or without the presence of the parents or familiar adults (e.g., teachers)
- for an average of 15-20 minutes to complete all direct assessment tests (range = 5 minutes - 1 hour).

Each participant typically was instructed to respond to the single word tasks using a hierarchy to elicit as many spontaneous productions as possible in several steps: (1) firstly a spontaneous response was encouraged by asking the question such as “What is this?”; (2) if there was no spontaneous response, additional prompts and questions were provided; and (3) lastly the request for imitation was given to the participant (e.g.,
To et al., 2013). However, in two studies participants were instructed to imitate the examiner as the first prompt (Arlt & Goodban, 1976; Yalcinkaya et al., 2010).

Within the three previous Vietnamese studies, Lưu (1996) reported the procedure of collecting spontaneous connected speech. The authors had undertaken group observation of 60 participants in all school activities over a total of 5 days, for 6 hours each day in order to listen and record online what participants said. Connected speech collected from two individual participants was recorded in a diary during everyday activities at home. The two other studies also reported the procedure of test administration in providing instruction for participants by questions and prompts (Nguyễn, 2011; Nguyễn & Phạm, 2014). However, the protocol of testing and instructed questions and prompts were not described and no examples were given. Thus, it was unclear whether words were elicited spontaneously or via imitation, and whether the assessments were administered across participants using the same testing procedure or not.

**Application to the current doctoral research.**

Within this doctoral research, each participant was assessed individually in a designated room away from the classroom in the participants’ preschools. Some parents or teachers were present with some participants during direct assessment sessions but they were advised to be nonparticipating observers. A sound level meter was used to ensure that the room had acceptable background noise levels for the tests. The signal to noise ratio was measured. Before each assessment session, rapport with the child was established and child assent was gained (Appendix L) (Harcourt & Conroy, 2005; Hurley & Underwood, 2002; Merrick, 2011). The speech assessment session took approximately 10-20 minutes for the 4- to 5-year-old children and 20-30 minutes for the 2- to 3-year-old children to complete. The examiner administered the speech assessment session consistently across participants by following the same testing procedure of a 4-
step prompt hierarchy that was designed for the VSA and described in Chapter 6 (Paper 3). The examiner also recorded the cueing level used for each response to elicit each target word.

**Examiners.**

Across the 29 studies, examiners typically were certified speech-language pathologists or graduate students in speech-language pathology with training in phonetic transcription. One study used examiners who were special educators with at least two years of training in phonetic transcription and were supervised by a speech-language pathologist during assessment sessions (Chirlian & Sharpley, 1982). In many studies the examiners were trained to undertake the data collection and phonetic transcription relevant to the study (e.g., Chirlian & Sharpley, 1982; Dodd et al., 2003; Hua & Dodd, 2000; Topbaş, 2006). The examiners were usually reported to be native speakers of the language and dialect that was tested. For example, MacLeod et al. (2011) used examiners who were Quebec French speakers, and Amayreh and Dyson (1998) used examiners who were native Jordanian Arabic speakers, while Ayyad et al. (2016) used examiners who were native Kuwaiti Arabic speakers.

Within the three previous Vietnamese studies, examiners in one study were the author who was a researcher in early childhood education (Lưu, 1996). The other studies did not report who were examiners; however, preschool teachers and undergraduate students in primary education were acknowledged as testing contributors for the data (Nguyễn, 2011; Nguyễn & Phạm, 2014).

**Application to the current doctoral research.**

With this doctoral research, all the direct assessments were conducted in Vietnamese by the author of this doctoral research who was a special educator and a native speaker of Northern Vietnamese. Additionally, this doctoral research’s author had extensive experience using the International Phonetic Alphabet to transcribe
Vietnamese, had many years’ experience working with children (Smit, 1986), and had been trained to undertake the data collection in the current study by the principal supervisor of this doctoral research.

**Recording of participants’ productions.**

All of the 29 studies recorded the participants’ productions online in real time and 19 out of 29 studies additionally used audio or video recordings to check transcription at a later time. In most of the studies ($n = 25$), the participants’ responses were transcribed (at the phoneme or word level) using the International Phonetic Alphabet. A few studies ($n = 3$) used a binary judgment of a correct or incorrect production based on orthography.

Within the three previous Vietnamese studies, the examiners recorded the participants’ productions online in real time. The participants’ responses were scored as a binary judgment of a correct or incorrect production based on orthography. Audio or video recording was not used, transcriptions thus were not checked.

**Application to the current doctoral research.**

Within this doctoral research, the participants’ responses were recorded online in real time and whole words were transcribed on the recording sheet by using the International Phonetic Alphabet to enable consideration of the accuracy of production and dialectal variants. Children’s responses were digitally audio and video recorded with the permission of parents and the preschool. The audio recordings were made by using a Zoom H1 audio recorder, were saved in .wav format, and were used to re-transcribe the responses of all participants after the assessment sessions by the doctoral research’s author. The video recordings were made by using a Sony HDR-PJ790VE video camera that was set up to provide a front view of the children’s faces. The video recordings were used to check when there was a discrepancy between the online and
audio transcriptions. The audio and video recordings were used for double checking with the online transcriptions to increase accuracy of transcriptions for the analysis.

**Reliability.**

Most of the 29 studies ($n = 26$) presented data regarding the reliability of transcription (phonetic or phonemic) of children’s speech. The exceptions were the three studies undertaken over 40 years ago: Poole (1934), Templin (1957), and Kilminster and Laird (1978). Inter-judge reliability of approximately 10% of the total samples was reported and ranged between 72.5% and 100% across two or more examiners. Intra-judge reliability was reported in six studies (Ben-David, 2006; Dodd & McIntosh, 2010; Gangji et al., 2015; Mahura & Pascoe, 2016; Maphalala et al., 2014; So & Dodd, 1995) and ranged from 84.78% to 98%. Reliability data showed a higher agreement for experienced examiners and for examiners who were trained in phonetic transcription (e.g., Hua & Dodd, 2000; So & Dodd, 1995). Reliability data showed higher agreement using both online transcription that was double checked using audio or video recordings than only using online transcription in real time (Hua & Dodd, 2000).

Within the three previous Vietnamese studies, reliability of transcription (intra-judge or inter-judge) was not described. It is possible that reliability was affected by not critically considering the attributes and skills of the examiners and by relying on online binary scoring. There were no judgments of recorded data within and between examiners, and between recording modes since audio or video recordings were not used in any of the three studies.

**Application to the current doctoral research.**

Within this doctoral research, intra- and inter-judge point-to-point reliability was conducted for consonants, semivowels, vowels, and tones for the speech assessment sessions. Intra-judge reliability was checked by using the audio and video recordings.
The author of the doctoral research re-transcribed 10.3% of audio recordings to compare with the original online transcription to determine intra-judge reliability, reaching to an agreement of 95.1%. Inter-judge reliability was checked by the author of the doctoral research and a Vietnamese speech-language pathologist. Online transcriptions were created independently then double checked via audio recordings after the session. The transcriptions were compared and inter-judge reliability reached to an agreement of 96.1% for 5.6% of the sample.

**Analyses of speech acquisition.**

Four main analyses of speech acquisition data are typically considered in speech acquisition studies throughout the world (McLeod, 2010):

1. **Comparison of the child’s speech sound with the adult target (relational analysis)**
   - Age of acquisition of speech sounds
   - Percentage of consonant correct
   - Common mismatches
   - Phonological processes

2. **Description of the abilities of the child (without comparison with the adult target)**
   (independent analysis)
   - Phonetic inventory
   - Syllable structure

3. **Prosody (stress, intonation, and tones)**

4. **Intelligibility (oral communication competence).**

   All of the 29 studies collected data about children’s production of consonants. Most studies considered consonants in word-initial and word-final position, while some studies also included within word consonants. Some studies also collected data about children’s production of vowels (e.g., Dodd et al., 2003; Prather et al., 1975), consonant clusters (Pearson et al., 2009; Smit et al., 1990; Templin, 1957; Wellman et al., 1931),
and tones (e.g., Cheung, 1990; Hua & Dodd, 2000; So & Dodd, 1995; To et al., 2013). Recall, this analysis focussed on 29 studies of consonant acquisition. Other studies have been undertaken that specifically focus on vowels (e.g., Donegan, 2002; Pollock & Berni, 2003), and consonant clusters (e.g., Kirk, 2008; McLeod, van Doorn & Reed, 2001; Phoon, Maclagan, & Abdullah, 2015). Analyses of the samples included:

- age of acquisition (criteria = customary 50%, acquired 75%, and mastery 90%)
- percentage of consonants, vowels, phonemes, and tones correct (PCC, PVC, PPC, PTC)
- phonological processes/patterns
- inventories of phonemes
- inventories of syllables and word shapes
- whole word proximity (WWP)

Within the three previous Vietnamese studies, all collected data about children’s production of consonants (in syllable-initial and syllable-final positions), semivowels, vowels, and tones but not all possible Vietnamese phonemes were examined (Table V). Analysis of the samples described age of acquisition by listing speech sounds that “xuất hiện” (appeared) (Lưu, 1996, n.p.) or were produced correctly in children’s speech. No account was made of the impact of dialect on children productions. Nguyễn (2011) used an analysis of the percentage of individual consonants, semivowels, vowels, and tones correct, while Nguyễn and Phạm (2014) used an analysis of the percentage of individual consonants, semivowels, vowels, and tones that were incorrect. However, the criteria used in the both studies to define age of acquisition were unclear. The description of substitution, omission, distortion, and addition (SODA) in speech production was used to describe mismatches. An analysis of phonological processes/patterns was not reported.
Based on the age of acquisition for individual consonants, semivowels, vowels, and tones correct and incorrect gained from the three studies, it could be discerned that the tones were acquired earliest followed by vowels, consonants, and semivowels (Luu, 1996; Nguyen, 2011). Regarding initial consonants, the last late consonants to be acquired included /f, ɨʰ, s, ʂ, ʐ, k, ɣ, x/ (Nguyen & Pham, 2014). Not all of the Vietnamese consonants, semivowels, vowels, and tones have been assessed (see the shading in Table V). Age of acquisition data contained many reversals that were inconsistent with data from other languages (e.g., Smit et al., 1990). For example, the acquisition of /f/ was illustrated in Figure VI using data from Nguyen (2011) showed that a reversal occurred as children were nearing school entry; however, data from Smit et al. (1990) showed a steep acquisition trend with no reversals. The reversals were inconsistent across the dataset from Nguyen (2011) and cannot easily be explained by considering children’s development.

Nguyen (2011) extracted from data within Table 3.1 (p. 13)  
Smit et al. (1990, p. 789)

Figure VII. Growth of Acquisition for Word-Initial /f/ from Smit et al. (1990) Compared with Nguyen (2011)
Table V.

*Age of Acquisition of Vietnamese Phonemes in Previous Vietnamese Studies*

<table>
<thead>
<tr>
<th>Grapheme</th>
<th>Northern Vietnamese</th>
<th>Southern Vietnamese</th>
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<td>u, o</td>
<td>/w/</td>
<td>/w/, -</td>
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</table>

Within syllable semivowels

Syllable final consonants

<table>
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<tr>
<th>Grapheme</th>
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<th>Southern Vietnamese</th>
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Application to the current doctoral research.

Within this doctoral research, analyses of the data of the VSA (Phạm, Le, & McLeod, 2016) were based on the participants’ speech productions during the VSA. The speech productions of each child were entered into the Phon software program which is free (https://phon.ca) and enables analysis of phonological acquisition (Rose & MacWhinney, 2014; Rose & Stoel-Gammon, 2015). Checking was undertaken for each Phon output for any errors. Following the use of the Phon, phonemic analyses of elements of speech production (i.e., consonants, semivowels, vowels, and tones) in syllable contexts were conducted. Relational analyses were employed with regards to degree of production accuracy and the percentage of children achieving the specified accuracy level (75% and 90%) in each age range (Dodd et al., 2003). Relational analyses which compare the children’s productions with the adult form and determine error patterns in children’s speech were applied. The number of correct productions or acceptable responses which were considered the effect of dialectal variants (cf. Goldstein & Iglesias, 2001; Phoon, Abdullah, & Maclagan, 2012) were calculated for each participant. The raw scores of these correct productions or acceptable responses

Note. a75% and 90% criterion applied to the published data, bA reversal occurs in older age groups, the shading indicates that the Vietnamese phonemes were not examined.
were formed into a number of speech accuracy variables: percentage of consonants correct (PCC), percentage of syllable-initial consonants correct (PICC), percentage of syllable-final consonants correct (PFCC), percentage of semivowels correct (PSVC), percentage of vowels correct (PVC), percentage of tones correct (PTC), percentage of phonemes correct (PPC), and percentage of word shapes correct (PWC). PCC was calculated by combining the number of correct productions or acceptable responses of syllable-initial consonants, syllable-final consonants, and semivowels and PCC was used to be consistent with previous international studies. The analyses of phonological processes/patterns and substitutions, omissions, distortion, and additions (SODA) were calculated to determine the number of occurrences.

The Statistical Package for Social Sciences version 25 computer program (SPSS) (IBM, 2017) was used to analyse results from the Phon analysis as well as raw score from the measures/variables. It was used to run descriptive statistics and frequency distribution on the sample population as well as to explore the significance of relationships between independent variables (e.g., age, sex, and socioeconomic status) and dependent variables (e.g., PPC, PCC, PVC) by hierarchical regression analyses (Field, 2013; Pallant, 2013).

Criteria of 75% and 90% across all children and all opportunities that each phoneme was produced correctly was recorded and applied to determine the age of acquisition. Non-adult realisations and phonological processes/patterns were analysed from participants’ speech productions. Non-adult realisations included any phoneme substitution, deletion, distortion, or addition and were scored as incorrect. Phonological processes/patterns that occurred more than 10% were summarised for syllable-initial and syllable-final consonants, and semivowels.

Parent responses to the Intelligibility in Context Scale: Vietnamese (ICS-VN) were entered into SPSS. The frequency of responses for each item was calculated.
Analyses of item by item inter-correlations (nonparametric) and a Cronbach’s alpha test of internal reliability were used to determine the coherence of the seven items as well as factor analysis to justify the formation an overall scale of parent-rated intelligibility in Vietnamese contexts. The correspondence between the scores of the ICS-VN and the VSA (Phạm, Le, & McLeod, 2016) was examined by correlation analyses.

**Conclusion**

In summary, the information summarised from 29 cross-sectional studies above has provided useful methodological guidance for studying speech acquisition among Vietnamese-speaking children. The findings reported in the three previous Vietnamese studies have provided valuable groundwork regarding Vietnamese children’s speech acquisition but caution is required when interpreting these findings because of shortcomings with regards to participant recruitment, data collection methods, and analyses compared to the international standards. Therefore, critical considerations of all aspects of research design (i.e., participant selection, instruments, procedure, examiners, recording, reliability, analysis, and reporting) were incorporated when conducting the current study of children’s speech acquisition in Northern Viet Nam.

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Chapter 6

Development of the Vietnamese Speech Assessment

Paper 3


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Development of the Vietnamese Speech Assessment

Ben Phạm, Sharyrne McLeod, and Xuan Thi Thanh Le

Vietnamese is the official language of over 92 million people in Viet Nam and nearly four million diaspora including in Australia, USA, and Canada. To date, there are no standardised speech assessments for Vietnamese children. This paper outlines the development of the Vietnamese Speech Assessment (VSA) through collaboration between researchers in Viet Nam and Australia. The VSA contains all Vietnamese consonants, vowels and tones in at least two words with different sequence constraints. Further, the VSA was developed to be within the vocabulary range of young children, frequently used by Vietnamese people in different regions, picturable, and either a noun or verb. Picture stimuli were identified and the test was piloted with Vietnamese speakers of different ages who spoke different Vietnamese dialects. A score sheet was designed to include acceptable dialectal pronunciations, and to enable calculation of percentage of consonants/vowels/semitones correct presence of phonological processes (patterns). The VSA is currently undergoing norming and standardisation.

Keywords: Assessment, Children, Speech, Vietnamese

This article has been peer-reviewed.

Journal articles, unpublished dissertations, and on websites (Cameron & Watt, 2006; Chong, 1991; Hwa-Foodrich, Hodson, & Edwards, 2002; Nguyễn, 2011; Nguyễn & Phạm, 2014; Phạm, 2009; Tang & Barlow, 2006; Vũ & Dặng, 2004), as well as tools developed by staff in particular clinic/school/hospital/university for use in their own clinical practice (The Children’s Hospital No. 1, 2013; Ducote, n.d.; Lê, 2013; West, 2000). Many of these tools are created to assess children who speak the southern Vietnamese dialect in Viet Nam, or other countries, and have limitations when used with people who speak the northern and central dialects of Vietnamese. This situation necessitated the development of the Vietnamese Speech Assessment (VSA) for research and clinical practice across Viet Nam and in other countries.

This paper outlines the creation of the VSA using psychometric standards for assessment in two stages: conceptualisation and operationalisation (Frytak, 2000) and has been written using the guidelines for test creation from McLeod (2012b). The VSA has been developed via collaboration between Ben Phạm, Xuan Thi Thanh Le, and Sharyrne McLeod, the Trinity Foundation and Charles Sturt University in Viet Nam and Australia (see Figure 1). Creation of the VSA would not be possible without extensive international collaboration between authors in these majority- and minority-world contexts drawing on the authors' expertise in Vietnamese phonetics and phonology, Vietnamese dialectal variants, child development, and test development. The authors met face-to-face on numerous occasions to listen to the production of consonants, vowels and tones by Vietnamese speakers, and to debate the benefits of different word choices. The three authors also undertook pilot testing and initial operationalisation of the tool together in Australia and Viet Nam, each transcribing, then discussing children’s production of the words. The VSA would not have the same level of rigor if the three authors had not collaborated and cooperated extensively during the conceptualisation stage.

Stage 1. Conceptualisation of the Vietnamese Speech Assessment

Conceptualisation of an assessment tool refers to determining its purpose and scope, ensuring it measures what it intends to do through its properties and features (Frytak, 2000). Conceptualisation of an assessment begins with a statement of its purpose, intended population, target skill, and scope (McLeod, 2012b).
Purpose
The current purpose of the VSA is to describe children’s ability to produce consonants, semivowels, vowels, and tones in the northern, central, and southern Vietnamese dialects. Once normative data have been collected and analyzed, the other purposes will be for diagnosis of speech sound disorders, to assist with goal setting for intervention, and to determine the outcomes of intervention.

Intended population
The VSA is designed for Vietnamese-speaking children ranging from 2.0 to 6.11 years who live in different regions of Vietnam and in other countries. Children may be either monolingual or multilingual speakers. Examiners using the VSA should be speech-language pathologists, special educators, psychologists, or other professionals who are Vietnamese native speakers with experience in Vietnamese phonetic transcription and working with children (Smit, 1986). It may be possible for non-Vietnamese-speaking speech-language pathologists to use the VSA with support from interpreters or family members (see McLoud, Vardon & IEFMCIS, in press, for guidelines).

Target skill
The VSA has been designed as a picture-naming task to elicit single words.

Scope
The scope of the VSA includes the type of words selected and methods used to elicit target sounds. Six areas were considered to ensure the scope matched the purpose of VSA: phonotactic inventory, Vietnamese speech sounds, elicitation of each speech sound, word selection, presentation, and test administration.

Vietnamese phonotactic inventory
Almost all words in Vietnamese are monosyllabic. The Vietnamese syllable is the smallest unit of pronunciation and Vietnamese is a syllable-timed language (in contrast to English, which is a stress-timed language). The structure of the Vietnamese syllable is: C1,w,VC,-w,T, where C1 is the initial consonant, w is the medial semivowel, V is the main vowel, C is the final consonant, w is the final semivowel, and T is the tone (Pham & McLoud, 2016). The vowel and the tone are the two compulsory components, whereas, the absence of the other components is optional. The VSA contains all Vietnamese speech sounds in every possible position in the Vietnamese syllable as follows: initial consonant, medial semivowel, main vowel, final consonant, final semivowel, and tone.

There are no consonant clusters in the Vietnamese language so that all Vietnamese speech sounds in the VSA are elicited in singleton contexts. Morphophonological contexts do not occur as the Vietnamese language does not use bounded morphemes to mark verb tense, aspect, or plurality (Pham, 2011). All stimuli in the VSA are monosyllabic words; the exception is the rare loan word for the initial consonant /p/ - /pê-th/ (pate). The classifiers, e.g., cái (genitive), còn (animate), are excluded although they commonly precede nouns (Pham & Kohert, 2003; Tran, 2011). For example, the single word task elicited thò (rabbit) instead of còn thò; and chiều (box) instead of cái chiều.

Vietnamese speech sounds
The VSA includes all potential Vietnamese consonants, semivowels, vowels, and tones to assess speech production of Vietnamese-speaking children spoken in three main dialects. A comprehensive summary of all Vietnamese speech sounds in Standard Vietnamese and in
Northern, Central and Southern dialects was collated based on an extensive literature review (Pham & McLeod, 2016). The following Vietnamese speech sounds were included in the VSA based on the review:

- 23 initial consonants in Standard Vietnamese (p, t, t', t, d, g, k, t, m, n, ng, f, v, s, z, ñ, x, y, h, j, and four variants including /n/, /n/ in the Northern dialect and /n/, /n/ in the Southern dialect;
- 6 final consonants in Standard Vietnamese (p, t, k, m, n, ng) and four variants across three dialects (c, j, k, g, r);
- 2 final semivowels /w, j/;
- 1 medial semivowel approximant /u/ in Standard Vietnamese and three dialects;
- 16 vowels in Standard Vietnamese (including nine long singleton vowels /a, i, u, o, a, o, õ, u, õ/) and four short singleton vowels /a, õ, t, 3/3, three diphthongs /ao, ou, u/, and ten variants /i, e, o, õ, e1, e2, u, u1, u2, y/ across three dialects;
- 6 tones in Standard Vietnamese and two variants of the tone 5 and 6 occurring in syllables ending by voiceless plosive consonants (p, t, k/) in three dialects.

Elicitation of each Vietnamese speech sound

Typically each speech sound is elicited in between one and five stimuli in single word sampling tools (McLeod, 2012b). Researchers have recommended that at least two words in a single word task containing each phoneme in order to determine the consistency of production or phoneme stabilization (Eisenberg & Hitchcock, 2010; Hua, 2002). Therefore, at least two stimuli were selected for each phoneme (consonants, vowels, and tones) shared across all dialects in the VSA. For example, the two selected words beginning with /l/ that were pronounced consistently across all dialects were /læp/ (candy) /læw/, and /læt/ (check) /læw/. The authors attempted to avoid excessive use of any consonant, vowel, or tone within the word list.

The selection of words also took into consideration different phonetic contexts in Vietnamese. Different phoneme sequence constraints were considered as to accommodate variability in terms of syllable shapes, rimes, phonetic variants, and tones within the child’s production rules. It was important to accommodate the effect of coarticulation of front and back vowels on the production of initial and final consonants (Cao, 2006; Doan, 2003). Therefore, it was decided that the two words in the VSA containing the same initial consonants should be followed by a front and back vowel. For example, the selected words beginning with the initial consonant /v/ contained a front vowel /e/ (pumpkin) /vɛ/ and back vowel /o/ (box) /vɔ/. In addition, the VSA authors considered the effect of coarticulation of rounded and unrounded vowels on the production of final consonants /r, n/ with back vowels (Cao, 2006; Doan, 2003). For example, the word being (light) /biŋ/ was added to the set of words beginning with initial consonant /v/.

Word selection

Within the VSA the selected words met following criteria. They had to:

- be within the vocabulary range of Vietnamese-speaking children in Viet Nam, Australia, and USA so that children can produce the word spontaneously as often as possible;
- be used frequently by the entire population throughout Viet Nam. Therefore, words having lexical variants were excluded. For example, the word me (mother) was not selected because of variants used in different regions such as bảm, bu, ma, ma, mẹ, mo, and u;
- be used currently in the speech of people within Viet Nam. For example, the traditional word for box was xâu; however, it was not selected because xâu or thing is used more commonly now;
- be culturally sensitive in both word choice and picture. For example, the word dâu (chopsticks) was selected rather than dao (knife) because seeing an image of a knife may scare young children;
- be pictureable so young children can recognize the word easily and spontaneously name the word. The images were considered to be contrastable to different meanings. For example, the word gà (chicken) was selected for the initial consonant /ɡ/ so the word chim (bird) was not selected for the initial consonant /c/ because of the possible confusion between these two images. Another example, the word phở (thinly sliced noodle soup) was seen as a good word choice containing the initial consonant /p/ but was not selected because of the possible confusion with the word bàn (round noodle soup);
- be selected from basic syntactic forms such as nouns (68 out of 77 words) and verbs (11 out of 77 words).

Presentation

The VSA consists of 77 monosyllabic words represented by 77 colour pictures. The order of the word list was based on initial consonants. Proposed prototypes for the 77 pictures were discussed by the VSA authors, then were sent to a Vietnamese artist to be drawn. The 77 pictures were bound in a picture booklet. The front page displays a picture illustrating a word and the orthography of the word (see Figure 2). On the back page, there is a small picture of the word plus full phonetic transcriptions of Standard Vietnamese, Northern, Central, and Southern Vietnamese as well as the prompts to elicit the word (see Figure 3).

Test administration

The VSA was designed to be administered in a standardized manner. The assessment can be administered in research and clinical settings. Instructions will be

![Figure 2. The front page for the stimulus item nón (cone hat).](image)

![Figure 3. The back page for the stimulus item nón (cone hat).](image)
Cuing hierarchy
Examiners are required to give instructions following a four-step prompt hierarchy to elicit each target word: (a) open-ended question, (b) gap fill or content-related prompt, (c) binary choice (with the target word produced first), and (d) delayed imitation (e.g., “Ha! Repeat, please!” (Tim, Con nhält deja)). Children are encouraged to respond spontaneously by naming the picture at the first step as much as possible. The open-ended question used in step 1 for each target picture is “What’s this?” Some target pictures will be asked differently to elicit the targeted response. For example, with the target picture of elephant (vol), the examiner asks the child “Day là con...” (This is a [animacy word]...) so that the child can fill the target word after the animacy word produced by the examiner. If the examiner does not say the animacy/ inanimacy word, the child might say a compound word (animacy/inanimacy target word, e.g., con vol) instead of saying the target word only (e.g., ‘vol’) because animacy/ inanimacy words can precede a noun in the Vietnamese language and are acquired early in young children (Pham & Kohnert, 2009). Before testing begins, it is useful to train the child to not include the classifier using common objects in the environment. If the child cannot label the picture, additional cues or content-related questions are provided to elicit the expected response. For example, a content-related question “What has a long trunk?” is asked to elicit a target word vol (elephant). If this step fails, the examiner will give a binary choice by presenting the target word first to the child to participate, for example, “vol hay chăn” (elephant or pig). If the participant does not respond to the binary choice, the examiner will provide the target word for imitation. A list of prompts and cues for each target word was also created to support the testing protocol.

Scoring, transcription, recording and analysis
A score form was created which includes columns for the word in orthography; the adult target in International Phonetic Alphabet for Standard Vietnamese, Northern, Central and Southern dialects; the child’s production, and columns for scoring each phonological pattern.

Children are assessed individually. Examiners are required to transcribe children’s responses online by using the International Phonetic Alphabet symbols. It is recommended that the transcriptions be based on the children’s first attempt if possible. If children’s first productions are not clear, then they are asked to repeat the words. The score form also requires examiners to mark the prompt or cueing level used for each response.

It is recommended that the children’s responses be audio-recorded and/or video-recorded with the permission of children’s caregivers and the school. A microphone should be placed close to the children’s mouth (within 15 cm) and the video camera should be set up to record the children’s face. The recordings can be used to check reliability between examiners, and to record change in the children’s speech over time. Video recordings can be used to check the children’s productions of consonants and vowels that can be seen on the recording (e.g., bloob). The VSA score form provides a relational analysis (including percentages of consonants, semivowels, vowels and tones that are produced correctly) and an analysis of phonological processes/ patterns. Guidance in terms of scoring, transcription, recordings and analysis will be included in the manual to instruct for examiners in both research and clinical use.

Stage 2. Operationalisation of the Vietnamese Speech Assessment
Operationalisation is the evaluation and validation process of an assessment to ensure its validity and reliability (Frykik, 2000). The VSA is currently undergoing operationalisation. Eventually the VSA will contain consistent assessment materials, administration and scoring protocols. Once normative data have been collected and analysed, they will be added to the manual. Eventually the manual will also include information about validity (content, construct, predictive, concurrent) and reliability (internal consistency, test-retest reliability, intra- and inter-rater reliability).

To date, the VSA authors have considered the content validity for the VSA. Content validity refers to “the degree to which the items in the measure cover the domain of interest” (Frykik. 2000, p. 22). Content validity of the VSA was conducted first by a systematic examination of relevant literature and previously designed speech sampling tools to specify the initial test content. Second, professional judgement was used to define the test areas and to evaluate the relevance and representativeness of the test items with the target construct. The VSA was piloted by the design team on five adults and one child who were bilingual Vietnamese–English speakers to examine the relevance of the word list and scoresheet and to estimate length of the time required to complete the test. Adults completed the task in approximately 6–10 minutes, the child in about 20 minutes. After the initial pilot testing, some changes were made to the stimulus items (e.g., changing images for the word ‘pén’ from torch to battery) and prompts (e.g., changing the cues for the word ‘tíf’ [Têt holiday]). Other psychometric properties (including internal consistency, test-retest reliability, inter- and intrarater reliability, criterion validity, construct validity, item analysis, sensitivity and specificity, standardisation) will be established in further steps to operationalise the VSA.

Conclusion
The development of a speech sampling tool requires two stages: conceptualisation and operationalisation. The conceptualisation of the VSA has been completed and work on the operationalisation is continuing. This paper provides an example of how to begin to undertake test development in a majority-world country.

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Chapter 7
Vietnamese-Speaking Children’s Acquisition of Consonants, Semivowels, Vowels, and Tones in Northern Viet Nam

Paper 4

Vietnamese-Speaking Children’s Acquisition of Consonants, Semivowels, Vowels, and Tones in Northern Viet Nam

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Abstract

Purpose: To investigate children’s acquisition of Vietnamese speech sounds.

Method: Participants were 195 children aged 2;2-5;11 living in Northern Viet Nam who spoke Vietnamese as their first language. Single-word samples were collected using the Vietnamese Speech Assessment (Phạm, Le, & McLeod, 2016) to measure accuracy of consonants, semivowels, vowels, and tones.

Results: Percentage of consonants correct for children aged 2;0-2;5 was 46.39 (SD=7.95) and increased to 93.13 (SD=6.13) for children aged 5;6-5;11. The most difficult consonants were /ɲ, s, z, x/. Percentage of semivowels correct for children aged 2;0-2;5 was 70.74 (SD=14.38) and increased to 99.60 (SD=1.55) for children aged 5;6-5;11. Percentage of vowels correct for children aged 2;0-2;5 was 91.93 (SD=3.13) and increased to 98.11 (SD=2.79) for children aged 5;6-5;11. Percentage of tones correct for children aged 2;0-2;5 was 91.05 (SD=1.42) and increased to 96.65 (SD=3.42) for children aged 5;6-5;11. Tones 1, 2, 5, and 6 were acquired by the youngest age group; whereas, tone 3 (creaky thanh ngã) and tone 4 (dipping-rising thanh hỏi) did not achieve 90% accuracy by the oldest age group. Common phonological patterns (>10%) for children aged 2;0 to 3;11 were: fronting, stopping, deaspiration, aspiration, and semivowel deletion and for children aged 4;0 to 5;11 were: fronting and deaspiration.

Conclusion: This is the first comprehensive study of typically developing Northern Vietnamese children’s speech acquisition and provides preliminary data to support the emerging speech therapy profession in Viet Nam.

Keywords: Speech, consonant, semivowel, vowel, tone, acquisition, Vietnamese, children, Northern, Viet Nam
Vietnamese-Speaking Children’s Acquisition of Consonants, Semivowels, Vowels, and Tones in Northern Viet Nam

Vietnamese is one of the 20 most commonly spoken languages throughout the world (Simons & Fennig, 2017). It is the official language of Viet Nam and is spoken by most of the approximately 92 million population (General Statistics Office of Viet Nam, 2016). Vietnamese also is commonly spoken as a home language in many other countries including US, Australia, and Canada. For example, in the US, Vietnamese was the fourth most commonly spoken home language other than English with approximately 1.5 million Vietnamese speakers (Camarota & Zeigler, 2014; Ryan, 2013). In Australia, Vietnamese was in the top five most common home languages other than English spoken by 1.2% of the population (Australian Bureau of Statistics, 2017).

Vietnamese has considerable regional pronunciation variants within Viet Nam. The three main dialects described by Vietnamese linguists are Northern, Central, and Southern Vietnamese (Dinh & Nguyễn, 1998; Đoàn, 2003; Hoàng, 2004; Nguyễn, 1997; Vũ, 1982). The main differences between the Vietnamese dialects are phonological with some differences in vocabulary (Alves, 2007; Huỳnh, 2014). Characteristics of each dialects and differences between these dialects have been studied by many linguists. Across the three dialects the following consonants are shared: /b, tʰ, t, d, m, n, ŋ, s, x, ɣ/. Additional information about phonological features including consonants, semivowels, vowels, and tones across these three main Vietnamese dialects is found in Phạm and McLeod (2016).

**Northern Vietnamese**

Northern Vietnamese is spoken in the North of Viet Nam including in the capital city Ha Noi and is spoken by over 35% of the population of Viet Nam (General Statistics Office of Viet Nam, 2016). Northern Vietnamese is considered to be the...
foundations of Standard Vietnamese, the official language that the Viet Nam government promotes for use in education, politics, the military, economy, society, culture, science and the arts throughout the country (Huỳnh, 1999; Trần, 2000). Northern Vietnamese shares similar characteristics with Standard Vietnamese and other Vietnamese dialects in terms of syllable structure and shape; however, has some differences from other dialects in term of phonological and lexical features.

**Syllable shape.**

Vietnamese is a syllabic language spoken with a syllable-timed rhythm. Each syllable is spoken independently with relatively equal emphasis and equal time intervals. There are five components shaping Northern Vietnamese syllables which can be written as: C1w1VC2/w2T. The syllable shape is similar across Vietnamese dialects (Phạm & McLeod, 2016). The main vowel (V) and the tone (T) are compulsory; whereas, the medial semivowel (w1) and the final phoneme, either final consonant (C2) or the final semivowel (w2), are optional in Vietnamese syllables across dialects. However, since the glottal /ʔ/, that has no grapheme represented, is included as an initial consonant in Northern Vietnamese (Cao, 2006; Đoàn, 2003; Hoàng, 2004; Kirby, 2011; Phạm & McLeod, 2016), it makes the initial consonant a compulsory component in Northern Vietnamese syllables in addition to the main vowel and the tone.

**Consonants.**

There are 20 initial consonants and ten final consonants in Northern Vietnamese (Hoàng, 2004; Huỳnh, 1999, 2014; Kirby, 2011; Phạm & McLeod, 2016). The 20 initial consonants include: eight plosives /p, b, tʰ, t, d, c, k, Ɂ/, four nasals /m, n, ŋ, ŋ/, seven fricatives /f, v, s, z, ɣ, h/, and a lateral approximant /l/ (see Table 1). Several initial consonants have dialectal variants. The phoneme /p/ is pronounced either as /p/ or /b/ (Doàn, 2003; Hoàng, 2004). Both the nasal /n/ and lateral approximant /l/ can be
switched between each other in some local regions of Northern Viet Nam (Kirby, 2011; Phạm, 2013). The three retroflex phonemes /ʈ, ʂ, ʐ/ in Northern Vietnamese are spoken differently between people who are at different educational levels and from different local areas. The variant pronunciations for /ʈ/ are /ʈ, c, ʦ/; for /ʂ/ are /s, ş/; and for /ʐ/ are /z, ʐ, r/ (Đỗ & Lê, 2005; Đoàn, 2003; Hoàng, 2004).

The ten final consonants in Northern Vietnamese are: three plosives /p, t, k/, three nasals /m, n, ɲ/, two palatals /c, ɲ/, and two labiovelars /kʰ, ŋʰ/ (Cao, 2006; Đoàn, 2003; Hoàng, 2004; Phạm & McLeod, 2016). The two final palatals /c, ɲ/ are variants of the two final velars /k, ŋ/ when following the short front vowels /ɨ, ě, ế/. The two labiovelars /kʰ, ŋʰ/ are variants of the two final velars /k, ŋ/ when following the short back rounded vowels /û, ĕ, ô/ (Hoàng, 2004; Huỳnh, 1999).

**Semivowels.**

The Northern Vietnamese semivowels are /w, j/ (Phạm & McLeod, 2016) and may be called approximants on the International Phonetic Alphabet chart. The semivowel /w/ can be produced between the initial consonant and the main vowel (within syllable position, also called the medial semivowel, âm đệm or tiền chính âm), or in the syllable-final position (final semivowel, bán âm cuối) in Northern Vietnamese. The semivowel /j/ may only be produced in the syllable-final position (Hoàng, 2004; Huỳnh, 1999).

**Vowels/Diphthongs.**
Generally, there are 11 vowels and three diphthongs in Northern Vietnamese. The 11 vowels include nine long monophthongs, /i, e, ɛ, u, o, ɔ, ɤ, ɑ/ and two short monophthongs /ã, ã/. The three diphthongs are /ie, uo, urɤ/. Additionally, authors include six short vowel variants /ɨ, ɛ̆, ɛ̆, ü, ɔ̆, ŏ/ in Northern Vietnamese (Cao, 2006; Đoàn, 2003). The long vowels and diphthongs are produced in all syllable shapes (i.e., open, semi-open, semi-closed, and closed syllables). The short vowels /ã, ã/ are not produced in open syllables. The short vowels /ɨ, ɛ̆, ɔ̆/ are only produced in syllables containing the final palatals /c, p/; for example, sách /sãc/ (book). The short vowels /ũ, ẽ, ŏ/ are only produced in syllables containing the final labiovelars /k, ɲ, m/; for example, bưng /bũn̩m̩/ (belly). There are variants for the vowel /u/ and the diphthong /uro/ in two Northern Vietnamese syllabic constraints. The vowel /u/ following the final semivowel /w/ is pronounced as /i/; for example, cừu (sheep) is produced as /kiw/ in Northern Vietnamese but /kɯw/ in other Vietnamese dialects. When the diphthong /uro/ is followed by the final semivowel /w/, it is pronounced as the diphthong /ie/; for example, hươu (giraffe) is pronounced as /hiew/ in Northern Vietnamese but /hɯɤw/ in other Vietnamese dialects (Đoàn, 2003; Huỳnh, 1999).

**Tones.**

In Vietnamese, tones are both speech- and language-related. There are six tones in Northern Vietnamese (Brunelle, 2009a, 2009b; Cao, 2006; Hoàng, 1989; Hoàng, 2004; Hwa-Froelich, Hodson, & Edwards, 2002; Kirby, 2010, 2011; Nguyễn & Edmondson, 1998; Phảm & McLeod, 2016). The six tones in Northern Vietnamese contrast pitch (the fundamental frequency, F0), shape and voice quality (Brunelle,
2009a, 2009b; Brunelle, Nguyen, & Nguyen, 2010; Hoàng, 1989; Vũ, 1982) in open and sonorant final syllables (Kirby, 2011). The six tones are numbered from one to six:

1. Level (thanh không dấu or thanh ngang),
2. Falling (thanh huyền),
3. Creaky (thanh ngã),
4. Dipping-rising (thanh hỏi),
5. Rising (thanh sắc), and

Contours of the six Northern Vietnamese tones are represented in Figure 1. Voice quality is a crucial perceptual cue amongst the six Northern Vietnamese tones for native speakers; for example, syllables bearing tones (3) and (6) are pronounced with final glottalization, syllables bearing tones (2) and (4) are pronounced with a breathy voice quality, and the syllable bearing tone (4) is pronounced with a light final laryngealization (Kirby 2010; Michaud 2004; Nguyễn & Edmondson 1998; Thompson 1965; Phạm, 2001, 2003). However, voice quality features, an intrinsic property of Northern Vietnamese tones, cannot be transcribed by the existing IPA transcription symbols (Kirby, 2011; Phạm, 2003, 2006).

Insert Figure 1 here

In addition to the six distinguished tones in the Northern Vietnamese, there are two more tones that are contained in syllables with a final voiceless stop /p, t, k/ (Brunelle et al., 2010; Kirby, 2011; Phạm, 2003, 2006). Kirby (2011) names these carrier syllables with obstruent codas as “checked syllables” and the two additional tones are thereby called “rising checked” (p. 386) and “low checked” (p. 386) along with the alphanumeric codes D1 and D2, respectively. This paper uses the Roman numerals (7) and (8) to indicate these two additional tones and to be consistent with the numbering for the six tones. Syllables bearing tones (7) and (8), for example, can be transcribed as /mát/ for mát (cool) or /họp/ for hộp (box). Although tone (7) phonetically differs from the tone (5) in pitch onset and trajectory and tone (8) differs...
from tone (6) in voice quality (Kirby, 2011), tones (7) and (8) are considered allophones of tones (5) and (6) in this paper because they are colloquially realized as tones (5) and (6) in conservative speech for Northern Vietnamese native speakers. Therefore, the two additional tones (7) and (8) on the carrier syllables ending in a voiceless stop in the target word list of the VSA and uttered by participants in this paper are transcribed as tones (5) and (6). For example, in the VSA the adult-like production of the target word xiếc (circus) is transcribed as /siekt/ instead of /siek7/ and hộp (box) is transcribed as /hop6/ in stead of /hop8/.

There are a number of transcription conventions for the Vietnamese tones (cf. Phạm & McLeod, 2016). However, the most common Vietnamese convention is that the tone is marked by a superscript number placed at the right of a syllable transcription within the slashes; for example, tone 2 is represented in /tʰwień2/ for thuyền (boat) (Phạm & McLeod, 2016).

**Acceptable Vietnamese productions.**

In Viet Nam, the government specifies the acceptable pronunciation (called Standard Vietnamese, chuẩn phát âm) for use in education, politics, the military, economy, society, culture, science, and the arts. However, at home, some consonants, vowels and tones are produced differently in the northern, central, or southern regions of Viet Nam (Cao, 2006; Đoàn, 2003; Hoàng, 2004; Phạm & McLeod, 2016). Therefore, it is important to define acceptable speech productions when examining typical acquisition of children’s speech (Goldstein & Iglesias, 2001; Phoon, Abdullah, Lee, & Murugaiah, 2014). Speech productions are determined to be correct or acceptable through considering dialectal variants. Dialectal variants in Northern Vietnamese compared to Standard Vietnamese were considered to be acceptable productions in the current study based on a comprehensive literature review of phonological differences across Vietnamese dialects (Phạm & McLeod, 2016). The
current study accepted that /p, b/ are acceptable pronunciations for the initial consonant /p/; /ʈ, c, ts/ are acceptable pronunciations for the initial consonant /ʈ/; /c, ts/ are acceptable pronunciations for the initial consonant /c/; /n, l/ are acceptable pronunciations for the initial consonant /n/; /ʂ, s/ are acceptable pronunciations for the initial consonant /ʂ/; /ʐ, z, t/ are acceptable pronunciations for the initial consonant /ʐ/; and /l, n/ are acceptable pronunciations for the initial consonant /l/. No dialectal variants were considered for semivowels, vowels/diphthongs, or tones in Northern Vietnamese in the current study.

**Children’s Speech Acquisition**

Speech acquisition is a significant component of children’s development. In speech-language pathology practice, the understanding of children’s typical acquisition has influenced decision making at different service phases such as referral, assessment, analysis, diagnosis, choosing intervention goals, intervention, and dismissal (McLeod & Baker, 2017). Identifying children who may require speech intervention services through speech assessments is crucial as many studies have determined that approximately 50% of young children with speech sound disorders will not achieve adult-like speech without intervention (Law, Boyle, Harris, Harkness, & Nye, 2000; Roulstone, Miller, Wren, & Peters, 2009; Roulstone, Peters, Glogowska, & Enderby, 2003). For those who do not receive adequate intervention, they may have subsequent difficulties with literacy, including spelling and reading (Anthony et al., 2011; Leitão & Fletcher, 2004; Lewis, Freebairn, & Taylor, 2000, 2002).

**Theoretical understanding of speech acquisition.**

Exploring descriptive data regarding speech acquisition can reveal developmental trends in phonology and inform theoretical understanding. Knowledge of the typical speech acquisition of a specific language can contribute to the understanding
of universal trends in children’s speech acquisition across languages (Jakobson & MacMahon, 1969) and can provide greater details regarding cross-linguistic differences and individual variation in speech acquisition (Hua & Dodd, 2006). The emergence approach by Davis and Bedore (2013) describes the importance of intrinsic, extrinsic and interaction capacities in children’s speech acquisition. In the emergence approach, phonological knowledge and behaviours are assumed to emerge from the interplay between the child-internal biological capacities and social-interactional capacities engaging with linguistic and cultural input from the external environment. The emergence approach provides an explanation for the patterns found in children’s speech output, children’s realisations compared to the adult’s realisations and variability across children and languages. Aspects that the emergence approach can account for include: mismatches between children’s and adult-like speech; general speech patterns observable across children and languages; inter- and intra-child variability during development; the role of ambient-language input; compatibility with other learning and perception theories; and the inclusion of biological and social-interactional aspects (Albrecht, 2017). Given these strengths, the emergence approach was chosen as the theoretical framework for the current study to support the aim of examining how ambient language phonology (Vietnamese) influences the rate, order and characteristics of speech sound acquisition by Vietnamese-speaking children.

**Descriptions of speech acquisition.**

Children’s speech acquisition has been studied for a long time, across languages and countries. McLeod (2010) summarized four main analyses of speech acquisition data that are typically considered in speech acquisition studies in her description of over 250 studies about children’s speech acquisition in 24 languages. First, relational analyses, which compare the children’s productions with the adult target and determine error patterns in children’s speech, measure production accuracy and the percentage of
children achieving the accuracy level in each age range through measurements, including: age of acquisition of speech sounds, percentage of consonants correct, common mismatches, and phonological processes. Second, independent analyses explore speech sounds that children can produce, regardless of accuracy and without comparison to the adult’s target form, to identify children’s inventories in terms of phonetic, syllable and word shape structures. Third, prosodic analysis considers speech acquisition of stress, intonation and tones. Fourth, children’s intelligibility is considered.

Previous studies of speech acquisition in tonal languages (e.g., Cantonese) have examined consonants, monophthongs, diphthongs, and tones (Stokes & Wong, 2002; To, Cheung, & McLeod, 2013a). Consonants within syllable-timed languages have been examined in the syllable-initial and syllable-final positions (Cheung, 1990; So & Dodd, 1995; Stokes & To, 2002; To et al., 2013a). Additionally, some studies conducted in Viet Nam have examined Vietnamese semivowels in the within syllable and the syllable final positions (Nguyễn, 2011; Nguyễn & Phạm, 2014). Phonological process analyses have been extensively employed across speech acquisition studies in English (e.g., Dodd, Holm, Hua, & Crosbie, 2003; Smit, 1993) and have been used in tonal languages such as Cantonese (Cheung, 1990; So & Dodd, 1995; To et al., 2013a). The analysis of phonological processes was also used in a study describing error patterns of four Vietnamese-speaking children with speech sound disorders (Tang & Barlow, 2006).

**Factors influencing children’s speech acquisition.**

The most frequently studied factors reported to influence speech acquisition are age, sex, and socioeconomic status. The evidence regarding the impact of age on children’s speech acquisition is conclusive across studies and languages with all studies demonstrating increased accuracy with increasing age (McLeod & Crowe, 2018). The influence of sex and socioeconomic status (e.g., maternal education) on the accuracy of
children speech acquisition varies across studies. No differences between boys’ and girls’ acquisition of speech were found in some studies; for example, in English (e.g., McIntosh & Dodd, 2008) and Cantonese (e.g., Cheung, 1990; So & Dodd, 1995); whereas, other studies indicated that there was a significant sex effect by which girls typically demonstrated more rapid acquisition than boys did (Dodd et al., 2003; Smit, Hand, Freilinger, Bernthal, & Bird, 1990; To et al., 2013a). Similarly, the impact of socioeconomic status (e.g., parental education and occupation) on children’s speech acquisition is inconclusive since no effect was found in some studies (e.g., Dodd et al., 2003; Smit et al., 1990); whereas, a significant effect was found in other studies (Templin, 1957; To, Cheung, & McLeod, 2013b) where children from higher socioeconomic backgrounds or who had mothers with higher level of education acquired speech earlier. In addition, little to no effect of socioeconomic backgrounds on children’s speech development was reported in a community sample of 7,390 children in the Wren, Roulstone, and Miller (2012)’s study. Socioeconomic backgrounds were also reported as a factor influencing the speech and language outcomes for children with early speech and language delays (Roulstone, Peters, Glogowska, & Enderby, 2003).

**Studies of speech acquisition of Vietnamese-speaking children.**

To date, there have been five studies that have documented Vietnamese-speaking children’s speech. Three studies of Vietnamese children’s speech acquisition have been undertaken in Viet Nam and are published in Vietnamese (Lưu, 1996; Nguyễn, 2011; Nguyễn & Phạm, 2014). Additionally, one study documented 182 Vietnamese children’s intelligibility (Phạm, McLeod, & Harrison, 2017), and a further study has considered four Vietnamese children with speech sound disorder (Tang & Barlow, 2006).

Regarding the three Vietnamese studies of speech acquisition, Lưu (1996) studied 62 children aged 2;0 to 6;0 in Northern Viet Nam (Ha Noi) as part of a larger
study about language acquisition. The children’s speech sounds were examined from connected speech that was recorded during natural observation so a complete speech repertoire was not examined. Mixing a longitudinal diary study and cross-sectional study design, Lưu listed the consonants, semivowels, vowels, and tones that “appeared” (n.p.) in children’s speech at each age range from two to six years old. By 3;0 the following had “appeared”: syllable-initial consonants /p, b, t, d, c, m, f, s, z, x/, all syllable final consonants, and all six tones. Nguyễn (2011) examined Vietnamese children’s syllable production within a cross-sectional study of 303 children aged 2;6-6;3 in Southern Viet Nam (Ho Chi Minh City). The study also included five participants with speech sound disorders (including two who had a repaired cleft palate). The study used a single word picture naming task to elicit 284 words. The results did not include findings for all of the assessed Vietnamese consonants, semivowels, vowels/diphthongs and tones at each age range. From the results, it could be determined that by 3;0 the following were produced correctly at least 90% of the time: syllable-initial consonants /b, c, m/, syllable-final consonants /p, m/, the within word-semivowel /w/, and tone 1. Nguyễn and Phạm (2014) studied 635 typically-developing children aged 2;0-4;0 in Southern Viet Nam (Ho Chi Minh City) and examined errors in children’s speech production. The assessment tool was a 50-item word list. The percentages of speech errors at each age group were used to determine error frequency. The following were produced incorrectly less than 10% of the time (cf. correct at least 90% of the time) by 3;0: syllable-initial consonants /b, d, m, n, ɲ, s, h/, syllable-final consonants /p, t, k, m, n, η/, the syllable-final semivowel /w/, and tones 1, 2, 4, 5, and 6. The following syllable-initial consonants were produced incorrectly more than 10% of the time (cf. correct less than 90% of the time) by 3;0: /t, tʰ, tʃ, c, k, η, f, v, ş, z, ʐ, x, ɣ, l/. These
three studies did not report reliability, acquisition criteria, age of acquisition for all Vietnamese phonemes, typical non-adult realizations, or phonological patterns.

To date, there has not been a comprehensive study of children’s acquisition of all Vietnamese consonants, semivowels, vowels/diphthongs, and tones. To align with other international studies, what is required is a study of the percentage of correct productions, age of acquisition, typical non-adult realizations, and phonological patterns for typically-developing Vietnamese children. Indeed Hwa-Froelich et al. (2002), who studied the speech of three Vietnamese adults in the US, indicated “there is a great need for research, including studying a larger sample of speakers with the different regional dialects and obtaining developmental informational (sic) about typical phonological acquisition in Vietnamese children” (p. 272).

**Aims**

The aim of this research was to describe the speech of young children in Northern Viet Nam. Five research questions were examined.

1. What is the percentage of correct Vietnamese consonants, semivowels, vowels/diphthongs, tones, and whole words from 2;0 years to 5;11 years?
2. What are the unique effects of age, sex, and socio-economic status on the percentage of correct Vietnamese consonants, vowels/diphthongs, and tones?
3. What is the age of acquisition of individual Vietnamese consonants, semivowels, and tones?
4. What are the typical non-adult realizations of Vietnamese consonants, semivowels, and tones?
5. What are typical phonological patterns for typically-developing Vietnamese children?

It was hypothesized that (1) the percentage of correct consonants, semivowels, vowels/diphthongs, tones, and whole words would be higher for the older participants in
the study, (2) there would be differences between groups of participants based on age, sex and socio-economic status on speech accuracy scores, (3) age of acquisition would be influenced by manner and place of production, (4) there would be patterns of non-adult realizations based on individual phonemes, and (5) participants’ phonological patterns would have similarities with other tone languages such as Cantonese. To et al. (2013) reported that common phonological patterns (>10%) produced by Cantonese-speaking children were nasalization of /l/, stopping, fronting, deaspiration, delabialization, and affrication of /s/ (To, et al., 2013).

Method

Ethical Approval

The Charles Sturt University Human Research Ethics Committee granted ethical approval (number 2015/285) to undertake this study. Additionally, consent was obtained from principals of each preschool and the participants’ parents. The child participants provided assent to participate.

Participants

Participants were 195 Vietnamese-speaking preschool children living in Ha Noi (n = 67) and Hai Phong (n = 128), Viet Nam (see Table 2). All of the participants were identified by their parents and teachers as typically-developing, with no concerns about speech, language, hearing, or development. The number of males (n = 94, 48.2%) and females (n = 101, 51.8%) was approximately equal. The ages\(^1\) of the participants ranged from 2;2 to 5;11 (26 to 71 months, \(M = 52.19\) months, \(SD = 12.76\)). The children’s ages

\(^1\) The age of the participants in the current study was calculated using the Western calendar age. That is, it was calculated as the number of months between the date of the speech assessment and the date of birth according to the Western calendar. This calculation is known in Vietnamese as \(\text{tuổi Tây}\) (Western calendar age) and is different from the calculation of \(\text{tuổi Ta}\) (Vietnamese age). Calculation of Vietnamese age includes time in the mother’s womb called \(\text{tuổi Mụ}\) (age including pre-birth). Additionally, the Vietnamese age is calculated by the lunar year represented by 12 Vietnamese zodiac animals/signs with the belief that those who were born in the same zodiac animal year have the same attribute; therefore, those who were born in lunar May in the year of the dragon have the same age as those who were born in lunar December in the year of the dragon and they all are credited with one more year of age after the first day of the lunar new year (typically in February). Therefore if Vietnamese age is used, children may be described as one to two years older than their Western calendar age.
were formed into intervals of 6 months creating eight age groups: 2;0-2;5, 2;6-2;11, 3;0-3;5, 3;6-3;11, 4;0-4;5, 4;6-4;11, 5;0-5;5, and 5;6-5;11 (Table 2).

All participants were reported to speak and listen to Northern Vietnamese at home. The ethnicity of all of the participants was described as belonging to the Kinh group. The majority of participants’ fathers\(^2\) were born in Hai Phong (\(n = 125, 64.1\%\)) and Ha Noi (\(n = 41, 21.0\%\)) and a few participants’ fathers were born in another city in Northern Viet Nam (\(n = 13, 6.67\%\)), in Central Viet Nam (\(n = 4, 2.1\%\)) or Southern Viet Nam (\(n = 8, 4.1\%\)) (missing data \(n = 2\)). Very few participants had lived outside of Northern Viet Nam for more than one year (2 participants, 12 mothers, 16 fathers).

Socioeconomic status was measured in two ways: parents’ education level and parents’ occupation level (Inglebret et al., 2017). The participants’ mothers’ highest education level was a postgraduate degree (\(n = 22, 11.3\%\)), bachelor’s degree (\(n = 60, 30.8\%\)), certificate (\(n = 20, 10.3\%\)), senior high school (\(n = 61, 31.3\%\)), or junior high school (\(n = 32, 16.4\%\)). The participants’ fathers’ highest education level was a postgraduate degree (\(n = 17, 8.7\%\)), bachelor’s degree (\(n = 65, 33.3\%\)), certificate (\(n = 26, 13.3\%\)), senior high school (\(n = 62, 31.8\%\)), junior high school (\(n = 22, 11.3\%\)), or primary school (\(n = 1, 0.5\%\)). Two participants had missing data because their fathers had died. The International Labour Office International Standard Classification of Occupations (ILO, ISCO-08, International Labour Office, 2012) was used to code parents’ occupation level from skill level 1 (i.e., “performance of simple and routine physical or manual tasks”, p. 12) to skill level 4 (i.e., “performance of tasks that require complex problem-solving, decision-making and creativity based on an extensive body of theoretical and factual knowledge in a specialized field”, p. 13). Most participants’

\(^2\) Place of birth (nơi sinh or quê quán in Vietnamese), typically is interpreted to mean the father’s city of birth, not the child’s city of birth.
parents’ occupations were easily classified based on the guidelines from the ILO, but some were not. For example, parents whose occupation status was stated as “self-employed” (tự do) \( (n = 7 \text{ for mother}; \ n = 13 \text{ for father}) \) were classified as skill level 1; “business” (kinh doanh or kinh doanh tự do) \( (n = 8 \text{ for mother}; \ n = 11 \text{ for father}) \) were classified as skill level 2; and “teacher” (giáo viên) \( (n = 34 \text{ for mother}; \ n = 6 \text{ for father}) \) were classified as skill level 4. The mothers’ skill level \( (n = 195) \) ranged from 1-4 with a mean of 2.26 \( (SD = 0.97) \). The fathers’ skill level ranged from 1-4 with a mean of 2.24 \( (SD = 0.97) \). This question was missed for one mother and one father. Occupation information was not applicable for two fathers because they had died.

**Instruments**

**Hearing.**

Children’s hearing levels in both ears were measured using a Maico MA1 Ultra-Portable Screening Audiometer and a DD-46 headset fitted with Peltor Audiocups for increased attenuation of background noise.

**Oromotor skills.**

Children’s oromotor skills were assessed using the screening oromotor assessment (OMA) that was adapted for Vietnamese from the 80-item scale from Robbins and Klee (1987). The OMA used in the current study had a total of 26 items including 24 items measuring oral structure and two items measuring oral function. The 24 structure items examined the status of the lips, mandible, maxilla, teeth, tongue, velopharynx, and larynx. Each item was assessed at rest providing a score of 1 point if normal or 0 if not, thus the total structural score was out of 24. Two functional items examined the ability to perform co-ordinated speech movements by repeating /p/ and /t/ in 3 seconds. The scoring included: 2 points if the child produced at least 10 repetitions for each sound (adult-like function), 1 point if the child produced at least one repetition
(emerging function), and 0 if the child was unable to perform the task (absent function); therefore, the total functional score was out of 4.

**Speech sample.**

The instrument used to assess participants’ speech was the Vietnamese Speech Assessment (VSA, Phạm, Le, & McLeod, 2016). The VSA is a single-word picture-naming task that includes a total of 77 single words (75 monosyllable and two bisyllable words). The VSA word list represents all possible Vietnamese consonants, semivowels, vowels and tones. The VSA enabled elicitation of 79 productions of the 20 initial consonants. Each initial consonant was sampled within different syllabic constraints so that each consonant was followed by a front vowel and a back vowel. In most cases, three stimulus items were chosen for each initial consonant, except for the consonant /p/ which had two stimuli because of difficulty in finding familiar words for children. For the 10 final consonants, three to seven stimulus items were selected for each, resulting in a total of 42 productions. For the long vowels and diphthongs, three to eight stimulus items were selected for each, resulting in a total of 41 stimuli for the nine long vowels, and nine for the three diphthongs. For the short vowels and variants, four and five stimuli were chosen for /̄ă, ɤ̆/ respectively, and two stimuli were chosen for each of the six short vowel variants /̄ĭ, ȷ, ĝ, ū, ş, õ/. The two semivowels appeared in both within and final syllable positions and were elicited through five and six stimuli so this yielded a total of 16 productions for the semivowels. For the six tones, each was sampled through five to 26 stimuli resulting in 79 productions. The stimuli for the VSA were illustrated by colorful drawings and collated in a book following the order of the International Phonetic Alphabet for the initial consonant. The VSA was validated for the test content and representativeness and relevance of the test items and a pilot test was undertaken to estimate testing duration and to examine the relevance of the word list and scoresheet (Phạm, McLeod, & Le, 2016).
Procedure

Recruitment of participants.

Participants were recruited from four trường mầm non (‘young sprout schools’ cf. preschools) in two cities in Northern Viet Nam: two preschools in the capital city Ha Noi and two preschools in Hai Phong, the third largest city in Viet Nam after Ho Chi Minh City. The preschools were located in suburbs of Ha Noi (where the residents had migrated from different regions of Northern Viet Nam) and the countryside of Hai Phong (where the residents were mostly farmers). Therefore, the preschools included children from a range of socio-economic status groups (cf. Dodd et al., 2003; McCauley & Swisher, 1984).

Only typically-developing children were invited to participate in this study in order to increase the specificity of results (the subsequent ability to illuminate more accurately children with typical speech versus speech sound disorders) (McCauley & Swisher, 1984; Peña, Spaulding, & Plante, 2006). Teachers distributed an information letter, consent form, and parent questionnaire to parents of children for whom teachers had no concern about these children’s speech and language. Potential participants were identified by their parents and teachers if they (1) spoke Northern Vietnamese as their first language/ dialect; (2) did not have a disability that could affect their speech production (e.g., a cleft lip or palate, cerebral palsy, a history of ongoing hearing loss, hearing aids, or cochlear implant); and (3) had no concerns about speech, language, or other aspects of communication based on the Parents’ Evaluation of Developmental Status (Glascoe, 2013). Additionally, although children spoke Northern Vietnamese as their first language, they were excluded if (1) they were from an ethnic minority group (e.g., Tay, Muong,) or (2) their mother’s or father’s nationality was from another country.

A total of 981 children’s parents returned the completed questionnaire and all
the children spoken Northern Vietnamese. Children \((n = 367)\) did not meet inclusion criteria for direct assessment because their parents had a little concern \((n = 183)\) or concern \((n = 183)\) about their speech and language. One had missing data \((n = 1)\).

Children \((n = 614)\) who had no parental concern about their speech and language were eligible for the direct assessment; however, 395 children \((64.3\%)\) did not undertake the direct assessment. The reasons were: parents did not provide consent \((n = 53)\), children did not provide assent \((n = 14)\), children were absent \((n = 18)\), children were from a minority ethnic group \((n = 4)\), children were younger than 2;0 \((n = 20)\), and the fieldwork trip ended, so were not assessed \((n = 286)\) (see Figure 2 for the recruitment flow diagram and reasons for exclusion). Therefore, direct assessments were conducted for 219 children \((35.7\%)\).

Insert Figure 2 here

**Direct assessment.**

The direct assessments were conducted in a designated room in the participants’ preschools by the first author, a native Northern Vietnamese speaker with specialist training in transcription using the International Phonetic Alphabet and special education.

**Hearing assessment.**

The hearing screening was conducted first for the participants \((n = 219)\). The purpose of hearing screening within the current study was to ensure that participants did not have any hearing difficulties. Participants’ hearing was screened at 500, 1000, 2000, and 4000 Hz. The stimulus was continuous and the rise/fall time was 35 msec. Testing was conducted in preschool settings with significant ambient noise. Ambient room noise levels were recorded using the Decibel 10 measurement app and frequently were above 50dB. Therefore, the test was conducted at a threshold of 40dB in line with recommendations across organizations and studies (American Academy of Audiology,
2011; McLeod, Baker, McCormack, Wren, & Roulstone, 2013-2015; Williams, 2010; World Health Organization, 2015). Each frequency tone was tested at least twice but less than four times. Test results were recorded in three categories including pass, refer, and incomplete as per the American Academy of Audiology’s Guidelines (American Academy of Audiology, 2011; American Speech-Language-Hearing Association, 2016). A pass required two positive responses to all frequencies (500, 1000, 2000, 4000Hz) in both ears. When participants did not meet the pass criteria, a second opportunity for testing was given on the same day. When participants did not pass the test the second time, they were advised to follow-up with a qualified audiologist. Incomplete status indicated that the required number of responses could not be obtained due to participants’ inability to perform the task or lack of cooperation. After the hearing screening, 11 participants concluded their participation because they did not complete \( n = 2, 0.9\% \) or did not pass the hearing screening \( n = 9, 4.1\% \).

**Oromotor assessment.**

The OMA was conducted for the participants \( n = 208 \) who passed the hearing test using the 26-item OMA adapted from Robbins and Klee (1987). The purpose of OMA was to ensure that participants did not have any oromotor difficulties impacting their speech production (e.g., dysarthria). Due to lack of normative data on oromotor skills of Vietnamese-speaking children, eligibility criteria for OMA skills was set up in the current study by the researchers interpreting the Robbins and Klee (1987) study for the Vietnamese context. Eligibility for participation in the speech assessment required that children’s scores were at least 21 for the total structural score and at least 2 for the total functional score. For participants achieving a total structural score of 21 to 23, they were only eligible to participate in the speech assessment if the three items scoring 0 included tooth decay, teeth missing, and tonsils present. Twelve participants were
excluded from the study because they did not complete \( n = 1, 0.5\% \) or did not pass \( n = 11, 5.0\% \) the OMA.

**Speech assessment.**

Participants \( n = 196 \) who passed the OMA continued on speech assessment using the VSA. One participant withdrew assent during the VSA; therefore, there were 195 participants \( (89.0\%) \) who completed the VSA. The VSA was administered by following a four-step prompt hierarchy: (1) open-ended question, (2) gap fill or content related prompt, (3) binary choice, and (4) delayed imitation (Phạm, McLeod, & Le, 2016). For example, for the target word nón (cone hat) four prompts given are: (1) *Đây là cái …* (This is a [inanimacy]…), (2) *Cái này dùng để đội đầu* (This can be worn on our head), (3) *Nón hay giấy* (Cone hat or shoes), and (4) *Nón, con nhắc lại nào* (Cone hat, please repeat). Other examples of the prompt hierarchy and explanations of how to administer the prompt hierarchy were described in Paper 3 (Chapter 6). The prompt or cueing level used for each response was recorded for the 195 participants’ responses to the 77 words \( (N = 15,015) \): (1) open-ended question \( (n = 6,848, 45.6\%) \), (2) gap fill or content related prompt \( (n = 725, 4.8\%) \), (3) binary choice \( (n = 1,598, 10.6\%) \), and (4) delayed imitation \( (n = 5,943, 38.9\%) \), with delayed imitation being used predominantly by the youngest children. The lower number of spontaneous responses may also be impacted by the Vietnamese children’s reticence to speak due to respect for the adult authority. The participant’s response at the first attempt of each word was transcribed online with broad transcription using the International Phonetic Alphabet symbols and diacritics relevant to the Vietnamese context. If a certain production was not clear, participants were encouraged to repeat their production. Participants’ responses on the VSA were audio and video recorded using a Zoom H1 audio recorder and a Sony HDR-PJ790VE video camera, respectively. The audio recordings, saved in .wav format, were used to re-transcribe the VSA for all participants within six months after the assessment.
The video recordings were used to check when there was a discrepancy between online and audio transcriptions. The final transcriptions, after checking using the audio and video recordings, were used in the analysis.

Reliability

Intra- and inter-judge point-to-point reliability was conducted separately for consonants, semivowels, vowels, and tones of the VSA. Intra-judge reliability was completed by the first author by comparing the online transcription and re-transcription undertaken 6 months later. Intra-judge agreement was 95.1% based on a total of 12,168 data items from 20 randomly selected participants (10.3% of the sample). Inter-judge reliability was completed by the first author and a Vietnamese speech-language pathologist by independently transcribing online then independently checking the transcription afterwards via audio recording. Inter-judge agreement was 96.1% based on a total of 6,362 data items from 11 randomly selected participants (5.6% of the sample). Both intra- and inter-judge agreement reached an acceptable level of above 85% for reliability of phonetic transcription (Shriberg & Lof, 1991).

Data Analysis

Analysis of the participants’ responses on the VSA was undertaken using Phon version 3.0.1 (Hedlund & Rose, 2018), a free phonological analysis software available from Phon.ca (Rose & Stoel-Gammon, 2015). Transcriptions of consonants, semivowels, vowels/diphthongs, and tones were reviewed by the first author. A phoneme was considered to be correct if the child produced an adult-like production or produced an acceptable dialectal variant (Table 1). The number of correct syllable-initial consonants, syllable-final consonants, semivowels, vowels, tones, and whole word for each participant were calculated to identify percentage of consonants correct (PCC), percentage of syllable-initial consonants (onset) correct (PICC), percentage of syllable-final consonants (coda) correct (PFCC), percentage of semivowels correct
(PSVC), percentage of vowels correct (PVC), percentage of tones correct (PTC), and percentage of whole word correct (PWWC). Calculation of PCC was based on combining children’s productions of syllable-initial consonants (onset), syllable-final consonants (coda), and semivowels. These data for each participant were transferred to the Statistical Package for Social Sciences version 25.0 computer program (SPSS) (IBM, 2017) for analysis of descriptive statistics and frequency distributions.

Three sets of hierarchical regression analyses were conducted to examine the predictive value of age (in months) and sex on children’s accuracy scores of consonants, vowels, and tones, while controlling for the effect of family socioeconomic status. A proxy of family socioeconomic status was created by using maternal education, as indicated in the literature as the most important indicator of family socioeconomic status (e.g., Campbell et al., 2003; To et al., 2013b). A dummy coded maternal education variable was created before being entered into the regression models, with junior high school education or below as the reference category. Adjusted $R^2$ values were used to examine the total variance in the outcome variables explained by the predictors.

Age of acquisition for each phoneme was recorded when each phoneme was produced correctly 75% and 90% across all children and all opportunities. A phoneme was considered to be acquired when the phoneme was produced correctly at least 90% of the time across all children and all opportunities. These criteria have been used in speech acquisition studies across the world (e.g., Dodd et al., 2003; MacLeod, Sutton, Trudeau, & Thordardottir, 2011; Smit et al., 1990; So & Dodd, 1995; To et al., 2013a).

Non-adult productions and phonological patterns were analyzed from participants’ speech productions. Non-adult productions included any phoneme substitution, deletion, distortion, or addition and were scored as incorrect. Non-adult realizations for each target phoneme were calculated by the percentage of occurrence of
the non-adult realizations over the total opportunities in two age groups (2;0-3;11 and 4;0-5;11). Dialectal variants were counted as correct productions so were excluded from the calculations. Non-adult realizations that occurred more than 10% of the time were listed.

Phonological patterns that occurred more than 10% were summarized for initial and final consonants and semivowels in two age groups (2;0-3;11 and 4;0-5;11). Substitution and syllable structure patterns identified in previous studies of Vietnamese speech production (Tang & Barlow, 2006), Cantonese speech production (To et al., 2013a), and studies of other languages (McLeod, 2007; McLeod & Baker, 2017) were included in the current study. Each phonological pattern was calculated by determining the occurrence of non-adult productions and the number of opportunities to produce relevant consonants and semivowels. Common dialectal productions were not included in the description of phonological patterns.

Results

Percentage of Consonants, Semivowels, Vowels/Diphthongs, and Tones Correct

Measures of speech accuracy were calculated for children in each of the eight age groups. PCC was calculated by combining children’s productions of consonants (onsets, codas, and semivowels) that aligned with Vietnamese Standard and acceptable dialectal variants for Northern Vietnamese speakers (Table 1, Pham & McLeod, 2016). Results for accuracy of consonants, vowels, tones and whole words are presented for male and female children in each age group in Table 3, for onsets, codas, and semivowels in Table 4, and a summary is provided in Figure 3.

There was a large increase in accuracy of consonants from 2;0-2;5 years ($M = 46.39, SD = 7.95$) to 3;0-3;5 years ($M = 79.75, SD = 9.30$), and accuracy continued to
increase so that by 5;6-5;11 years children had a mean PCC of 93.13 ($SD = 6.13$). There was a large amount of variability in the accuracy of consonants for children younger than 4 years old as demonstrated by standard deviations ranging from 6.5 to 17.1 (Table 3). For syllable-initial and syllable-final consonants, approximately 90% of correct productions had been achieved by the 5;0-5;5 age group (Table 4).

There was a large increase in the accuracy of semivowels from 2;0-2;5 years ($M = 70.74, SD = 14.38$) to 3;0-3;5 years ($M = 90.82, SD = 9.90$), and accuracy continued to increase so that by 5;6-5;11 years old children had a mean PSVC of 99.60 ($SD = 1.55$). On average, children acquired semivowels earlier than syllable-final consonants that were acquired earlier than syllable-initial consonants. For semivowels, approximately 90% of correct productions had been achieved by the 3;0-3;5 age group (Table 4).

The participants’ accuracy of vowels increased from 2;0-2;5 years ($M = 91.93, SD = 3.13$) to 5;5-5;11 years ($M = 99.11, SD = 2.79$). On average, children acquired vowels/diphthongs earlier than consonants and semivowels. Approximately 90% of correct productions of vowels/diphthongs had been achieved by the 2;0-2;5 age group (Table 3).

The participants’ accuracy of tones increased from 2;0-2;5 years ($M = 91.05, SD = 1.42$) to 5;5-5;11 years ($M = 96.65, SD = 3.42$). Similar to vowels/diphthongs, children acquired tones earlier than consonants and semivowels. The average number of tones producing correctly was more than 90% from 2 years of age (Table 3).

There was a large increase in the accuracy of whole words from 2;0-2;5 years ($M = 16.58, SD = 7.38$) to 4;0-4;5 years ($M = 68.47, SD = 12.08$), and accuracy for whole word continued to increase so that by 5;6-5;11 years children had a mean PWWC of 85.16 ($SD = 12.89$) (Table 3).
**Effect of Age, Sex, and Maternal Education**

Hierarchical regression analyses were conducted to consider the effect of age, sex and maternal education on speech accuracy. Interaction terms between child sex and age were tested but there were no significant interactions for PCC, PVC and PTC scores. Therefore, they were not included in the final regression models for parsimony. Results from regression analyses showed that children’s age positively predicted their PCC (beta = .80, \( p < .001 \)), PVC (beta = .54, \( p < .001 \)), and PTC (beta = .48, \( p < .001 \)) scores, indicating that the older children are, the higher scores they achieved on PCC, PVC, and PTC. However, there were no significant differences between boys and girls in their PCC (beta =-.01, \( p = .76 \)), PVC (beta =.01, \( p = .89 \)), and PTC scores (beta =.05, \( p = .43 \)). Maternal education, a proxy for family socioeconomic status (e.g., Campbell et al., 2003; To et al., 2013b), was significantly related to PCC and PVC, but not PTC. Children whose mothers had post-graduate degrees or bachelor’s degrees had higher PCC and PVC scores compared to those whose mothers had junior high school education or below. The regression models explained 69.5%, 39.8%, and 21% of the variance in PCC, PVC and PTC, respectively (Table 5).

Insert Table 5 here

**Age of Acquisition of Consonants, Semivowels, and Tones**

**Age of acquisition of Vietnamese consonants.**

Table 6 summarizes the percentage of tokens for each of the syllable initial and syllable final consonants, and within syllable and syllable final semivowels that were correct at each age group. Figure 4 shows the age of acquisition for each Vietnamese consonant in the syllable-initial and syllable-final positions.

Insert Table 6 here

Insert Figure 4 here
**Syllable-initial consonants.** Using the Standard Vietnamese pronunciation plus the Northern dialectal variants as the definition of correct, children produced more syllable-initial consonants correctly in the older age groups (see Tables 6 and 7). The only consonant that children in the youngest age group (2;0-2;5) could produce at least 75% of the time was /b/; whereas, the 5;6-5;11 age group produced most consonants correctly 75% of the time: /p, b, tʰ, t, d, ṭ, c, k, ?, m, n, ɲ, ŋ, f, v, ɹ, ɣ, h, l/ (see Table 7). Indeed, most syllable-initial consonants were acquired with >90% accuracy by the oldest age group (5;6-5;11) /p, b, tʰ, t, d, ṭ, c, k, ?, m, n, ɲ, ŋ, v, ɹ, ɣ, h, l/. However, the following consonants were not produced correctly 90% of the time by the oldest age group: /ɲ, s, z, ʂ, ŋ/.

Insert Table 7 here

**Syllable-final consonants.** Using the Standard Vietnamese pronunciation plus the Northern dialectal variants as the definition of correct, children in the youngest age group (2;0-2;5) produced /t, m, n/ at least 75% of the time; whereas, children in the 5;0-5;5 and 5;6-5;11 age groups produced all syllable-final consonants /p, t, c, k, kʰ, m, n, ɲ, ŋ, ɲ⁵⁰/ at least 75% of the time (see Tables 6 and 7). Most syllable-final consonants were acquired with >90% accuracy by the oldest age group (5;6-5;11) /p, t, kʰ, m, n, ɲ⁵⁰/. However, the following syllable-final consonants were not produced correctly 90% of the time by the oldest age group: /c, k, ɲ, ɲ/.

**Age of acquisition of Vietnamese semivowels.**

Children in the 3;0-3;5 age group produced the within-syllable semivowel /w/ correctly at least 75% of the time and from 4;0-4;5 produced the within-syllable semivowel /w/ correctly at least 90% of the time. Children from the youngest to the oldest age groups produced both syllable-final semivowels correctly at least 90% of the time: /w, ɹ/ (Table 6).
**Age of acquisition of Vietnamese tones.**

Table 8 shows the age of acquisition for each Vietnamese tone. Tones 1, 2, 5, and 6 were acquired by the earliest age group (2;0-2;5) and were produced with nearly 100 per cent accuracy. Tone 4 was produced correctly between 72.7 and 86.6 per cent across the age groups. Tone 3 was the most difficult to produce with few children producing it correctly until 3;6-3;11. The 5;6-5;11 age group produced tone 3 correctly 86.6 per cent of the time. To summarize, all tones were produced correctly at least 75% of the time by the oldest age groups (5;0-5;5 and 5;6-5;11).

Insert Table 8 here

**Non-Adult Realizations of Vietnamese Consonants, Semivowels, and Tones**

**Non-adult realizations of syllable-initial Vietnamese consonants.**

Table 9 indicates the realizations of syllable-initial consonants by typically-developing Northern Vietnamese-speaking children. Overall, there were common non-adult realisations for groups of syllable-initial consonants; specifically [tʰ] was commonly used for target plosives, [n] was commonly used for target nasals, and [s], [z̪], [tʰ], and [h] were commonly used for target fricatives. Specific non-adult realizations are outlined below.

Insert Table 9 here

**Plosives.** Overall, three syllable-initial plosives, /b, k, ʔ/ were produced correctly at least 90% of the time. Three syllable-initial plosives were frequently produced as dialectal variants: /p/ was frequently produced as the dialectal variant /b/, /tɭ/ was frequently produced as the dialectal variants /c/ and /ts/, and /c/ was frequently produced as the dialectal variant /ts/. For the remaining syllable-initial plosives /tʰ, t, d, tɭ, c/ the most common non-adult realization was [tʰ].

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**Nasals.** Overall, the syllable-initial nasal /m/ was produced correctly at least 90% of the time. The syllable-initial nasal /n/ was frequently produced as the dialectal variant /l/. For the remaining syllable-initial nasals /ɲ, ŋ/ the most common non-adult realization was [n].

**Fricatives.** Overall, one syllable-initial fricative, /v/ was produced correctly at least 90% of the time. Two syllable-initial fricatives were frequently produced as a dialectal variant: /ʂ/ was frequently produced as the dialectal variant /s/, and /ʐ/ was frequently produced as the dialectal variants /z/ and /r/ (these are typical for Northern Viet Nam, but not Southern Viet Nam). For the remaining syllable-initial fricatives the most common non-adult realization of /f/ was [b], /s/ was [ʂ] and [tʰ], /z/ was [z] and [tʰ], /x/ was [h], /ɣ/ was [k] and [tʰ], and /h/ was omitted.

**Lateral approximant.** The syllable-initial lateral approximant /l/ was frequently produced as the dialectal variant /n/.

**Non-adult realizations of syllable-final Vietnamese consonants.**

Table 10 indicates the realizations of syllable-final consonants by typically-developing Northern Vietnamese-speaking children.

Insert Table 10 here

**Plosives.** The syllable-final plosive /kʰ/ was produced correctly at least 90% of the time. The most common non-adult realization of syllable-final /p/ was [t], /t/ was [k], /ʧ/ was [t], and /k/ was [p] and [t].

**Nasals.** The syllable-final nasals /m, m/ were produced correctly at least 90% of the time. The most common non-adult realization of syllable-final /n, n/ was [n], and /n/ was [ŋ].
Non-adult realizations of Vietnamese semivowels.

Table 10 also indicates the realizations of semivowels by typically-developing Northern Vietnamese-speaking children. The syllable-final semivowels, /w, j/ were produced correctly at least 90% of the time. The most common non-adult realization of the within syllable semivowel /w/ was to omit it.

Non-adult realizations of Vietnamese tones.

Table 11 indicates the realizations of tones by typically-developing Northern Vietnamese-speaking children. Tone 2 was always correct, so there were no non-adult realizations. Most of the non-adult realizations for tones 1, 5 and 6 were rare (<5% occurrence). When tone 1 was incorrect, it was produced as tone 2 or tone 6. When tone 5 was incorrect, it was produced as tone 1 and tone 3. When tone 6 was incorrect, it was produced as tones 1, 2, and 5. When tone 4 was incorrect, it was occasionally produced as tones 6, 5, and 3; and was rarely produced as tones 2 and 1. Tone 3 was the most difficult tone for these Northern Vietnamese children; it was commonly produced as tone 5 (41.6% of the time) and was rarely produced as tones 1, 4, and 6.

Typical Phonological Patterns

Substitution patterns that were analyzed in the current study were: fronting (palatal and velar plosives), backing (alveolar plosives), stopping of fricatives, gliding of fricatives and nasals, denasalization, nasalization, aspiration, deaspiration, and glottal replacement. Syllable structure patterns that were analyzed in the current study were: initial consonant deletion, final consonant deletion, and semivowel deletion (see Table 12). The most commonly occurring phonological patterns (>10%) used by the younger children (aged 2;0 to 3;11) were: fronting of palatal and velar plosives (36.5%), stopping of fricatives (24.2%), deaspiration (19.0%), aspiration (12.3%), and semivowel deletion (14.4%). The most commonly occurring phonological patterns (>10%) used by
the older children aged 4;0 to 5;11 were: fronting of palatal and velar plosives (13.3%) and deaspiration (11.5%). The most commonly occurring phonological patterns (>10%) used by the whole sample were: fronting of palatal and velar plosives (21.0%) and deaspiration (14.0%).

Insert Table 12 here

**Discussion**

Four main findings about acquisition of consonants, semivowels, vowels/diphthongs and tones of Northern Vietnamese-speaking children emerged from the current study. First, the accuracy scores of consonants, semivowels, vowels, and tones for Northern Vietnamese-speaking children were higher as age increased demonstrating the development of the phonological system in Vietnamese. Second, by the age of 5;5-5;11, these Northern Vietnamese-speaking children had acquired all Vietnamese consonants, semivowels, vowels, and tones, with the exceptions of the initial-syllable consonants /ɲ, s, z, x/, the within syllable semivowel /w/, tone 3 (creaky thanh ngã), and tone 4 (dipping-rising thanh hỏi). Third, the typical non-adult realizations of Northern Vietnamese consonants, semivowels, and tones could be identified and variability of non-adult productions decreased in the older age groups. Fourth, common phonological patterns (>10%) were fronting, stopping, deaspiration, aspiration, and semivowel deletion for younger children, and were fronting and deaspiration for older children. In general, Northern Vietnamese-speaking children acquired vowels/diphthongs and tones earlier than semivowels, syllable-final consonants and syllable-initial consonants. Findings from the current comprehensive study add to previous studies of Vietnamese speech acquisition.

**Percentage of Consonants, Semivowels, Vowels/Diphthongs, and Tones Correct**

Measures of the accuracy of consonants, semivowels, vowels, and tones calculated in the current study demonstrated the improvement of speech production.
accuracy with age. These measures were not reported in previous Vietnamese studies but have been reported in Cantonese. Comparison of these results to those in a Cantonese study reporting accuracy of consonants, vowels, and tones (To et al., 2013a) shows a similar trend. Older children obtained higher accuracy scores than the younger children. Accuracy in vowels/diphthongs and tones was higher than for semivowels, and consonants. From 2;0 years of age the average number of vowels/diphthongs and tones produced correctly was more than 90%. In the current study vowels/diphthongs were more accurate than tones, and consonants; whereas, in Cantonese tones were more accurate than vowels/diphthongs and consonants (Cheung, 1990; So & Dodd, 1995; To et al., 2013a). A possible reason is that Vietnamese tones are more complex than Cantonese tones is because two out of the six Vietnamese tones have two directions in the contour (tones 3 and 4) while all nine tones in Cantonese have simpler contours.

**Effect of age, sex, and maternal education.**

Significant age differences were found in the current study as children in older age groups had higher speech accuracy scores. This result contributed to conclusive previous evidence regarding the impact of age on children’s speech acquisition.

In the current study there were no sex differences for accuracy of consonants, vowels, and tones for the whole sample (n = 195). Previous Vietnamese studies did not report the impact of sex on speech accuracy. The current results were similar to those from two Cantonese studies that investigated the speech samples of 155 participants (Cheung, 1990) and 268 participants (So & Dodd, 1995). In contrast, a significant sex effect by which female participants showed high speech accuracy scores at an earlier age than their male counterparts was found in another Cantonese study with 1,726 participants (To et al., 2013a) and studies of English speech acquisition (e.g., Dodd et al., 2003; Smit et al., 1990).
Accuracy of consonants and vowels but not tones were significantly related to children’s maternal education, representing family socioeconomic status in the current study. Children whose mothers had post-graduate degrees or bachelor’s degrees had higher accuracy of consonants and vowels than those whose mothers had junior high school education or below. No account was made of the impact of socioeconomic status on children’s speech acquisition in previous Vietnamese studies so comparison between these was not made. This result was similar to those from a Cantonese study which showed that higher maternal education was significantly linked with better speech skills (To et al., 2013b).

Age of Acquisition of Consonants, Semivowels, and Tones

The age of acquisition for each Vietnamese consonant, semivowel and tone was established in the current study using the criterion of at least 90% correct. Among previous Vietnamese studies, Lưu (1996) did not report the criterion for acquired phonemes, and Nguyễn (2011) and Nguyễn and Phạm (2014) did not report the age of acquisition of all phonemes being assessed. However, there were similar overall findings between previous studies of Vietnamese speech acquisition and the current study: vowels/diphthongs, and tones were acquired earlier than semivowels and consonants. These findings were also similar to Cantonese as consonants were the latest to be acquired in comparison to tones and vowels/diphthongs (Cheung, 1990; So & Dodd, 1995; To et al., 2013a).

Syllable-initial consonants.

The syllable-initial consonant /m/ was the earliest to be acquired by age 2;11 in the current study and /m/ was among the earliest acquired sounds by age 2;11 in previous studies undertaken in Vietnamese (Nguyễn, 2011; Nguyễn & Phạm, 2014), Cantonese (Cheung, 1990; So & Dodd, 1995; To et al., 2013a) and English (Dodd et al., 2003; Smit et al., 1990). The syllable-initial consonant /b/ was acquired by age 3;5 in
the current study, but was acquired a year earlier in Nguyễn (2011). The syllable-initial consonants /k, ð, f, v, l/ were acquired by age 3;11 in the current study and a similar acquisition pattern was observed for /f, v, l/ in Nguyễn and Phạm (2014), except that /k/ was acquired at age 4;0-4;5, /ð/ was not assessed, and /ŋ/ was acquired after age 5;0. /ŋ, f, l/ were acquired at a slightly earlier age, but /k/ was acquired later (by age 5;0) in Cantonese studies (Cheung, 1990; So & Dodd, 1995; To et al., 2013a). The syllable-initial consonants /t, d, c, n, ŋ, h/ were acquired by age 4;11 in the current study and the acquisition of /t, d, c, n, h/ was inconsistent with findings in previous Vietnamese studies where /t/ was acquired late (after age 5;0), /d, c, h/ were acquired early (at age 2;11), /n/ was acquired very early (by age 2;6) (Nguyễn & Phạm, 2014), and /c/ was acquired very early (by age 2;6) (Nguyễn, 2011). The large discrepancy in development paths for these phonemes might be due to difference in research methods. For example, in the previous Vietnamese studies speech productions were scored using a binary correct/incorrect system based on orthography rather than transcription of whole words using the International Phonetic Alphabet symbols, audio or video recordings were not used for double checking of online scoring, and the criteria used to define age of acquisition were not reported. Additionally, the syllable-initial consonant /tʰ/ was acquired by age 5;11 in the current study and it developed at the same pace in Nguyễn (2011).

The most difficult syllable-initial consonants to be acquired in the current study were /ɲ, s, z, x/ as the oldest children did not produce these phonemes correctly using the 90% criterion. /s/ was also found to be among the most difficult phonemes in a number of Cantonese and English studies (Cheung, 1990; McLeod, 2013; So & Dodd, 1995; To et al., 2013a). However, Nguyễn and Phạm (2014) reported that /ɲ/ was
acquired earliest (by age 2;5), /s/ was acquired at age 2;11, and /z/ was acquired at age 4;5 and Nguyễn (2011) reported that /x/ was acquired at age 3;11. The slower rate of acquisition of these phonemes in the current study may be explained by stricter criteria in terms of consonant occurrence and stimulus complexity (Macrae, 2017) than those in previous Vietnamese studies as each consonant was required to be produced correctly in three stimuli with different syllable structures and vowel combinations.

The current study included the dialectal variants of /p, tɕ, c, n, ş, z, l/ in the calculation of accuracy scores. The consideration was relevant because if dialectal variants were excluded, these phonemes would not be acquired by age 5;11. Calculation of dialectal variants was not mentioned in previous Vietnamese studies but was considered in Cantonese studies.

**Syllable-final consonants.**

The consonant /m/ was the earliest acquired sound in both initial and final positions in the current study and this finding is similar to previous Vietnamese studies. The consonant /ɲ/ was recorded as the most difficult in both initial and final positions in the current study and the acquisition of this final consonant was not recorded in previous Vietnamese studies. The consonant /t/ was acquired by 4;6 both in initial and final positions. Surprisingly in the current study, while the syllable-final consonants /k, ŋ/ were the last to be acquired, the two double-articulation variants /kʰ, ñʰ/ were acquired early, by age 3;0. Nguyễn (2011) and Nguyễn and Phạm (2014) did not include these two final variants. A further study of acquisition of the two final double-articulation phonemes would be valuable to provide complementary data about the acquisition of the final double-articulation consonants in elicited and connected samples. Another interesting phenomenon in the current study was that the acquisition rate of final velars /k, ŋ/ was reversed compared to their initial counterparts because
they were both acquired early (by age 3;5) in initial position but had not been acquired by the oldest age group in the final position. In contrast, Nguyễn and Phạm (2014) found that these velars were not acquired by age 3;11 in initial position but were acquired early in the final position. In the current study, the final consonant /c/ was also the last to be acquired but it cannot be compared with the initial /c/ because the initial counterpart has dialectal variants. Similarly, acquisition of the finals /p, n/ cannot be compared with the initial counterparts because of dialectal variants.

**Semivowels.**

The within-syllable semivowel /w/ was acquired by age 4;5 in the current study; however, it is considered to be acquired late in Nguyễn and Phạm (2014) because children aged 4;5-4;11 only produced it correctly 67.3% of the time. The two final semivowels /w, j/ were acquired by the youngest age group in the current study; whereas, it took longer to be acquired in the previous Vietnamese studies.

**Tones.**

In the current study, the Northern Vietnamese tones 1, 2, 5, and 6 were acquired by the youngest age group; whereas, tones 3 and 4 were the most difficult as they were not acquired by age 5;11. This finding is not consistent with the previous analysis by Lưu (1996) that showed that all the Vietnamese tones were acquired by the age of three. However, this finding is supported by the other previous Vietnamese studies (Nguyễn, 2011; Nguyễn & Phạm, 2014). A possible explanation why Northern Vietnamese tones 3 and 4 took a longer time to be acquired than the other tones may be because tones 3 and 4 are known as complex (or contour) tones that have two directions in the contour and require the articulation of creaky and falling-rising features, respectively (Doàn, 2003; Hoàng, 1989) (see Figure 1). Another reason may be because tones 3 and 4 have a low frequency of occurrence in Vietnamese. As a result, the articulation difficulty and low functional load of tones 3 and 4 may explain their slower rate of acquisition.
compared to the other tones having simpler contours. It seems apparent from the current study that tones having simpler contours were acquired early and this finding is supported by a number of Cantonese studies since all nine Cantonese tones have simpler contours and are reported to be acquired early (Cheung, 1990; So & Dodd, 1995; To et al., 2013a).

Another note is that in the current study age of acquisition data contained reversals for the initial consonants /d, t, p, k/ and final consonants /c, m, n, ŋ, n̥/.

Reversals occurring in older age groups were also found in speech acquisition data for other languages such as English (Smit et al., 1990) and Cantonese (To et al., 2013). Reversals were also found in previous Vietnamese studies (Nguyễn, 2011; Nguyễn & Phạm, 2014).

**Typical Non-Adult Realizations of Vietnamese Consonants, Semivowels, and Tones**

The description of non-adult realizations for each Vietnamese consonant, semivowel and tone was presented in the current study by calculation of the occurrence rate in three categories: common (>10%), occasional (5-10%) and rare (<5%) for two age groups (2;0-3;11 and 4;0-5;11) (Tables 9, 10, 11). Non-adult realizations for Vietnamese phonemes were listed without the occurrence rate in previous Vietnamese studies; therefore, a direct comparison of non-adult realizations cannot be made. However, there is agreement that the within syllable semivowel has one typical non-adult realization. It was deleted 43.3% of the time by age 3;11 in Nguyễn and Phạm (2014) and 41.2% by ages 2;0 to 3;11 in the current study. Non-adult realizations for tones were varied for all six tones in the current study. All tones except for the tone 1 had only one non-adult token in Nguyễn and Phạm (2014). There is agreement that tone 3 was the most difficult tone among Vietnamese studies; however, in the current study its common non-adult realization was tone 5 and rare non-adult realizations were tones.
1, 4, and 6 whereas in Nguyễn and Phạm (2014), the only non-adult realization of tone 3 was tone 2.

**Typical Phonological Patterns for Typically-Developing Vietnamese Children**

The current study was an initial step towards describing typical phonological patterns for typically-developing Vietnamese-speaking children, so a comparison cannot be made to previous Vietnamese studies. Instead, similarities and differences in phonological patterns were explored by comparing the results of the current study to studies of Cantonese and other languages. Common phonological patterns in Vietnamese that were similar to those in Cantonese were: fronting, stopping, deaspiration, and aspiration in children ages 2;0-3;11 but Cantonese had additional phonological patterns. Fronting in Vietnamese was found to be the most commonly occurring pattern across the age groups of 2;0-5;11 in the current study but it was less common in the age groups of 2;6-3;0 in Cantonese (To et al., 2013a) and 2;0-3;6 in English (Smit, 1993). Deaspiration in the current study occurred across the age groups 2;0-5;11, while this pattern disappeared by 3;6 in Cantonese and was “occasional” by 5;0 and “rare” by 9;0 in English (Smit, 1993). These studies are in agreement that it takes time for aspiration to be acquired in Cantonese, English and Vietnamese. Also, it seems apparent from the analyses of phonological patterns in the current study that, backing was found to be an “occasional” phonological pattern for typically-developing children in Vietnamese and Cantonese; whereas, it is likely an atypical pattern in English (Dodd et al., 2003; To et al., 2013a).

**Theoretical Implications**

The current study shows that Vietnamese acquisition shared many similarities with acquisition of other languages (e.g., English, Cantonese). The results of the current study generally supported the emergence approach to speech acquisition (Davis & Bedore, 2013) that ascribes a strong interplay between the child-internal biological
capacities (e.g., child’s speech accuracy) and linguistic and cultural input from the external environment (e.g., the ambient phonology).

Clinical Implications

The field of speech-language pathology is emerging in Viet Nam thus it is important to develop contextually relevant resources that inform evidence-based and equitable practice, and “bring legitimacy to the profession and advance recognition” (Atherton, Davidson, & McAllister, 2017, p. 118). The preliminary findings presented in the current study may provide emerging evidence for professionals working with Vietnamese-speaking children in Viet Nam and other countries regarding typical acquisition to support identification and management of children with speech sound disorders. These data provide initial benchmarks for all Vietnamese phonemes mastery by 2-to 5-year-old Vietnamese-speaking children based on a culturally and linguistically appropriate speech test designed for the Vietnamese phonology, the Vietnamese Speech Assessment (VSA, Phạm, Le, et al., 2016). The VSA is undergoing standardization so it can subsequently be a clinical tool for professionals working with Vietnamese-speaking children.

Limitations

Although the current study provided valuable and reliable information about speech acquisition of Northern Vietnamese-speaking children, there are some limitations. First, the children’s developmental status was not obtained from direct assessment because there were no standardized screening tests to assess the development of preschool-aged children in Viet Nam. The status of typical development of children in the current study was based on concerns that parents and teachers reported on children’s speech, language, and development by using the Parents’ Evaluation of Developmental Status (Glascoe, 2013). The study used a cross-sectional design, and findings about change over time should be supplemented with longitudinal data. The
current study included participants ranging from 2;2 to 5;11 years but the older groups had more participants than the younger groups. Some challenges were encountered in eliciting spontaneous speech with the children due to the cultural heritage of teacher authority and superiority and child submission in educational settings in Viet Nam. During data collection, the children generally appeared shy, apprehensive and reticent to speak spontaneously despite taking time to establish rapport and this resulted in many participants imitating the target words. Individual differences in allophonic variants were not analyzed, so it was not possible to determine whether a single speaker tended to produce a specific variant, or whether intra-speaker variation indicated instability in learning sounds. The contribution of the interactions between tones and vowels in the acquisition of tones was not considered in the current study although the stimuli for tones selected in the speech instrument included items with various vowel combinations.

**Future Directions**

The findings of the current study provide a description of Northern Vietnamese children’s acquisition of consonants, semivowels, vowels/diphthongs and tones. The Vietnamese language has differences in pronunciation between the Northern, Central, and Southern Vietnamese dialects (Phám & McLeod, 2016); therefore, it is important to replicate the study in the Central and Southern Vietnamese dialects. Future research should also compare data from children who are monolingual and multilingual speakers, and from children who are typically developing and with speech sound disorders. Additionally, it would be useful to undertake research into acquisition of Vietnamese phonemes with more participants across the targeted age ranges.

**Conclusion**

This cross-sectional study provided data regarding speech acquisition among Vietnamese-speaking children aged 2;0 to 5;11. The development of Vietnamese
phoneme accuracy, age of acquisition, non-adult realizations, and phonological patterns across the age groups was described based on calculations of children’s productions of consonants, semivowels, vowels/diphthongs, and tones. These data are important for professionals working with Vietnamese-speaking children to assist with the identification and management of children with speech sound disorders. This study may serve as a reference for studies of speech and language acquisition in other Vietnamese dialects to support the emerging speech-language pathology profession in Viet Nam.

ACKNOWLEDGMENTS

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REFERENCES


Table 1.

*Consonants and Semivowels Produced in Northern Viet Nam (Adapted from Phạm & McLeod, 2016)*

<table>
<thead>
<tr>
<th></th>
<th>Bilabial</th>
<th>Labiodental</th>
<th>Alveolar</th>
<th>Retroflex</th>
<th>Palatal</th>
<th>Velar</th>
<th>Glottal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial consonants</td>
<td>Plosive</td>
<td>p</td>
<td>b</td>
<td>ʈʰ</td>
<td>t</td>
<td>d</td>
<td>c</td>
</tr>
<tr>
<td>Nasal</td>
<td>m</td>
<td>n</td>
<td></td>
<td>j</td>
<td>η</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trill</td>
<td>r**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fricative</td>
<td>f v s z</td>
<td></td>
<td></td>
<td>x y h</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lateral approximant</td>
<td>l</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Affricate</td>
<td>ts*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Final consonants</td>
<td>Plosive</td>
<td>p</td>
<td></td>
<td>c</td>
<td>k</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nasal</td>
<td>m</td>
<td>n</td>
<td></td>
<td>j</td>
<td>η ηᵐ</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Semivowel**</td>
<td>w (labio-velar)</td>
<td>w</td>
<td></td>
<td></td>
<td>j</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note.* *A variant for Northern Vietnamese dialect. **In Vietnamese, approximants are called semivowels.*
Table 2.

Demographic Characteristics of the Participants (n = 195)

<table>
<thead>
<tr>
<th>Age</th>
<th>Ha Noi Male</th>
<th>Female</th>
<th>Hai Phong Male</th>
<th>Female</th>
<th>TOTAL Male</th>
<th>Female</th>
<th>Total</th>
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</thead>
<tbody>
<tr>
<td>2;0-2;5</td>
<td>0</td>
<td>0</td>
<td>9</td>
<td>7</td>
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<td>7</td>
<td>16</td>
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<td>2;6-2;11</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>4</td>
<td>5</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>3;0-3;5</td>
<td>2</td>
<td>4</td>
<td>7</td>
<td>4</td>
<td>9</td>
<td>8</td>
<td>17</td>
</tr>
<tr>
<td>3;6-3;11</td>
<td>2</td>
<td>5</td>
<td>9</td>
<td>7</td>
<td>11</td>
<td>12</td>
<td>23</td>
</tr>
<tr>
<td>4;0-4;5</td>
<td>3</td>
<td>6</td>
<td>11</td>
<td>11</td>
<td>14</td>
<td>17</td>
<td>31</td>
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<td>4;6-4;11</td>
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<td>8</td>
<td>9</td>
<td>9</td>
<td>16</td>
<td>17</td>
<td>33</td>
</tr>
<tr>
<td>5;0-5;5</td>
<td>9</td>
<td>7</td>
<td>7</td>
<td>12</td>
<td>16</td>
<td>19</td>
<td>35</td>
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<tr>
<td>5;6-5;11</td>
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<td>11</td>
<td>6</td>
<td>14</td>
<td>17</td>
<td>31</td>
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<tr>
<td>TOTAL</td>
<td>26</td>
<td>41</td>
<td>68</td>
<td>60</td>
<td>94</td>
<td>101</td>
<td>195</td>
</tr>
</tbody>
</table>
Table 3.
Percentage of Consonants Correct (PCC) a, Vowels/Diphthongs Correct (PVC), Tones Correct (PTC), and Whole Word Correct (PWWC)
by Age Group and by Sex for Typically-Developing Northern Vietnamese-Speaking Children (n = 195)

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Sex</th>
<th>n</th>
<th>PCC a,b</th>
<th>PVC b</th>
<th>PTC b</th>
<th>PWWC b</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Range</td>
<td>Mean</td>
</tr>
<tr>
<td>2;0-2;5</td>
<td>Female</td>
<td>7</td>
<td>45.14</td>
<td>6.53</td>
<td>37.2-53.3</td>
<td>91.50</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>9</td>
<td>47.36</td>
<td>9.17</td>
<td>34.3-59.9</td>
<td>92.37</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>16</td>
<td>46.39</td>
<td>7.95</td>
<td>34.3-59.9</td>
<td>91.93</td>
</tr>
<tr>
<td>2;6-2;11</td>
<td>Female</td>
<td>4</td>
<td>47.80</td>
<td>8.20</td>
<td>35.8-54.0</td>
<td>91.13</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>5</td>
<td>62.48</td>
<td>8.45</td>
<td>51.8-74.5</td>
<td>91.64</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>9</td>
<td>55.96</td>
<td>10.99</td>
<td>35.8-74.5</td>
<td>91.41</td>
</tr>
<tr>
<td>3;0-3;5</td>
<td>Female</td>
<td>8</td>
<td>76.82</td>
<td>10.71</td>
<td>60.6-94.2</td>
<td>94.45</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>9</td>
<td>68.38</td>
<td>17.05</td>
<td>46.7-89.8</td>
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a PCC includes percentage of initial consonants, final consonants and semivowels correct (see Table 4 for more information). b Dialectal variants are included as correct productions. F = Female, M = Male.
Table 4.  
**Percentage of Initial Consonants Correct (PICC), Final Consonants Correct (PFCC), and Semivowels Correct (PSVC) by Age Group and by Sex for Typically-Developing Northern Vietnamese-Speaking Children (n = 195)**

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<th>n</th>
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<th>Final consonants</th>
<th>Semivowels</th>
<th>Sex</th>
<th>n</th>
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<th>Semivowels</th>
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<td>Range</td>
<td>Mean</td>
<td>SD</td>
<td>Range</td>
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<td>SD</td>
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<td>33.61</td>
<td>12.24</td>
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<td>10.34</td>
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<td>70.74</td>
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<td>13.56</td>
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*a Dialectal variants are included as correct productions.*
Table 5.

**Child’s Age, Sex, and Family Socioeconomic Status Predicting Speech Accuracy Scores**

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<th>PTC</th>
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<td>0.48***</td>
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<td>0.01</td>
<td>0.05</td>
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<td>0.05</td>
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<td>0.25**</td>
<td>0.001</td>
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<td>0.02</td>
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<td>Maternal education: senior high school</td>
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<td>0.398</td>
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Note. $p < .05$, $^* p < .01$, $^** p < .001$. PCC = Percentage of consonants correct, PVC = Percentage of vowels/diphthongs correct, PTC = Percentage of tones correct.
Table 6.

*Percentage of Tokens for Each Target Consonant* a *Correct at Each Age Group for Typically-Developing Northern Vietnamese-Speaking Children (n = 195)*

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<th>Words</th>
<th>No. tokens for each target consonant</th>
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<th>3;0-3;5 (n=17)</th>
<th>3;6-3;11 (n=23)</th>
<th>4;0-4;5 (n=31)</th>
<th>4;6-4;11 (n=33)</th>
<th>5;0-5;5 (n=35)</th>
<th>5;6-5;11 (n=31)</th>
<th>Total (n=195)</th>
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<td>29.0</td>
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<td>40.3</td>
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<td></td>
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<td>50.0</td>
<td>82.4</td>
<td>73.9</td>
<td>85.5</td>
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<td>92.9</td>
<td>93.5</td>
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<td>95.7</td>
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<td>98.6</td>
<td>98.4</td>
<td>94.9</td>
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<td>92.5</td>
<td>69.4</td>
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<td>81.4</td>
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**Syllable final consonants**

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<th>83.8</th>
<th>92.4</th>
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<th>83.1</th>
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<tbody>
<tr>
<td></td>
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<td>/c/</td>
<td>/k/</td>
<td>/kp/</td>
<td>/m/</td>
<td>/n/</td>
<td>/ɲ/</td>
<td>/ŋ/</td>
<td>/ŋm/</td>
<td>/w/</td>
<td></td>
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<tr>
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<td>-----</td>
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<td>-----</td>
<td>------</td>
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<td>-----</td>
<td>-----</td>
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<td>-----</td>
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<td>thịt, tết, quạt, ót, một, hót</td>
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<td>98.1</td>
<td>97.8</td>
<td>94.4</td>
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<td>89.9</td>
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<td>/ŋ/</td>
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<td>87.6</td>
<td>74.1</td>
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<td>95.7</td>
<td>98.0</td>
<td>99.0</td>
<td>97.8</td>
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<td>79.1</td>
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<td>95.2</td>
<td>96.0</td>
<td>98.1</td>
<td>83.4</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>/w/</td>
<td>táo, kẹo, dâu, rau, (hoàng) hậu</td>
<td>5</td>
<td>90.0</td>
<td>97.8</td>
<td>95.3</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>99.4</td>
<td>100.0</td>
<td>98.6</td>
</tr>
<tr>
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<td>thời, núi, nhảy, ngồi, phơi, voi</td>
<td>6</td>
<td>95.8</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>99.5</td>
<td>99.5</td>
<td>100.0</td>
<td>99.5</td>
</tr>
</tbody>
</table>

*a* Consonant includes syllable initial consonant, syllable final consonant, within syllable semivowel and syllable final semivowel;  
*b* A = Standard Vietnamese pronunciation (chuẩn phát âm), B = Standard Vietnamese + acceptable dialectal variants.
Table 7.

Age of Acquisition (75% & 90% criteria) for Each Target Consonant\textsuperscript{a} for Typically-Developing Northern Vietnamese-Speaking Children

\textit{(n = 195)}

<table>
<thead>
<tr>
<th>Age group</th>
<th>Syllable initial\textsuperscript{a}</th>
<th>75%</th>
<th>90%</th>
</tr>
</thead>
<tbody>
<tr>
<td>2;0-2;5</td>
<td>/b/</td>
<td>/t, m, n/</td>
<td>/m/</td>
</tr>
<tr>
<td>2;6-2;11</td>
<td>/b, ?, m, v/</td>
<td>/k\textsuperscript{p}, m/</td>
<td>/m/</td>
</tr>
<tr>
<td>3;0-3;5</td>
<td>/p, b, d, c, k, ?, m, n, ŋ, v, l/</td>
<td>/p, t, k\textsuperscript{p}, m, n, ŋ\textsuperscript{m}/</td>
<td>/k\textsuperscript{p}, m, ŋ\textsuperscript{m}/</td>
</tr>
<tr>
<td>3;6-3;11</td>
<td>/b, d, c, k, ?, m, n, ŋ, f, v, ŋ, h, l/</td>
<td>/t, k\textsuperscript{p}, m, n, ŋ/</td>
<td>/k\textsuperscript{p}, n/</td>
</tr>
<tr>
<td>4;0-4;5</td>
<td>/p, b, t, c, k, ?, m, n, ŋ, f, v, y, h, l/</td>
<td>/p, t, c, k\textsuperscript{p}, m, n, ŋ\textsuperscript{m}/</td>
<td>/k\textsuperscript{p}, m, ŋ\textsuperscript{m}/</td>
</tr>
<tr>
<td>4;6-4;11</td>
<td>/p, b, ð\textsuperscript{p}, t, d, c, k, ?, m, n, ŋ, f, v, y, h, l/</td>
<td>/p, t, k, k\textsuperscript{p}, m, n, ŋ, ŋ\textsuperscript{m}/</td>
<td>/t, k\textsuperscript{p}, m, n, ŋ\textsuperscript{m}/</td>
</tr>
<tr>
<td>5;0-5;5</td>
<td>/p, b, ð\textsuperscript{p}, t, d, c, k, ?, m, n, ŋ, f, v, x, y, h, l/</td>
<td>/p, t, c, k, k\textsuperscript{p}, m, n, ŋ, ŋ\textsuperscript{m}/</td>
<td>/p, t, c, k\textsuperscript{p}, m, n, ŋ\textsuperscript{m}/</td>
</tr>
<tr>
<td>5;6-5;11</td>
<td>/p, b, ð\textsuperscript{p}, t, d, c, k, ?, m, n, ŋ, f, v, s, y, h, l/</td>
<td>/p, t, c, k\textsuperscript{p}, m, n, ŋ, ŋ\textsuperscript{m}/</td>
<td>/p, t, k\textsuperscript{p}, m, n, ŋ\textsuperscript{m}/</td>
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</table>

\textsuperscript{a}Listed according to the order on the International Phonetic Alphabet chart
Table 8.

Percentage of Tokens for Each Tone that was Correct at Each Age Group for Typically-Developing Northern Vietnamese-Speaking Children (n = 195)

<table>
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<th>Tone</th>
<th>No. tokens for each target tone</th>
<th>% of correct tokens</th>
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<td></td>
<td>2;0-2;5 (n = 16)</td>
<td>2;6-2;11 (n = 9)</td>
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<tr>
<td>(Thanh ngang)</td>
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<td></td>
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<tr>
<td>T2 Falling</td>
<td>5</td>
<td>100.0</td>
</tr>
<tr>
<td>(Thanh huyền)</td>
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<td></td>
</tr>
<tr>
<td>T3 Creaky</td>
<td>6</td>
<td>1.0</td>
</tr>
<tr>
<td>(Thanh ngã)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T4 Dipping-rising</td>
<td>7</td>
<td>86.6</td>
</tr>
<tr>
<td>(Thanh hỏi)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T5 Rising</td>
<td>24</td>
<td>99.7</td>
</tr>
<tr>
<td>(Thanh sắc)</td>
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</tr>
<tr>
<td>T6 Constricted</td>
<td>11</td>
<td>99.4</td>
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<tr>
<td>(Thanh nặng)</td>
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Table 9.

Realizations of Syllable-Initial Consonants by Typically-Developing Northern Vietnamese-Speaking Children Aged 2;0-5;11 (n = 195)

<table>
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<tr>
<th>Words</th>
<th>No. opportunities</th>
<th>Age group</th>
<th>Tokens correct</th>
<th>Dialectal variant</th>
<th>Non-adult realizations</th>
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<td>n (%)</td>
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<td>Common (&gt;10%)</td>
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<tr>
<td>/p/</td>
<td>2</td>
<td>TOTAL</td>
<td>110 (28.2%)</td>
<td>/b/</td>
<td>213 (54.6%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2;0-3;11</td>
<td>26 (20.0%)</td>
<td>/b/</td>
<td>57 (43.8%)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4;0-5;11</td>
<td>84 (32.3%)</td>
<td>/b/</td>
<td>156 (60.0%)</td>
</tr>
<tr>
<td>/b/</td>
<td>4</td>
<td>TOTAL</td>
<td>740 (94.9%)</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2;0-3;11</td>
<td>235 (90.4%)</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4;0-5;11</td>
<td>505 (97.1%)</td>
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<td>-</td>
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<td>/kʰ/</td>
<td>3</td>
<td>TOTAL</td>
<td>406 (69.4%)</td>
<td>/tʰ/</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2;0-3;11</td>
<td>80 (41.0%)</td>
<td>/tʰ/</td>
<td>-</td>
</tr>
<tr>
<td></td>
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<td>4;0-5;11</td>
<td>326 (83.6%)</td>
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<td>-</td>
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<tr>
<td>/t/</td>
<td>4</td>
<td>TOTAL</td>
<td>647 (82.9%)</td>
<td>/tʰ/</td>
<td>-</td>
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<tr>
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<td>2;0-3;11</td>
<td>155 (59.6%)</td>
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<td>-</td>
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<tr>
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<td>4;0-5;11</td>
<td>492 (94.6%)</td>
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<td>/d/</td>
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<td>TOTAL</td>
<td>476 (81.4%)</td>
<td>/tʰ/</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2;0-3;11</td>
<td>124 (63.6%)</td>
<td>/tʰ/</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4;0-5;11</td>
<td>352 (90.3%)</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>/t/</td>
<td>3</td>
<td>TOTAL</td>
<td>2 (0.3%)</td>
<td>/c/</td>
<td>283 (48.4%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2;0-3;11</td>
<td>0 (0.0%)</td>
<td>/c/</td>
<td>82 (42.1%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4;0-5;11</td>
<td>2 (0.5%)</td>
<td>/c/</td>
<td>201 (51.5%)</td>
</tr>
</tbody>
</table>

239
<table>
<thead>
<tr>
<th>Vowel</th>
<th>Examples</th>
<th>Total</th>
<th>% [%]</th>
<th>Phrase Boundaries</th>
<th>Sounds</th>
</tr>
</thead>
<tbody>
<tr>
<td>/c/</td>
<td>chủ, chuông, chanh</td>
<td>3</td>
<td>280 (47.9%)</td>
<td>/ts/ 210 (35.9%)</td>
<td>[tʰ] 10.6%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2:0-3;11</td>
<td>77 (39.5%)</td>
<td>/ts/ 39 (20.0%)</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4:0-5;11</td>
<td>203 (52.1%)</td>
<td>/ts/ 171 (43.8%)</td>
<td>-</td>
</tr>
<tr>
<td>/k/</td>
<td>cổ, kẹo, kênh, que, quạt</td>
<td>5</td>
<td>882 (90.5%)</td>
<td>-</td>
<td>[t, tʰ, ?] Ø</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2:0-3;11</td>
<td>238 (73.2%)</td>
<td>-</td>
<td>[tʰ] 12.0%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4:0-5;11</td>
<td>644 (99.1%)</td>
<td>-</td>
<td>Ø 12.0%</td>
</tr>
<tr>
<td>/ʔ/</td>
<td>em, ớt, éch, óc, oa</td>
<td>5</td>
<td>893 (91.6%)</td>
<td>-</td>
<td>[tʰ, m, n, ŋ, h, l] Ø</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2:0-3;11</td>
<td>274 (84.3%)</td>
<td>-</td>
<td>[tʰ, m, n, ŋ, h] Ø</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4:0-5;11</td>
<td>691 (95.2%)</td>
<td>-</td>
<td>[ŋ, h, l] Ø</td>
</tr>
<tr>
<td>/m/</td>
<td>mia, muc, mét</td>
<td>3</td>
<td>561 (95.9%)</td>
<td>-</td>
<td>[p, n] Ø</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2:0-3;11</td>
<td>173 (88.7%)</td>
<td>-</td>
<td>[b] [p, n, h] Ø</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4:0-5;11</td>
<td>388 (99.5%)</td>
<td>-</td>
<td>[b, n] Ø</td>
</tr>
<tr>
<td>/n/</td>
<td>nơi, năm, nú, nón</td>
<td>4</td>
<td>521 (66.8%)</td>
<td>/l/ 181 (23.2%)</td>
<td>[b, t, n, m, n, ŋ, z, h] Ø</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2:0-3;11</td>
<td>159 (61.2%)</td>
<td>/l/ 34 (13.1%)</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4:0-5;11</td>
<td>362 (69.6%)</td>
<td>/l/ 147 (28.3%)</td>
<td>[ŋ] Ø</td>
</tr>
<tr>
<td>/ɲ/</td>
<td>nhíp, nho, nhện, nhảy</td>
<td>4</td>
<td>538 (69.0%)</td>
<td>-</td>
<td>[b, t, n, c, m, ŋ, z, z̪, l] Ø</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2:0-3;11</td>
<td>92 (35.4%)</td>
<td>-</td>
<td>[b, t, n, m, l] Ø</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4:0-5;11</td>
<td>446 (85.5%)</td>
<td>-</td>
<td>[c, m, n, ŋ, z, l] Ø</td>
</tr>
<tr>
<td>/ŋ/</td>
<td>nghe, ngú, ngói</td>
<td>3</td>
<td>511 (87.4%)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2:0-3;11</td>
<td>140 (71.8%)</td>
<td>-</td>
<td>[ŋ] 19.5%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4:0-5;11</td>
<td>371 (95.1%)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>/f/</td>
<td>phim, phơi, phán</td>
<td>3</td>
<td>494 (84.4%)</td>
<td>-</td>
<td>[b] [p, t, c, k, v, h, ts] Ø</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2:0-3;11</td>
<td>113 (57.9%)</td>
<td>-</td>
<td>[b] 15.4%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4:0-5;11</td>
<td>381 (97.7%)</td>
<td>-</td>
<td>[tʰ, v] Ø</td>
</tr>
<tr>
<td>/v/</td>
<td>về, voi, vong</td>
<td>3</td>
<td>529 (90.4%)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2:0-3;11</td>
<td>145 (74.4%)</td>
<td>-</td>
<td>[b] 13.3%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4:0-5;11</td>
<td>384 (98.5%)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>/s/</td>
<td>xiếc, xúc, xương</td>
<td>TOTAL</td>
<td>319 (54.5%)</td>
<td>-</td>
<td>27.5%</td>
</tr>
<tr>
<td>-----</td>
<td>-----------------</td>
<td>------</td>
<td>-------------</td>
<td>---</td>
<td>------</td>
</tr>
<tr>
<td></td>
<td>2;0-3;11</td>
<td>69</td>
<td>(35.4%)</td>
<td>-</td>
<td>[s]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>[tʰ]</td>
</tr>
<tr>
<td></td>
<td>4;0-5;11</td>
<td>250</td>
<td>(64.1)</td>
<td>-</td>
<td>[s]</td>
</tr>
<tr>
<td>/z/</td>
<td>dép, dau, giếng</td>
<td>TOTAL</td>
<td>319 (54.5%)</td>
<td>-</td>
<td>28.2%</td>
</tr>
<tr>
<td></td>
<td>2;0-3;11</td>
<td>73</td>
<td>(37.4%)</td>
<td>-</td>
<td>[tʰ]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>[z]</td>
</tr>
<tr>
<td></td>
<td>4;0-5;11</td>
<td>246</td>
<td>(63.1%)</td>
<td>-</td>
<td>[z]</td>
</tr>
<tr>
<td>/ɣ/</td>
<td>sen, sũa, sách</td>
<td>TOTAL</td>
<td>11 (1.9%)</td>
<td>/s/</td>
<td>321</td>
</tr>
<tr>
<td></td>
<td>2;0-3;11</td>
<td>2</td>
<td>(1.0%)</td>
<td>/s/</td>
<td>62</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>[s]</td>
</tr>
<tr>
<td></td>
<td>4;0-5;11</td>
<td>9</td>
<td>(2.3%)</td>
<td>/s/</td>
<td>259</td>
</tr>
<tr>
<td>/z̞/</td>
<td>rẽ, r bại, rau</td>
<td>TOTAL</td>
<td>17 (2.9%)</td>
<td>/z/</td>
<td>266</td>
</tr>
<tr>
<td></td>
<td>2;0-3;11</td>
<td>4</td>
<td>(2.1%)</td>
<td>/z/</td>
<td>54</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>[z]</td>
</tr>
<tr>
<td></td>
<td>4;0-5;11</td>
<td>13</td>
<td>(3.3%)</td>
<td>/z/</td>
<td>212</td>
</tr>
<tr>
<td>/x/</td>
<td>khi, khóc, khăn</td>
<td>TOTAL</td>
<td>320 (54.7%)</td>
<td>-</td>
<td>31.6%</td>
</tr>
<tr>
<td></td>
<td>2;0-3;11</td>
<td>43</td>
<td>(22.1%)</td>
<td>-</td>
<td>[h]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>[k]</td>
</tr>
<tr>
<td></td>
<td>4;0-5;11</td>
<td>277</td>
<td>(71.0%)</td>
<td>-</td>
<td>[h]</td>
</tr>
<tr>
<td>/γ/</td>
<td>gà, ghé, gacc</td>
<td>TOTAL</td>
<td>465 (79.5%)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>2;0-3;11</td>
<td>94</td>
<td>(48.2%)</td>
<td>-</td>
<td>[k]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>[z, h]</td>
</tr>
<tr>
<td>/h/</td>
<td>hé, hôp, hót, hoa, hoàng hậu</td>
<td>4:0-5;11</td>
<td>371 (95.1%)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>-----</td>
<td>-------------------------</td>
<td>----------</td>
<td>-------------</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td>TOTAL</td>
<td></td>
<td>970 (82.9%)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>2:0-3;11</td>
<td>257 (65.9%)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>4:0-5;11</td>
<td>713 (91.4%)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>/l/</td>
<td>ly, lược, lịch</td>
<td>3 TOTAL</td>
<td>365 (62.4%)</td>
<td>/n/</td>
<td>174 (29.7%)</td>
</tr>
<tr>
<td></td>
<td>2:0-3;11</td>
<td>71 (36.4%)</td>
<td>/n/</td>
<td>85 (43.6%)</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>4:0-5;11</td>
<td>294 (75.4%)</td>
<td>/n/</td>
<td>89 (22.8%)</td>
<td>-</td>
</tr>
</tbody>
</table>

*Note. a the target consonant is found in syllable initial position of the first syllable; b the target consonant is found in syllable initial position of the second syllable; c the target consonants is found in syllable initial positions of two syllables; Ø: omitted.*
<table>
<thead>
<tr>
<th>Words</th>
<th>No. opportunities</th>
<th>Age group</th>
<th>Tokens correct n (%)</th>
<th>Dialectal variant n (%)</th>
<th>Non-adult realizations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Syllable-final consonant</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>/p/ nhíp, dép, hộp</td>
<td>3</td>
<td>TOTAL</td>
<td>486 (83.1%)</td>
<td>[t] 14.7%</td>
<td>[tʰ, k, m, n] Ø</td>
</tr>
<tr>
<td></td>
<td>2;0-3;11</td>
<td></td>
<td>142 (72.8%)</td>
<td>[t] 22.1%</td>
<td>[tʰ, k] Ø</td>
</tr>
<tr>
<td></td>
<td>4;0-5;11</td>
<td></td>
<td>344 (88.2%)</td>
<td>[t] 11.0%</td>
<td>[m, n]</td>
</tr>
<tr>
<td>/t/ thịt, tết, quán, ot, môt, hot</td>
<td>6</td>
<td>TOTAL</td>
<td>1046 (89.4%)</td>
<td>[k] 12.3%</td>
<td>[p, tʰ, n, ɲ⁵, ts] Ø</td>
</tr>
<tr>
<td></td>
<td>2;0-3;11</td>
<td></td>
<td>319 (81.8%)</td>
<td>[k] 12.3%</td>
<td>[p, tʰ, n, ɲ⁵, ts] Ø</td>
</tr>
<tr>
<td></td>
<td>4;0-5;11</td>
<td></td>
<td>727 (93.2%)</td>
<td>[k] 12.3%</td>
<td>[p, tʰ, n, ɲ⁵]</td>
</tr>
<tr>
<td>/c/ ếch, sách, lịch</td>
<td>3</td>
<td>TOTAL</td>
<td>398 (68.0%)</td>
<td>[t] 26.8%</td>
<td>[p, tʰ, c⁶, k, n, ɲ] Ø</td>
</tr>
<tr>
<td></td>
<td>2;0-3;11</td>
<td></td>
<td>84 (43.1%)</td>
<td>[t] 48.7%</td>
<td>[p, tʰ, c⁶, k, n] Ø</td>
</tr>
<tr>
<td></td>
<td>4;0-5;11</td>
<td></td>
<td>314 (80.5%)</td>
<td>[t] 15.9%</td>
<td>[p, tʰ, c⁶, k, ɲ]</td>
</tr>
<tr>
<td>/k/ mực, xiếc, gắc, lược</td>
<td>4</td>
<td>TOTAL</td>
<td>562 (72.1%)</td>
<td>[p] 12.8%</td>
<td>[tʰ, kʰ, kʷ, n, ɲ] Ø</td>
</tr>
<tr>
<td></td>
<td>2;0-3;11</td>
<td></td>
<td>139 (53.5%)</td>
<td>[t] 22.7%</td>
<td>[tʰ, kʰ, kʷ, n] Ø</td>
</tr>
<tr>
<td></td>
<td>4;0-5;11</td>
<td></td>
<td>423 (81.3%)</td>
<td>[p] 10.8%</td>
<td>[n, ɲ] Ø</td>
</tr>
<tr>
<td>/kʰ/ ốc, xúc, khóc</td>
<td>3</td>
<td>TOTAL</td>
<td>552 (94.4%)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>2;0-3;11</td>
<td></td>
<td>174 (89.2%)</td>
<td>[t] tʰ, k</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4;0-5;11</td>
<td></td>
<td>378 (96.9%)</td>
<td>-</td>
<td>[p, pʰ, t, k, kʰ]</td>
</tr>
<tr>
<td>/m/ tim, em, năm, phim</td>
<td>4</td>
<td>TOTAL</td>
<td>738 (94.6%)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>2;0-3;11</td>
<td></td>
<td>241 (92.7%)</td>
<td>-</td>
<td>[n, ɲ, ɲ⁴] Ø</td>
</tr>
</tbody>
</table>

Table 10. 
Realizations of Syllable-Final Consonants and Semivowels by Typically-Developing Northern Vietnamese-Speaking Children Aged 2;0-5;11 (n = 195)
Within syllable semivowel

| /ŋ/ | pin, bón, nón, nhện, phán, sen, khăn | 4:0-5;11 | 497 (95.6%) | - | - | - | [n, ŋ] Ø |
| /ɲ/ | dinh, chanh, kênh | 2:0-3;11 | 376 (82.6%) | [ŋ] 10.3% | [m] Ø |
| /ŋ/ | bảng, trứng, chuông, xương, giếng, hoàng (hậu) | 2:0-3;11 | 57 (29.2%) | - | [ŋ] 64.1% | [m, ŋ, j] Ø |
| /ŋ/ | bụng, trọng, vồng | 4:0-5;11 | 653 (83.7%) | - | [ŋ] 14.7% | [m] Ø |
| /ŋ/ | que, quất, oà, hoà, hoàng (hậu) | 2:0-3;11 | 214 (54.9%) | - | [n] 28.1% | [m] Ø |
| /ŋ/ | táo, kẹo, dâu, rau, (hoàng) hậu | 4:0-5;11 | 622 (95.7%) | - | - | - | Ø |

Syllable-final semivowels

| /ŋ/ | thời, núi, nhảy, ngồi, phơi, voi | 2:0-3;11 | 386 (99.0%) | - | - | - | [m] Ø |
| /ŋ/ | ngoài, ngoài, ngoài, ngoài | 4:0-5;11 | 778 (99.7%) | - | - | - | [m] Ø |

a the target consonant is found in syllable final position of the first syllable; b the target semivowel is found in within syllable position of the first syllable; c the target semivowel is found in syllable final position of the second syllable; Ø: omitted.
Table 11.

**Realizations of Tones by Typically-Developing Northern Vietnamese-Speaking Children (n = 195)**

<table>
<thead>
<tr>
<th>Tone</th>
<th>Tokens/ participant</th>
<th>Children with 100% of tokens correct</th>
<th>Children with 90%+ of tokens correct</th>
<th>Tokens correct</th>
<th>Dialectal variant tokens</th>
<th>Non-adult realizations</th>
<th>Rare (&lt;5%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>n (%)</td>
<td>n (%)</td>
<td>n (%)</td>
<td></td>
<td>Common (&gt;10%)</td>
<td>Occasional (5-10%)</td>
</tr>
<tr>
<td>T1 Level</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Thành ngang)</td>
<td>26</td>
<td>190 (97.4%)</td>
<td>195 (100.0%)</td>
<td>5,065 (99.9%)</td>
<td>-</td>
<td>-</td>
<td>T1 → T2</td>
</tr>
<tr>
<td>T2 Falling</td>
<td>5</td>
<td>195 (100.0%)</td>
<td>975 (100.0%)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>T1 → T6</td>
</tr>
<tr>
<td>(Thành huyện)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T3 Creaky</td>
<td>6</td>
<td>93 (47.7%)</td>
<td>93 (47.7%)</td>
<td>667 (57.0%)</td>
<td>-</td>
<td>T3 → T5 41.6%</td>
<td>T3 → T4</td>
</tr>
<tr>
<td>(Thành ngã)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>T3 → T6</td>
</tr>
<tr>
<td>T4 Dipping-rising</td>
<td>7</td>
<td>86 (44.1%)</td>
<td>86 (44.1%)</td>
<td>1,084 (79.4%)</td>
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<td>-</td>
<td>T4 → T3</td>
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<tr>
<td>(Thành hỏi)</td>
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<td></td>
<td></td>
<td>T4 → T1</td>
</tr>
<tr>
<td>T5 Rising</td>
<td>24</td>
<td>188 (96.4%)</td>
<td>195 (100.0%)</td>
<td>4,673 (99.9%)</td>
<td>-</td>
<td>-</td>
<td>T5 → T1</td>
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<tr>
<td>(Thành sắc)</td>
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<td></td>
<td></td>
<td></td>
<td>T5 → T3</td>
</tr>
<tr>
<td>T6 Constricted</td>
<td>11</td>
<td>189 (96.9%)</td>
<td>194 (99.5%)</td>
<td>2,138 (99.7%)</td>
<td>-</td>
<td>-</td>
<td>T6 → T1</td>
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<tr>
<td>(Thành nặng)</td>
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<td>T6 → T2</td>
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<td>T6 → T5</td>
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</table>
Table 12.

**Summary of Phonological Patterns for Vietnamese Consonants at Each Age Group for Typically-Developing Northern Vietnamese-Speaking Children (n = 195)**

<table>
<thead>
<tr>
<th>Phonological pattern</th>
<th>Syllable position</th>
<th>Example of target and production</th>
<th>2:0-3:11 (n = 65)</th>
<th>%</th>
<th>4:0-5:11 (n = 130)</th>
<th>%</th>
<th>TOTAL (n = 195)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SUBSTITUTION PATTERNS</strong></td>
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<tr>
<td>Fronting (palatal and velar plosives)</td>
<td>initial and final</td>
<td>/c/ → [t]</td>
<td>879/2405</td>
<td>36.5%</td>
<td>638/4810</td>
<td>13.3%</td>
<td>1517/7215</td>
<td>21.0%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>/k/ → [t]</td>
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<td></td>
<td></td>
<td>/ɲ/ → [n]</td>
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<td></td>
<td></td>
<td>/ɲ/ → [n]</td>
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<tr>
<td>Backing (alveolar plosives)</td>
<td>initial and final</td>
<td>/t/ → [k]</td>
<td>132/1755</td>
<td>7.5%</td>
<td>94/3510</td>
<td>2.7%</td>
<td>226/5265</td>
<td>4.3%</td>
</tr>
<tr>
<td></td>
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<td>/n/ → [n]</td>
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<td>/n/ → [n]</td>
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<tr>
<td>Stopping of fricatives</td>
<td>initial</td>
<td>/v/ → [b]</td>
<td>471/1950</td>
<td>24.2%</td>
<td>68/3900</td>
<td>1.7%</td>
<td>539/5850</td>
<td>9.2%</td>
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<tr>
<td></td>
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<td>/s/ → [t]</td>
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<td></td>
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<td>/ʃ/ → [t]</td>
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<td></td>
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<td>/z/ → [d]</td>
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<tr>
<td>Gliding (fricatives + nasals)</td>
<td>initial and final</td>
<td>/z/ → [j]</td>
<td>15/4355</td>
<td>0.3%</td>
<td>28/8710</td>
<td>0.3%</td>
<td>43/13065</td>
<td>0.3%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>/z/ → [j]</td>
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<td></td>
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<td>/h/ → [w]</td>
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<td></td>
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<td>/ɲ/ → [j]</td>
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<tr>
<td>Denasalization (does not include dialectal /n/ → [l])</td>
<td>initial and final</td>
<td>/m/ → [b]</td>
<td>66/2730</td>
<td>2.2%</td>
<td>33/5070</td>
<td>0.8%</td>
<td>99/7800</td>
<td>1.3%</td>
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<tr>
<td></td>
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<td>/n/ → [d]</td>
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<td></td>
<td></td>
<td>/ɲ/ → [c]</td>
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<td></td>
<td></td>
<td>/ɲ/ → [k]</td>
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</tr>
<tr>
<td>Nasalization</td>
<td>initial and final</td>
<td>/b/ → [m]</td>
<td>193/6175</td>
<td>3.1%</td>
<td>312/12350</td>
<td>2.5%</td>
<td>505/18525</td>
<td>2.7%</td>
</tr>
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</table>
(does not include dialectal /l → [n])

<table>
<thead>
<tr>
<th>Process</th>
<th>Initial / Final</th>
<th>Phoneme</th>
<th>Occurrences</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aspiration</td>
<td>Initial</td>
<td>/l/ → [tʰ]</td>
<td>606/4940</td>
<td>12.3%</td>
</tr>
<tr>
<td>Deaspiration</td>
<td>Initial</td>
<td>/tʰ/ → [t]</td>
<td>37/195</td>
<td>19.0%</td>
</tr>
<tr>
<td>Glottal replacement</td>
<td>Initial</td>
<td>/tʰ/ → [h]</td>
<td>143/4160</td>
<td>3.4%</td>
</tr>
<tr>
<td>Syllable structure patterns</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Initial consonant deletion</td>
<td>Initial</td>
<td>/p/ → Ø</td>
<td>328/5135</td>
<td>6.4%</td>
</tr>
<tr>
<td>Final consonant deletion</td>
<td>Final</td>
<td>/l/ → Ø</td>
<td>28/2730</td>
<td>1.0%</td>
</tr>
<tr>
<td>Semivowel deletion</td>
<td>Within and Final</td>
<td>/w/ → Ø</td>
<td>150/1040</td>
<td>14.4%</td>
</tr>
</tbody>
</table>

*Dialectal variants were excluded from the calculation of the occurrence of phonological processes.*
Figure 1. Six Vietnamese tones.
Figure 2. Participant recruitment diagram.
Participants in shaded boxes were included in the current study. PEDS = Parents’ Evaluation of Development Status (Glascoe, 2013); OMA = oromotor assessment; VSA = Vietnamese Speech Assessment (Phạm, Le, et al., 2016); WNL = within normal limits.

Note. * Not assessed because parents did not provide consent (n = 53), children did not provide assent (n = 14), children were absent (n = 18), children were from a minority ethnic group (n = 4), children were <2;0 (n = 20), fieldwork trip ended, so were not assessed (n = 286).
Figure 3. Percentage of Consonants, Semivowels, Vowels/Diphthongs and Tones Correct for Northern Vietnamese-Speaking Children by Age Group (n = 195).
<table>
<thead>
<tr>
<th>Grapheme(s)</th>
<th>Northern dialect pronunciation</th>
<th>2.0</th>
<th>2.6</th>
<th>3.0</th>
<th>3.6</th>
<th>4.0</th>
<th>4.6</th>
<th>5.0</th>
<th>5.6</th>
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<tbody>
<tr>
<td><strong>Initial consonants</strong></td>
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<td>p</td>
<td>/p/ (dialectal variants accepted /p, b/)</td>
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<td>/c/ (dialectal variants accepted /ts, c/)</td>
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<td>c, k, q</td>
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<td>/n/ (dialectal variants accepted /n, l/)</td>
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<td>ng, ngh</td>
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<td>d, gi</td>
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<td>/l/ (dialectal variants accepted /l, n/)</td>
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<td><strong>Final consonants</strong></td>
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<td><strong>Final Semivowels</strong></td>
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</table>
Figure 4. Age of Acquisition of Consonants Produced Correctly for Northern Vietnamese-Speaking Children by Age Group (n = 195). White <50%, light gray 50-75%, dark gray 75-90%, black 90-100%.
Chapter 8

Validation and Norming of the Intelligibility in Context Scale
in Northern Viet Nam

Paper 5


This is an accepted manuscript of an article published by Taylor & Francis in *Clinical Linguistics and Phonetics* on 14 April 2017, available online:
http://www.tandfonline.com/10.1080/02699206.2017.1306110

Taylor & Francis has granted permission for the accepted manuscript to appear in this PhD thesis.
Validation and norming of the Intelligibility in Context Scale in Northern Viet Nam

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Abstract

Vietnamese is one of the 20 most commonly spoken languages in the world; however, there are no standardised tools to assess Vietnamese children’s speech. This study aimed to validate and norm the Vietnamese version of the Intelligibility in Context Scale (ICS-VN). Data were collected from parents of 181 children (aged 2;0-5;11) living in Ha Noi, Northern Viet Nam. The mean ICS-VN score was 4.43 (out of a maximum of 5) indicating that children were “usually” to “always” intelligible; however, item-level scores demonstrated significant differences between communication partners. Children with parental concerns about speech and language had significantly lower mean scores than children without parental concerns. Scores also differed by children’s age, parents’ skill level, and mothers’ education level but not by sex of child or fathers’ education level. The ICS-VN had good psychometric properties indicating it to be a valid tool for use with Vietnamese-speaking children in Northern Viet Nam.

Key words: Vietnamese, intelligibility, speech, assessment, Intelligibility in Context Scale
Introduction

Intelligibility is an important component in a comprehensive descriptive assessment of children’s speech (McLeod & Baker, 2017) and assessing intelligibility plays an essential role in clinical decision-making and management (Miller, 2013). Intelligibility can be described as “the degree to which a speaker’s speech signal is understood” (Weismer, 2009, p. 569). Intelligibility can be defined into two types: signal-dependent intelligibility that refers to “the listener being able to retrieve the spoken message based solely on the sound signal”; and signal-independent intelligibility that refers to the listener’s ability to convey the message “based on not just the immediate acoustic signal but on cues and clues from any other verbal (e.g. syntax, semantics) or non-verbal sources (e.g. facial expression, gesture, broader contextual setting)” (Miller, 2013, p.602). Therefore, assessment of intelligibility requires consideration of both types of intelligibility. Intelligibility can be assessed to assist in determining the presence of speech sound disorder, the need for intervention, and the evaluation of intervention (Baker, 2010; Mullen & Schooling, 2010; Williams, McLeod, & McCauley, 2010). There are many methods for assessing intelligibility and the three main methods are: single word measures, connected speech measures, and rating scales (Kent, Miolo, & Bloedel, 1994). Through conducting a critical review of assessing intelligibility in speakers with cleft palate, Whitehill (2002) indicated that the most popular measure to assess intelligibility was rating scale; however she described many problems with ratings of intelligibility including the reliability and validity of intelligibility measures, discrimination between definitions of intelligibility other terms such as acceptability and speech proficiency, and consideration of factors that influenced intelligibility. The use of rating scales has a number of advantages such as offering a quick and easy screening measure, providing a score, and some enable assessing intelligibility with different conversational partners. Rating scales used to
measure intelligibility include the Intelligibility in Context Scale (ICS, McLeod, Harrison, & McCormack, 2012a), the Speech Intelligibility Rating Scale (Allen, Nikolopoulos, Dyar, & O’Donoghue, 2001), and the Meaningful Use of Speech Scale (MUSS, Robbins & Osberger, 1990). The ICS is the only intelligibility scale that has been validated in multiple languages.

The Intelligibility in Context Scale (ICS, McLeod et al., 2012a) is a rating scale designed for parents to estimate children’s intelligibility when speaking with seven different communicative partners: parents, immediate family, extended family, friends, acquaintances, teachers, and strangers. Children’s intelligibility is estimated for each interlocutor on a 5-point Likert scale from always (5) to never (1). The ICS scores can be interpreted to describe children’s intelligibility, to compare the child’s average total score with norms for the language spoken by the child (if norms are available), or to compare the child’s scores at the beginning and end of intervention. The ICS is available online for free from http://www.csu.edu.au/research/multilingual-speech/ics.

The ICS was initially validated and normed for English-speaking children in Australia (McLeod, Crowe, & Shahaeian, 2015; McLeod, Harrison, & McCormack, 2012b). The mean ICS score for 803 Australian English-speaking preschoolers was 4.4 \( (SD = 0.7) \) out of total score of 5 (McLeod et al., 2015). Psychometric tests showed moderate to high internal consistency between items, high internal reliability and good test-retest reliability. There were significant correlations between the ICS mean score and severity measures of speech sound disorders: percentage of consonants correct (PCC), percentage of vowels correct (PVC), and percentage of phonemes correct (PPC) (McLeod et al., 2015).

The ICS has been translated into more than 60 languages and has been validated and/or tested in Cantonese (Ng, To, & McLeod, 2014), Croatian (Tomić & Mildner, 2014), Dutch (van der Zee, 2015), Fijian and Fiji Hindi (Hopf, McLeod, & McDonagh,
2016), German (Neumann, Rietz, & Stenneken, 2016), Jamaican (Washington, McDonald, McLeod, Crowe, & Devonish, 2016), and Slovenian (Kogovšek & Ozbič, 2013). Across studies, the ICS mean score was between 4 and 5 for typically developing children. The ICS has been used with different groups of children (e.g., children who are: monolingual, multilingual, or typically developing, and children who have: speech sound disorders, cleft palate, or cochlear implants) at different ages but is commonly used with children younger than 6 years of age.

Vietnamese is one of the 20 most commonly spoken languages in the world. Vietnamese is the official language of Viet Nam (spoken by approximate 92 million people) and is commonly spoken in many predominantly English-speaking countries, including Canada, US, UK and Australia. For example, in Canada, Vietnamese is spoken by 3.6% of people in Montréal, 4.7% of people in Calgary, 2.6% of people in Vancouver, 4.0% of people in Edmonton, and 3.7% of people in Ottawa (Statistics Canada, 2012). Furthermore, the government of Viet Nam has implemented The National Development Standards for 5-year-old children, Standard 15, item 65 is “to speak clearly” and item 70 is “the children’s speech is intelligible to others” (The Viet Nam Ministry of Education and Training, 2010). Currently, no standardised tools to assess Vietnamese children’s speech and language are available within Viet Nam or abroad. Due to the lack of normative data for Vietnamese-speaking children, it is challenging to identify young children who meet the National Development Standards or who need additional speech and language support. Vietnamese professionals report they assess Vietnamese children’s speech production by using informal and time consuming measures in preschool settings (The Viet Nam Institute of Educational Sciences, 2014). This situation raises the need to have assessments in Vietnamese available to speech-language pathologists and educators to assess children’s speech to determine who meet the national development standards for school readiness. Although
there has been a Vietnamese translated form of the ICS since 2012, it has not been validated or normed for Vietnamese-speaking children.

The current study was designed to test the usefulness of the Vietnamese version of the ICS (henceforth ICS-VN) and to determine the psychometric properties of the ICS-VN by gathering normative data on intelligibility for Vietnamese-speaking preschoolers. We also sought to examine factors that affect children’s ICS-VN score. The study provided answers for following specific questions:

5. Does the ICS-VN demonstrate satisfactory internal consistency, comparable to other international studies using the ICS?
6. Does the ICS-VN demonstrate criterion validity with other measures of speech and language status, including a direct assessment measure of speech production?
7. What are the mean scores for Vietnamese-speaking preschool children on the ICS-VN?
8. To what extent do ICS-VN scores for Vietnamese-speaking preschoolers vary by child and family demographic characteristics (age, sex, parents’ occupation and educational level)?

Method

Recruitment of Participants

Two preschools in Ha Noi (the capital city of Viet Nam) were invited and agreed to participate in the study. One preschool included children from a wide range of socioeconomic backgrounds and the other preschool predominantly had children with higher socioeconomic backgrounds as it was associated with a university. The directors of these two preschools were asked to distribute forms (i.e., information letter, a consent form, and a questionnaire) to parents of typically developing children aged 2;0-5;11. The researcher provided 350 sets of forms to the directors. Parents returned 200
questionnaires and 182 consent forms. Questionnaires that were returned without consent forms were not used in the research. Data were excluded for one child whose parent returned the consent form and questionnaire but did not respond to the ICS-VN questions.

Participants

Children.

The sample consisted of 181 Vietnamese-speaking preschool children living in Ha Noi, Viet Nam. There were approximately equal numbers of males (n = 89, 49.2%) and females (n = 92, 50.8%). The age of the children ranged from 2;0 to 5;11 (24 to 71 months, M = 49.9 months, SD = 12.7). There were more children aged between 3;0 to 5;11 than children aged 2;0 to 2;11 reflecting the Vietnamese preschool context.

The ethnicity of the majority of participants was described as Kinh (Vietnamese) (n = 175, 96.7%) and a few participants were described by their parents as belonging to the Tay (n = 5, 2.8%) and Muong (n = 1, 0.6%) minority ethnic groups. All participants spoke Vietnamese and most participants were reported to speak (n =179, 98.9%) and listen (n = 171, 94.5%) to the Northern Vietnamese dialect at home. The majority of participants had lived in Northern Viet Nam all of their lives. A few participants (n = 3, 1.6%) lived in Central or Southern Viet Nam or another country for more than a year.

Although the preschools were asked to invite parents of typically developing children to participate in this study, some parents reported concerns about speech, language, or other aspects of communication. Parental concerns included: children who lisped (n = 14, 7.7%), children having persistent hearing loss (n = 3, 1.7%), cleft lip and/or palate (n = 2, 1.1%), and/or developmental delay (n = 5, 2.8%). Peña, Spaulding, and Plante (2006) recommended a complete sample should include participants who have speech, language and/or other difficulties in order to provide relative rather than
absolute interpretation of the test scores in comparison to the mean of general population, not in context of normal population. Therefore, in this paper all 181 participants were included.

Parents.

Parents of children provided reports on children’s speech intelligibility and development. Mothers were the majority of respondents (n = 145, 80.1%). The remaining respondents were fathers (n = 34, 18.8%) and grandfathers (n = 2, 1.1%). There were 177 mothers (97.8%) and 198 fathers (98.3%) speaking the Northern Vietnamese dialect. The majority of mothers and fathers had lived in Northern Viet Nam all of their lives. There were 26 (14.3%) mothers and 34 (18.7%) fathers who had lived in Central or Southern Viet Nam or another country for more than a year.

Socio-economic status was determined using the parents’ occupations and education level. The parents’ occupation level was classified using the International Labour Office International Standard Classification of Occupations (ILO, ISCO-08, International Labour Office, 2012). The mothers’ and fathers’ occupations were grouped from skill level 1 (i.e., “performance of simple and routine physical or manual tasks”, p. 12) to skill level 4 (i.e., “performance of tasks that require complex problem-solving, decision-making and creativity based on an extensive body of theoretical and factual knowledge in a specialized field”, p. 13). In most cases this was straightforward but in some cases the skill level was not easily classified according to the guidelines from the ILO. For example, caregivers who wrote “free” (mothers = 4; fathers = 9) were classified as skill level 1; caregivers who wrote “business” (mothers = 15; fathers = 27) were classified as skill level 2; and caregivers who wrote “teacher” (mothers = 47; fathers = 5) were classified as skill level 4, even when the type of teaching was not specified. The children’s mothers’ skill level (n = 178) ranged from 1-4 with a mean of
2.73 (SD = 1.01). The children’s fathers’ skill level (n = 178) ranged from 1-4 with a mean of 2.73 (SD = 0.98). Two mothers and two fathers did not answer this question. Occupation information was not applicable for one mother and one father because they had died.

The parents’ highest education level was recorded. Mothers indicated that their highest education level was a postgraduate degree (n = 60, 33.1%), bachelor’s degree (n = 102, 56.4%), certificate (n = 12, 6.6%), or high school or below (n = 6, 3.3%), and one mother did not answer this question. Fathers indicated that their highest education level was a postgraduate degree (n = 55, 30.4%), bachelor’s degree (n = 103, 56.9%), certificate (n = 13, 7.2%), or high school or below (n = 9, 5.0%) and one father did not answer this question. The high level of parental education reflects the importance of education for residents of Vietnamese cities.

**Instruments**

**Intelligibility in Context Scale (ICS).**

The ICS (McLeod et al., 2012a) is a parent-screening questionnaire designed to estimate children’s intelligibility. In 2012, translators in a Vietnamese medical university translated the ICS into Vietnamese. A professional translation company back translated this version. It was used as a learning material in the first and second speech pathology training programs (2011 and 2013) in Ho Chi Minh City, Viet Nam and in medical and clinical settings by the first and second cohorts of Vietnamese speech pathologists (Hoàng, Trà, & Cao, 2014).

In 2015, the translation was revised by the first author, in consultation with the ICS authors, educational colleagues, and parents in Viet Nam so that it was more accurate and user-friendly for parents in educational as well as medical settings. For example, in the original Vietnamese version, the word for “parent” was the word “bạn”.

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However, this word more accurately means “friend”, so it was changed to “anh/chị” (young adult/parent). Similarly, the word for “the child” was the word “bé”. However, this word more accurately means “baby” so was changed to the word “con” (child). The revised Vietnamese version of the ICS can be found at the ICS website (McLeod et al., 2012c). The current study used this revised Vietnamese version of the ICS (henceforth ICS-VN) to consider children’s intelligibility in northern Viet Nam.

**Parents’ Evaluation of Developmental Status (PEDS).**

The Parents’ Evaluation of Developmental Status (PEDS, Glascoe, 2000) is a standardized and validated parent-screening questionnaire used to examine children’s global development. The Vietnamese version of the PEDS (Glascoe, 2013) has been available and used for the Vietnamese-speaking population in the United States. Given permission from the PEDS authors, the existing translated form was revised by the current study’s first author in consultation with educational professionals and parents in Viet Nam so that the PEDS questions were accurate and user-friendly for the parents living in Viet Nam.

Parents were asked to estimate each child’s developmental status by indicating their level of concern on the PEDS questions which included two open ended questions and eight closed-ended questions on a 3-point Likert scale. Authors from previous studies recommended one PEDS question can be used to describe status of children’s speech and language (McLeod et al., 2015; McLeod, Harrison, McAllister, & McCormack, 2013); therefore, in the current paper, only parents’ responses to the question “Do you have any concerns about how your child talks and make speech sounds? no, a little, yes” (Anh/chị có lo lắng về cách con mình nói và phát âm không? không, một chút, có) were used. If their parents answered no, the children were considered to have typical speech and language.
The Vietnamese Speech Assessment (VSA).

The Vietnamese Speech Assessment (VSA, Phạm, Le, & McLeod, 2016) was used to assess participants’ speech. The VSA is a 77-single-word picture-naming task that samples Vietnamese consonants, semivowels, vowels, and tones. Content validation of the VSA was undertaken to define the test content and evaluate the relevance and representativeness of the test items with the target construct (Phạm, McLeod, & Le, 2016). The VSA has been piloted to examine the relevance of the word list and scoresheet and to estimate the time to complete testing (Phạm, McLeod, & Le, 2016). Normative sampling is underway. The participants’ percentage of consonants correct (PCC) was manually calculated from their responses on the VSA.

Procedure

Classroom teachers were asked to provide 4-page questionnaires to parents of typically developing children in their classes. The questionnaire contained questions about children’s language and general development, parental cultural and demographic background, and the ICS-VN and the PEDS instruments. Questionnaires were completed either at the preschool or at home and were returned to the teachers who gave them to the first author.

A sub-sample of children participated in the next phase of the study, the direct assessment of child speech. This sample comprised 112 participants (62.2%). The derivation of participants included in the direct assessment phase of the research is set out in Figure 1. Those not included were absent on the day of testing, did not provide assent, or were younger than 3 years old. Children with parental concerns were randomly selected for assessment.
The first author conducted the direct assessments in a designated room in the participants’ preschools. Before administering the VSA speech assessment, hearing and oral structure and function assessments were conducted to check for any difficulties the participants might have. Participants’ hearing was screened in both ears for frequencies most important for speech ranging from 500 to 4000 Hz at 20dB using an MA1 Ultra Portable Audiometer fitted with Peltor cups. The testing was adapted to 40dB because of the background noise levels at preschool. Four of 112 participants (3.6%) did not pass the hearing screen and were referred for further hearing assessment. Participants \((n = 108)\) who passed the hearing screening then had their oral structure and function required for production of intelligible speech assessed by using the screening oral motor assessment based on the 80-item scale from Robbins and Klee (1987). The oral motor assessment (OMA) revealed tongue-tie in two participants \((n = 2, 1.9\%)\). The VSA was conducted for participants \((n = 106)\) who passed the hearing and OMA screening. Participants’ responses on the VSA were video and audio recorded. Video and/or audio recording was undertaken using a Sony HDR-PJ790VE video camera and Zoom H1 audio recorder. After the assessment, the first author re-transcribed the VSA using the audio recordings for all participants within 6 months of assessment.

**Reliability**

Point-to-point reliability of the VSA transcription was conducted for consonants, semivowels, vowels, and tones. Intra-rater reliability between the online transcription and re-transcription was calculated randomly for 11 participants (10.4% of the sample). The agreement for intra-judge phoneme was 97.3% on total of 6,404 items. To determine inter-rater reliability, the first author and a Vietnamese speech-language pathologist independently transcribed online for 11 participants (10.47% of the sample).
and then independently checked the transcription afterwards via audio recordings. The item-by-item agreement for inter-rater reliability was 96.1% on total of 6,362 items. Both intra-rater and inter-rater reliability indicate an acceptable level of reliability for transcription as it reached an agreement level of above 85% (Shriberg & Lof, 1991).

Data Analysis

Parent ratings on the ICS-VN as well as the raw scores from the other measures were analysed using the Statistical Package for Social Sciences version 20.0 computer program (SPSS) (IBM, 2011). Both non-parametric and parametric analyses of data were used because both ranked and continuous data collected in the measurement level (Pallant, 2013). Descriptive statistics were used to determine the frequency of responses for each item in the ICS-VN. To demonstrate reliability of the ICS-VN, nonparametric correlation Spearman’s rho for item by item inter-correlations and Cronbach’s alpha test of internal reliability were calculated to indicate the coherence of the seven items. To present normative data, the mean scores were calculated using the whole sample for each item on the ICS-VN. Analyses of variance (ANOVAs) and bivariate correlations were used to examine the psychometric properties (criterion validity) and the impact of age, sex, and parents’ skill level and educational level on parents’ responses.

Results

Descriptive Statistics for the ICS-VN items

The participants’ intelligibility was rated on a 5-point Likert scale: always (5), usually (4), sometimes (3), rarely (2), or never (1). Overall, the ratings ranged from 1-5 when speaking with parents, immediate family members, friends, acquaintances, and strangers (see Table 1). The ratings ranged from 3-5 when speaking to extended family members and teachers. The most common rating for all seven communication partners
was *always*: parents (71.3%), immediate family (60.8%), extended family (51.9%), the child’s friends (55.2%), acquaintances (49.2%), the child’s teachers (57.5%), and strangers (45.3%). Parents reported *sometimes* for strangers (17.7%), extended family (14.4%), acquaintances (13.3%), the child’s friends (7.2%), the child’s teachers (5.0%), immediate family (3.3%) and parents (1.7%). Only a few cases were noted when ratings of *rarely* or *never* were given for communicative partners.

Psychometric Properties of the ICS-VN

**Internal Consistency and Correlation between the Items.**

Bivariate nonparametric correlation analyses (Spearman’s *rho*) for the 7-item ICS-VN showed moderate to high correlations (ranging from *rho* = .54 to *rho* = .88, *p* < .001) between the items (see Table 2). While most correlations are high (> .70), moderate correlations were observed between ratings for parents and strangers (*rho* = .54) and parents and child’s friends (*rho* = .56). Cronbach’s alpha was calculated in order to measure the internal consistency of the items (α = .94), indicating high internal consistency in responses to the items of the scale. This finding confirmed that the ICS-VN items could be combined to generate a total score. The mean for this combined scale was 4.43 (*SD* = 0.62).

**Criterion Validity.**

Criterion validity describes the degree of overlap between two tools that measure similar abilities (Gay, 1985). In this study, criterion validity of the ICS-VN was tested two ways: (1) by comparing scores for participants identified as having concern about
speech and language (PEDS, Glascoe, 2013) and (2) by participants’ PCC scores on the VSA (Phạm, Le, et al., 2016).

*Parents’ Evaluation of Developmental Status (PEDS).*

The mean ICS-VN scores were compared with the level of parental concern about talking and making speech sounds ($n = 181$). The mean ICS-VN scores for three groups of participants were as follows: *no concern* ($M = 4.63$, $SD = 0.67$), *a little concern* ($M = 4.29$, $SD = 0.67$), and *yes (have) concern* ($M = 3.96$, $SD = 0.70$). ANOVA tests were conducted to test for linearity, and to test post-hoc comparisons between the groups. Results showed there was a significant linear relationship for parents’ responses on the ICS-VN based on PEDS categories of parental concern ($F(1,178) = 23.09$, $p < .001$), as well as significant differences between groups ($F(2,178) = 12.68; p = .000$). Post-hoc comparisons showed that there was a significant difference on the ICS-VN mean score between the group of participants with no concern and the groups with a little concern ($p = .03$) or concern ($p < .001$), but there was no difference between groups of participants having a little concern and having concern.

*Vietnamese Speech Assessment (VSA).*

The VSA was used to assess speech of 106 participants, made up of 66 children whose parents had no concern, 33 whose parents had a little concern and 7 whose parents had concern about speech and language (see Figure 1). In the current study, participants’ PCC was calculated from the VSA ($M = 86.52$, $SD = 10.12$).

The correlation between the ICS-VN mean scores and PCC was tested by using bivariate correlation analyses (Pearson’s $r$). The bivariate correlation between the ICS-VN mean scores and PCC was ($r = .42$, $p < .01$) indicating that parents’ responses of
intelligibility on the ICS-VN was positively correlated with the participants’ speech accuracy.

**Normative Data**

Average ratings (means and standard deviations) were calculated for the participants’ intelligibility with each communication partner. The ICS-VN mean average total score for the 181 participants was 4.43 ($SD = 0.62$). The mean scores for each partner ranged from $M = 4.66$ ($SD = 0.63$) to $M = 4.21$ ($SD = 0.87$) (see Table 3). Repeated measure ANOVAs with Greenhouse-Geisser correction was conducted to test for mean differences among the different communication partners ($F(1, 179) = 9076.11, p < .01, \eta_p^2 = .981$). Pairwise comparisons using Bonferroni correction showed that parents’ ratings of participants’ intelligibility was the highest with themselves ($M = 4.66$) compared with all other partners: immediate family members ($M = 4.53$), teachers ($M = 4.53$), friends ($M = 4.43$), extended family members ($M = 4.38$), acquaintances ($M = 4.30$), and strangers ($M = 4.21$). Among these communicative partners, there was no difference between immediate family and teachers and friends. Other pair-wise comparisons are presented in Table 3.

Insert Table 3 here

**Impact of Demographic Variables**

Three demographic variables were considered to determine their effect on the ICS-VN scores ($n = 181$): participants’ age and sex, and parents’ skill level and education level.

**Age and Sex.**
Pearson’s correlation was used to examine the correlation between the ICS-VN mean score and the participants’ age. A weak positive correlation was found ($r = .26$, $p < 0.01$), indicating that as children got older their scores for intelligibility increased. Next, the ICS-VN scores for males ($M = 4.53$, $SD = 0.66$) and females ($M = 4.51$, $SD = 0.58$) were examined using a t-test comparison of means. There were no significant differences between the participants’ mean scores based on their sex ($t = 0.281$, ns). To further test sex and age differences, a 2-factor analysis of variance (ANOVA) was run (sex*age groups). The participants’ ages were formed into intervals of 6 months creating eight age groups: 2;0-2;5; 2;6-2;11; 3;0-3;5; 3;6-3;11; 4;0-4;5; 4;6-4;11; 5;0-5;5; 5;6-5;11. Results showed a marginal effect for age group ($F = 1.98$, $p = .06$), no effect for sex, and no interaction effect (see Table 4).

Parents’ Skill and Education Level.

A one-way ANOVA was used to test the differences between the parents’ skill level and the participants’ ICS-VN mean score and between the parents’ education level and the participants’ ICS-VN mean score for the 181 participants. Results are presented in Table 5. There were significant differences between the participants’ ICS-VN mean score and the parents’ skill level: for mothers ($F(3, 175) = 5.17$, $p = .002$) and for fathers ($F(3, 175) = 5.63$, $p = .001$). There were also significant differences between the participants’ ICS-VN mean score and the education level for mothers ($F(2, 178) = 3.96$, $p = .02$) but not for fathers ($F(2, 178) = 1.49$, $p = .23$). These results showed that the mean ICS-VN scores were higher for participants whose parents had a higher skill level and participants whose mothers had a higher educational level.
Discussion

The ICS-VN was completed by 181 parents of Vietnamese-speaking children aged 2;0 to 5;11. The overall mean ICS-VN score and item-level scores for each communicative partner were similar to scores achieved by Australian-English speaking children (see Table 3; McLeod et al., 2015). For example, overall ICS mean score was 4.43 ($SD = 0.62$) for Vietnamese and 4.4 ($SD = 0.7$) for Australian children. The children’s intelligibility with different communicative partners was similar to findings from other studies: intelligibility was the highest with parents, then immediate family members, teachers, friends, extended family members, acquaintances, and strangers.

This current study used bivariate correlations to examine the validity of the ICS-VN. The ICS-VN mean scores were compared to socio-demographic variables including age, sex, parents’ skill and parents’ educational level. Result indicated a significant but weak impact of age on the ICS-VN score ($r = .26$). The intelligibility scores were higher when children got older. The finding is consistent with that in other previous ICS studies (Neumann et al., 2016; Tomić & Mildner, 2014). Nevertheless, McLeod et al. (2015) found that Australian preschool children aged 5;0-5;5 had lower ICS score than for younger age groups. They indicated this may be due to the educational policy allowing parent-choice regarding the age of school entry, suggesting children who were less intelligible may be attending preschool for an additional year. Hopf et al. (2016) also reported no influence of age on ICS score for primary school students in Fiji.

In the present study, there were no significant differences on the ICS-VN score between female and male participants. This result was similar to previous ICS studies except for one different result found in McLeod et al. (2015) that the ICS ratings for females were higher than for males. Regarding family demographic factors, the current study indicated a significant influence of parents’ skill level and mothers’ educational
The higher the parents’ skill level and higher the mothers’ educational level, the better their children’s intelligibility ratings. The finding was similar to what Neumann et al. (2016) found with German children, presenting a significant but low impact of family social class on ICS scores. Most other ICS studies did not show socio-demographic influences on ICS scores (e.g., Hopf et al., 2016; McLeod et al., 2015).

The current study provided evidence that the ICS-VN is a valid tool to assess intelligibility of Vietnamese-speaking children in Northern Viet Nam. The results demonstrated high internal reliability between items ($\alpha = 0.94$) and moderate to high correlations between items (range $r = .54$ to $r = .80$, $ps < .001$). There was a significant difference in ICS-VN scores between participants identified as typically developing compared with participants whose parents had concerns about their speech and language and with the measure of participants’ speech (PCC). Parents rated their child’s intelligibility on the ICS-VN and also filled the PEDS to indicate their concerns about their children’s speech and language. The significant differences on the ICS-VN mean score between the group of participants with no parental concern and the groups of participants with a little parental concern and having parental concern showed the consistency of parents’ responses in these both measures. Previous studies (McLeod et al., 2015; McLeod, Harrison, McAllister, & McCormack, 2013) recommended using one PEDS question “Do you have any concerns about how your child talks and make speech sounds? no, a little, yes” (Anh/chị có lo lắng về cách con mình nói và phát âm không? không, một chút, có) to describe children’s speech and language status. A similar finding was also reported in McLeod et al. (2015) that only parental concern about talking and speech sounds was a significant predictor of children’s ICS-VN score. Currently there are limited standardised speech and language assessment tools in Vietnamese, and the status of children’s speech and language is mainly based on reports...
from parents and/or teachers, not from direct testing. The current study indicates that parental concern about talking and making speech sounds appears to be reliably correlated with intelligibility ratings of Vietnamese-speaking children. Additionally, the criterion validity of the ICS-VN was considered by undertaking bivariate correlations between the ICS-VN score and the PCC score from the VSA. PCC is considered a measure of signal dependent intelligibility (Miller, 2013). The use of PCC was similar to previous ICS validation studies in other languages (e.g., Hopf et al., 2016; McLeod et al., 2015; McLeod et al., 2012b; Neumann et al., 2016; Ng et al., 2014; Washington et al., 2016).

The results for internal consistency and psychometric properties of the ICS-VN shared many similarities with other studies using the ICS (see Tables 3 and 6; McLeod et al., 2015; McLeod et al., 2012b; Neumann et al., 2016; Ng et al., 2014; Washington et al., 2016). For example, internal consistency in parents’ responses to the items of the ICS was $\alpha = .93$ in McLeod et al. (2012a), $\alpha = .94$ in McLeod et al. (2015), and $\alpha = .91$ in Washington et al. (2015). The construct validity of the ICS-VN demonstrated moderate to high correlations, similar to other studies using the ICS (see Table 6). Similarly, the criterion validity between the ICS-VN and PCC was comparable to other studies using the ICS (see Table 6).

Limitations

The current study was undertaken in two preschools in Ha Noi, the capital city of Viet Nam. Parents’ educational level was high, but this is reflective of the higher educational attainment of residents of Ha Noi. Another limitation of the study was that direct assessment using the VSA was predominantly undertaken for children whose parents were not concerned about their speech and language, so the sensitivity and
specificity findings are based on parents’ and teachers’ report of concern, not from direct assessment. Furthermore, although the sample in the current study included a broad age range of preschoolers (from 2;0 to 5;11 years), there were more children in the older groups than the younger groups who participated. However, the different proportions of children in different age groups are reasonably representative of children at preschool settings in Viet Nam.

Clinical Implications and Future Directions

The findings of the current study indicate that the ICS-VN may provide a valid description and screener of Vietnamese-speaking children’s intelligibility in Northern Viet Nam. Since there are differences between the pronunciation of Vietnamese in Northern, Central, and Southern Viet Nam (Phạm & McLeod, 2016) there is a need for replication for this study within other regions. It would also be useful conduct research into the validity and norming of the ICS-VN with more participants within younger age groups.

Conclusion

The current study gathered normative data on intelligibility for Vietnamese-speaking preschoolers using the ICS-VN. The ICS-VN demonstrated satisfactory internal consistency and was comparable to other international studies using the ICS. The ICS-VN demonstrated criterion validity with measures of speech and language status including parents’ reported concern on the PEDS and PCC on direct assessment using the VSA. Factors significantly affecting the ICS-VN scores included age, parents’ skill level, and mothers’ educational level. There were no significant effects from children’s sex or fathers’ educational level. The ICS-VN appears to be a valid tool to describe Vietnamese-speaking children’s intelligibility in Northern Viet Nam.
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Declaration of interest

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Table 1.

*Distribution of Parent Responses for the 7-Item Intelligibility in Context Scale (n = 181)*

<table>
<thead>
<tr>
<th>Question</th>
<th>Range</th>
<th>Always (5)</th>
<th>Usually (4)</th>
<th>Sometimes (3)</th>
<th>Rarely (2)</th>
<th>Never (1)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>1. Do you understand your child?</td>
<td>1-5</td>
<td>129</td>
<td>71.3</td>
<td>47</td>
<td>26.0</td>
<td>3</td>
</tr>
<tr>
<td>2. Do immediate members of your family understand your child?</td>
<td>1-5</td>
<td>110</td>
<td>60.8</td>
<td>62</td>
<td>34.3</td>
<td>6</td>
</tr>
<tr>
<td>3. Do extended members of your family understand your child?</td>
<td>3-5</td>
<td>94</td>
<td>51.9</td>
<td>61</td>
<td>33.7</td>
<td>26</td>
</tr>
<tr>
<td>4. Do your child’s friends understand your child?</td>
<td>1-5</td>
<td>100</td>
<td>55.2</td>
<td>64</td>
<td>35.4</td>
<td>13</td>
</tr>
<tr>
<td>5. Do other acquaintances understand your child?</td>
<td>1-5</td>
<td>89</td>
<td>49.2</td>
<td>63</td>
<td>34.8</td>
<td>24</td>
</tr>
<tr>
<td>6. Do your child’s teachers understand your child?</td>
<td>3-5</td>
<td>104</td>
<td>57.5</td>
<td>67</td>
<td>37.0</td>
<td>9</td>
</tr>
<tr>
<td>7. Do strangers understand your child?</td>
<td>1-5</td>
<td>82</td>
<td>45.3</td>
<td>62</td>
<td>34.3</td>
<td>32</td>
</tr>
</tbody>
</table>
Table 2.

*Correlations Between the Seven Items on the Intelligibility in Context Scale (n = 181)*

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Parent</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Immediate family</td>
<td>.76**</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Extended family</td>
<td>.62** .74**</td>
<td>.76** -</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Child’s friends</td>
<td>.56** .66** .73**</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Acquaintances</td>
<td>.61** .71** .84** .79**</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Teachers</td>
<td>.68** .73** .74** .73** .72**</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Strangers</td>
<td>.54** .66** .86** .75** .88** .77**</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. **p < .01 (2-tailed)
Table 3.

The ICS Mean Score and Mean Score Differences

<table>
<thead>
<tr>
<th>Item</th>
<th>Vietnamese (n = 181)</th>
<th>English (n = 803) (McLeod et al., 2015)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean score (SD)</td>
<td>Comparison of means for each item</td>
</tr>
<tr>
<td>1. Parent</td>
<td>4.66 (0.63)</td>
<td>1 &gt; 2, 3, 4, 5, 6, 7</td>
</tr>
<tr>
<td>2. Immediate family</td>
<td>4.53 (0.70)</td>
<td>2 &gt; 3, 5, 7</td>
</tr>
<tr>
<td>3. Extended family</td>
<td>4.38 (0.72)</td>
<td>3 &lt; 6 and 3 &gt; 7</td>
</tr>
<tr>
<td>4. Child’s friends</td>
<td>4.43 (0.77)</td>
<td>4 &gt; 3, 5, 7</td>
</tr>
<tr>
<td>5. Acquaintances</td>
<td>4.30 (0.82)</td>
<td>5 &lt; 6</td>
</tr>
<tr>
<td>6. Teachers</td>
<td>4.53 (0.59)</td>
<td>6 &gt; 3, 5, 7</td>
</tr>
<tr>
<td>7. Strangers</td>
<td>4.21 (0.87)</td>
<td>7 &lt; 1, 2, 3, 4, 5, 6</td>
</tr>
<tr>
<td><strong>Total ICS Score</strong></td>
<td><strong>31.01 (4.37)</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Overall Mean</strong></td>
<td><strong>4.43 (0.62)</strong></td>
<td></td>
</tr>
</tbody>
</table>

ICS

Note. Mean scores were generated from responses on a 5 point scale where 1 = never, 2 = rarely, 3 = sometimes, 4 = usually, 5 = always (McLeod et al., 2012a)
Table 4.

Mean and Standard Deviations for the Intelligibility in Context Scale by Sex and Age (n = 181)

<table>
<thead>
<tr>
<th>Age range</th>
<th>Sex</th>
<th>n</th>
<th>Mean (range 1-5)</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>2;0-2;5</td>
<td>Male</td>
<td>8</td>
<td>3.95</td>
<td>0.84</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>5</td>
<td>3.97</td>
<td>0.75</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>13</td>
<td>3.96</td>
<td>0.77</td>
</tr>
<tr>
<td>2;6-2;11</td>
<td>Male</td>
<td>6</td>
<td>4.05</td>
<td>0.95</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>5</td>
<td>4.37</td>
<td>0.59</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>11</td>
<td>4.19</td>
<td>0.79</td>
</tr>
<tr>
<td>3;0-3;5</td>
<td>Male</td>
<td>17</td>
<td>4.08</td>
<td>0.55</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>15</td>
<td>4.32</td>
<td>0.55</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>32</td>
<td>4.19</td>
<td>0.56</td>
</tr>
<tr>
<td>3;6-3;11</td>
<td>Male</td>
<td>10</td>
<td>4.46</td>
<td>0.46</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>12</td>
<td>4.45</td>
<td>0.51</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>22</td>
<td>4.45</td>
<td>0.47</td>
</tr>
<tr>
<td>4;0-4;5</td>
<td>Male</td>
<td>9</td>
<td>4.44</td>
<td>0.52</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>14</td>
<td>4.43</td>
<td>0.82</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>23</td>
<td>4.43</td>
<td>0.71</td>
</tr>
<tr>
<td>4;6-4;11</td>
<td>Male</td>
<td>17</td>
<td>4.47</td>
<td>0.60</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>17</td>
<td>4.70</td>
<td>0.40</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>34</td>
<td>4.58</td>
<td>0.51</td>
</tr>
<tr>
<td>5;0-5;5</td>
<td>Male</td>
<td>13</td>
<td>4.73</td>
<td>0.43</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>10</td>
<td>4.57</td>
<td>0.54</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>23</td>
<td>4.66</td>
<td>0.48</td>
</tr>
<tr>
<td>5;6-5;11</td>
<td>Male</td>
<td>9</td>
<td>4.44</td>
<td>0.89</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>14</td>
<td>4.82</td>
<td>0.36</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>23</td>
<td>4.68</td>
<td>0.63</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>Male</td>
<td>89</td>
<td><strong>4.35</strong></td>
<td><strong>0.66</strong></td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>92</td>
<td><strong>4.51</strong></td>
<td><strong>0.58</strong></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>181</td>
<td><strong>4.43</strong></td>
<td><strong>0.62</strong></td>
</tr>
</tbody>
</table>
Note. Mean scores were generated from responses on a 5 point scale where 1 = never, 2 = rarely, 3 = sometimes, 4 = usually, 5 = always (McLeod et al., 2012a).
Table 5.

Comparisons between the Mean ICS Scores and Parents’ Educational Levels and Skill Levels (n = 181)

<table>
<thead>
<tr>
<th>Parents’ Educational Levels</th>
<th>Mothers</th>
<th></th>
<th>Fathers</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>ICS Mean (SD)</td>
<td>df</td>
<td>Sig</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(2, 178)</td>
<td>.021</td>
<td></td>
</tr>
<tr>
<td>Certificate or below</td>
<td>19</td>
<td>4.06 (1.36)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bachelor university or</td>
<td>102</td>
<td>4.52 (0.53)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>college degree</td>
<td>60</td>
<td>4.35 (0.61)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Postgraduate degree</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>181</td>
<td>4.42 (0.70)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(3, 175)</td>
<td>.002</td>
<td></td>
</tr>
<tr>
<td>Skill level 1</td>
<td>11</td>
<td>3.64 (1.61)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skill level 2</td>
<td>92</td>
<td>4.47 (0.56)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skill level 3</td>
<td>12</td>
<td>4.40 (0.52)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skill level 4</td>
<td>64</td>
<td>4.46 (0.60)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>179</td>
<td>4.41 (0.70)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Table 6.

Comparisons of psychometric properties of the ICS between studies

<table>
<thead>
<tr>
<th>Language</th>
<th>Mean ICS score (SD):</th>
<th>Mean ICS score (SD):</th>
<th>Internal reliability</th>
<th>Construct validity</th>
<th>Criterion validity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Typical</td>
<td>Atypical*</td>
<td>α = .94</td>
<td>range r = .51 to r = .85, ps &lt; .001</td>
<td>PCC (r = .42, p &lt; .01)</td>
</tr>
<tr>
<td>Vietnamese</td>
<td>4.63 (0.67)</td>
<td>3.96 (0.70)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(n = 181)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>English</td>
<td>4.6</td>
<td>3.9</td>
<td>α = .94</td>
<td>range r = .54 to r = .80, ps &lt; .001</td>
<td>PCC (r = .24, p &lt; .001)</td>
</tr>
<tr>
<td>(n = 803)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>PVC (r = .30, p &lt; .001)</td>
</tr>
<tr>
<td>(McLeod et al., 2015)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>PPC (r = .30, p &lt; .001)</td>
</tr>
<tr>
<td>English</td>
<td>4.69 (0.51)</td>
<td>3.85 (0.49)</td>
<td>α = .93</td>
<td>range r = .48 to r = .86, ps &lt; .001</td>
<td>PCC (r = .54, p &lt; .01)</td>
</tr>
<tr>
<td>(n = 120)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>PVC (r = .36, p &lt; .01)</td>
</tr>
<tr>
<td>(McLeod et al., 2012)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>PPC (r = .54, p &lt; .01)</td>
</tr>
<tr>
<td>Cantonese</td>
<td>4.56 (0.48)</td>
<td>4.14 (0.65)</td>
<td>-</td>
<td>range r = .56 to r = .89, ps &lt; .001</td>
<td>PICC (r = .41, p &lt; .001)</td>
</tr>
<tr>
<td>(n = 72)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Atypical speech errors</td>
</tr>
<tr>
<td>(Ng et al., 2014)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(r = -.41, p &lt; .001)</td>
</tr>
<tr>
<td>English/Jamaican-Creole</td>
<td>4.43</td>
<td>4.50</td>
<td>α = .91</td>
<td>range r = .42 to r = .81, ps &lt; .001</td>
<td>PCC (r = .39, p &lt; .001)</td>
</tr>
<tr>
<td>(n = 98)</td>
<td>(.63)</td>
<td>(.56)</td>
<td></td>
<td></td>
<td>PVC (r = .28, p = .005)</td>
</tr>
<tr>
<td>(Washington et al., 2015)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>PPC (r = .39, p &lt; .001)</td>
</tr>
<tr>
<td>German</td>
<td>4.49 (0.47)</td>
<td>3.97 (0.63)</td>
<td>α = .94</td>
<td>range r = .71 to r = .93, ps &lt; .001</td>
<td>PCC (r = .42, p &lt; .001)</td>
</tr>
<tr>
<td>(n = 181)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>PVC (r = .62, p &lt; .001)</td>
</tr>
</tbody>
</table>
Neumann, Rietz, & Stenneken, 2016)

PPC ($r = .47, p < .001$)

Note. PCC = percentage of consonants correct, PVC = percentage of vowels correct, PPC = percentage of phonemes correct, PICC = percentage of initial consonants correct. *Children with parental concern/ speech sound disorder.
Figure 1. Participant recruitment diagram. Participants in shaded boxes were included in the current study.

Note. ICS-VN = Intelligibility in Context Scale: Vietnamese, PEDS = Parents’ Evaluation of Development Status, OMA = Oromotor assessment, VSA = Vietnamese Speech Assessment, WNL = within normal limits

*Not assessed due to being absent, not providing assent, or being younger than 3 years old.

**Children with parental concerns were randomly selected for assessment.
Chapter 9

Conclusions and Contributions of this Doctoral Research

This doctoral research sought to describe Northern Vietnamese-speaking children’s acquisition of consonants, semivowels, vowels, and tones. This final chapter highlights the main points presented in Chapter 1 to Chapter 8 by providing an overall summary and describing the unique contributions of this doctoral research and key contributions in reference to the individual research aims. The chapter also addresses key contributions of this doctoral research to literature and theories, and its implications for policy and practice. Limitations, directions for future research, as well as the impact of this doctoral research are described before concluding with the final summary of the whole thesis.

Summary and Unique Contribution of this Doctoral Research

Children’s speech acquisition has been investigated extensively across many languages and countries. Many of studies have focused on English; however, recently there has been an increase in recognition of studies of speech acquisition in languages other than English including tone languages (e.g., Cantonese) (see McLeod & Crowe, 2018). In speech-language pathology, knowledge and understanding of children’s speech acquisition is of great importance for making clinical decisions in all service phases (Dodd, Holm, Hua, & Crosbie, 2003; McLeod & Baker, 2017). Children’s speech acquisition data assist in the classification/diagnosis of children who have typically developing speech and those who do not (Davis, 2007; Dodd et al., 2003), determination of the type and the severity of children’s disorder (Waring & Knight, 2013), and identification of whether children may require speech intervention services or not (Broomfield & Dodd, 2004). Children’s speech acquisition data also allow for comparison of speech sounds acquired by children across a range of typologies within a specific language, between languages, between children who are typically developing
and those who have speech sound disorders, and between monolingual and multilingual children. For example, McLeod and Crowe (2018) investigated consonant acquisition in 27 languages through a cross-linguistic review of over 60 studies to examine universal trends, the idea initially introduced by Jakobson (1968), as well as to view language-specific variations in children’s speech acquisition across languages (cf. Hua & Dodd, 2006; McLeod, 2007).

Vietnamese is one of the most common languages in the world, spoken by approximately 92 million people in Viet Nam and about four million people of Vietnamese descent living in other countries. The Vietnamese government’s Developmental Standards are applied to all children in Viet Nam, and Standard 15 states that 5-year-old children should “Nói rõ ràng” (To speak clearly) in Item 65 and “Kể về một sự việc, hiện tượng nào đó để người khác hiểu được” (To narrate an event or a fact intelligibly to others) in Item 70 (Viet Nam Ministry of Education and Training, 2010). Notably little is known about Vietnamese children’s speech acquisition (Hwa-Froelich, Hodson, & Edwards, 2002; Tang & Barlow, 2006). No standardised speech assessment tools for Vietnamese are available (McLeod & Verdon, 2014). Additionally, the speech-pathology profession is emerging in Viet Nam and there have been calls for the development of culturally and linguistically appropriate norms and resources (e.g., assessment tools) to inform practice and legitimate the profession (Atherton, Davidson, & McAllister, 2017). Studying Northern Vietnamese-speaking children’s speech acquisition was thereby motivated as the over-arching aim of this doctoral research in order to fill the current knowledge gap.

Different research methods and activities were applied through two parts spanning nine chapters including five individual papers within this doctoral research. These research methods and activities included literature reviews, participant recruitment, screening and direct assessment, data entry and storage, comprehensive
speech analysis, and statistical analyses and interpretation. Five research aims were addressed towards achieving the over-arching research aim that has provided emerging evidence regarding Northern Vietnamese-speaking children’s acquisition of consonants, semivowels, vowels, and tones and intelligibility. In alignment with achievement of the five research aims, the four stages proposed in the Communication Capacity Research program for the development of communication specialist services in Majority World countries (Hopf, 2018) and all components of the International Classification of Functioning, Disability, and Health-Children and Youth version (ICF-CY, World Health Organization, 2007) were addressed within this doctoral research (Table VI).

**Synopsis of this Doctoral Research (revisited)**

This doctoral research contained two parts and was presented in nine chapters, five of which were publications (one encyclopaedia entry and four journal articles). Part 1 consisted of four chapters including Papers 1 and 2, and Part 2 consisted of five chapters including Papers 3, 4, and 5.

**Part 1. Vietnamese language and context.**

The first chapter of this doctoral research provided a general introduction followed by the research aims. The synopsis described this doctoral research’s structure to orient readers to the whole doctoral research. A description of the theoretical framework and the research methodology employed within this doctoral research was presented.

Chapter 2 (Paper 1) was a published journal article that provided a comprehensive literature review of variations of consonants, semivowels, vowels, and tones in the Northern Vietnamese dialect in comparison with the Standard, Central, and Southern Vietnamese dialects. The information presented in Chapter 2 provided a foundation for consideration of Vietnamese phonemes included in the speech assessment and speech analysis for Part 2 of this doctoral research.
Table VI.

Summary of Research Aims, Stages in the Communication Capacity Research Program, and the ICF-CY Components Addressed

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Research aim addressed or chapter title</th>
<th>Paper</th>
<th>Communication Capacity Research’s stages addressed</th>
<th>ICF-CY components addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction and orientation to this doctoral research</td>
<td>-</td>
<td>Stage 1 “gathering knowledge from policy and literature” and Stage 2 “gathering knowledge from the community”.</td>
<td>All ICF-CY components</td>
</tr>
<tr>
<td>2</td>
<td>Aim 1: To identify the consonants, semivowels, vowels/diphthongs, and tones of the Northern dialect compared with the Standard, Central, and Southern dialects of Vietnamese.</td>
<td>Paper 1: Consonants, vowels, and tones across Vietnamese dialects (Pham &amp; McLeod, 2016).</td>
<td>Stage 1 “gathering knowledge from policy and literature” and Stage 2 “gathering knowledge from the community”.</td>
<td>Body Functions and Environmental Factors</td>
</tr>
<tr>
<td>3</td>
<td>Aim 2: To present an overview of tone languages.</td>
<td>Paper 2: Tone languages and communication disorders (Pham &amp; McLeod, 2017, in press)</td>
<td>Stage 1 “gathering knowledge from policy and literature”</td>
<td>Body Functions, Environmental and Personal Factors</td>
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<td>4</td>
<td>The Vietnamese context: Education and Speech-language pathology.</td>
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<td>Stage 1 “gathering knowledge from policy and literature” and Stage 2 “gathering knowledge from the community”.</td>
<td>Environmental Factors</td>
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<td>5</td>
<td>Children’s speech acquisition: Definitions, theories and methodological considerations.</td>
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<td>Stage 1 “gathering knowledge from policy and literature” and Stage 2 “gathering knowledge from the community”.</td>
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<td>6</td>
<td>Aim 3: To develop a speech assessment to elicit speech samples from Vietnamese-speaking children.</td>
<td>Paper 3: Development of the Vietnamese Speech Assessment (Pham, McLeod, et al., 2016)</td>
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<td>7</td>
<td>Aim 4: To investigate children’s acquisition of Northern Vietnamese phonemes (speech accuracy, phoneme acquisition, non-adult realisations, and phonological patterns).</td>
<td>Paper 4: Vietnamese-speaking children’s acquisition of consonants, semivowels, vowels, and tones in Northern Viet Nam (Pham &amp; McLeod, 2017)</td>
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<td>9</td>
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<td>All ICF-CY components</td>
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Chapter 3 was embedded within an encyclopaedia entry (Paper 2) and provided an overview about tone languages in association with communication disorders. The broad information presented in Chapter 3 supported the clinical value of Vietnamese tones in studying speech acquisition of Northern Vietnamese-speaking children.

Chapter 4 provided an introduction to the Vietnamese context regarding the educational system and speech-language pathology profession. This chapter also outlined the Vietnamese government’s Developmental Standards for 5-year-old children and described six standards comprising 30 items regarding language and communication development. In reviewing the Developmental Standards for 5-year-old children, it was evident that there was a pressing need for finer-grained data to assist with the enactment and understanding of the Developmental Standards for Standard 15 “The child uses speech to communicate”. Information presented in Part 1 of this doctoral research laid the foundation regarding the Vietnamese context and speech sound system for study of Vietnamese-speaking children’s speech acquisition that was described in Part 2.

Part 2. Vietnamese children’s speech acquisition.

Chapter 5, beginning Part 2 of this doctoral research, provided information about definitions, theories, and methodological considerations for studying speech acquisition. Within this chapter, each section was described theoretically then clinical applications were transferred to the current doctoral research. An introduction of typical speech acquisition was presented including definitions of typical speech acquisition and reasons to examine children’s typical speech acquisition. Chapter 5 overviewed a number of phonological theories to provide a multi-faceted perspective on children’s speech acquisition including the Emergence Approach (Davis & Bedore, 2013) that was used as the speech acquisition theory underpinning of this doctoral research. Chapter 5 also outlined methodological considerations including research designs for studying
speech acquisition, and speech acquisition measurement protocols for cross-sectional studies.

Chapter 6 (Paper 3) provided the conceptualisation and operationalisation of the Vietnamese Speech Assessment (VSA, Phạm, Le, & McLeod, 2016). The VSA was developed as a part of this doctoral research to elicit speech samples for data collection for Chapters 7 and 8 that contained the main results of the thesis.

Chapter 7 (Paper 4) presented an analysis of speech samples collected from 195 typically-developing children from preschools in Ha Noi and Hai Phong, Northern Viet Nam (Phạm & McLeod, 2017). These speech samples were used to analyse productions of consonants, semivowels, vowels, and tones to report children’s phoneme acquisition, non-adult realisations, and common phonological patterns.

Chapter 8 (Paper 5) used responses collected from 181 parents who completed the ICS-VN (McLeod et al., 2012b) to examine Northern Vietnamese-speaking children’s intelligibility. This chapter also reported information regarding validation of the ICS-VN to showcase it was a valid parent-report screening tool for the use with Northern Vietnamese-speaking children (Phạm et al., 2017).

This chapter is the final chapter of the doctoral research summarising the new knowledge about Vietnamese children’s speech acquisition and the key contributions of this doctoral research associated with the research aims. This chapter also highlights the contributions to literature and theory, and the implications for policy and practice, summarises the limitations, recommends directions for future research, and reveals the impact of this doctoral research to date.

**Key Contributions of this Doctoral Research**

This doctoral research has made five key contributions about Northern Vietnamese-speaking children’s speech acquisition that have wide applicability to understanding of the Developmental Standards for 5-year-old children and the field of
speech-language pathology. These five key contributions are documented in reference to each of the research aims.

**Aim 1: To identify the consonants, semivowels, vowels/diphthongs, and tones of the Northern dialect compared with the Standard, Central, and Southern dialects of Vietnamese (Paper 1)**

A comprehensive description of consonants, semivowels, vowels/diphthongs, and tones pronounced between Northern Vietnamese dialect and other Vietnamese dialects (i.e., Standard, Central, and Southern) was presented in Chapter 3 (Paper 1). The findings were drawn from reviewing literature, most of which was written in Vietnamese and published in Viet Nam. Consonants (including syllable-initial and syllable-final consonants), semivowels, vowels, and tones pronounced in Northern Vietnamese were compared with Standard, Central, and Southern Vietnamese. There are a number of shared phonemes between Northern Vietnamese and the other Vietnamese dialects. Variations occurred regarding the number and type of initial consonants, final consonants, semivowels, vowels, and tones. For example, the number of the initial consonants in Northern Vietnamese is 20; whereas, there are 23 in Standard Vietnamese and Central Vietnamese and 21 in Southern Vietnamese. The number of final consonants in Northern Vietnamese is 10; whereas, there are 6 in Standard Vietnamese, and 8 in Southern Vietnamese. There are six tones in Northern Vietnamese, similar to Standard Vietnamese; whereas, there are five tones in Central and Southern Vietnamese.

**Aim 2: To present an overview of tone languages (Paper 2).**

Vietnamese is a tone language and the Vietnamese tones are a compulsory component of syllables that contrast word meaning. In studying speech acquisition, tones are considered as a parameter used in relational and prosodic analyses (McLeod, 2010). Chapter 4 (Paper 2) was written to assist with the broad understanding of lexical
tones associated with communication disorders across tone languages. This overview addressed key points regarding the definition of tones, examples of tone languages, transcription of tones using the International Phonetic Alphabet and other systems, children’s acquisition of tones, the impact of communication disorders on tone perception and production, and assessment and intervention of tones. It provided understanding for the implementation of an analysis of children’s acquisition of Vietnamese tones targeted in research aims 3, 4, and 5 of this doctoral research.

**Aim 3: To develop a speech assessment to elicit speech samples from Vietnamese-speaking children (Paper 3)**

A speech assessment, the Vietnamese Speech Assessment (VSA, Phạm, Le, & McLeod, 2016), that can be used to elicit speech samples from Vietnamese-speaking children was developed as part of this doctoral research and was described in Chapter 6 (Paper 3). The VSA is a single-word picture-naming task including a total of 77 single words (75 monosyllabic and two disyllabic words) that represents all possible Vietnamese consonants, semivowels, vowels, and tones. The VSA was conceptualised to enable elicitation of all Vietnamese phonemes across the Vietnamese dialects including Northern Vietnamese. Content validity and a pilot study were completed resulting in a research version that consists of a stimuli book and a scoresheet. The VSA’s stimuli book includes 77 colourful drawings and a 4-step prompt hierarchy for elicitation of each target word attached in the back page of the individual drawings. Expected responses, including dialectal variants transcribed using the International Phonetic Alphabet, were also provided on the back page of each drawing in the stimuli book. Analysing dialectal variants was an innovative feature of this doctoral research, and can be applied to other languages with significant dialectal variants. The VSA’s scoresheet comprises a number of columns including: (1) the target phonemes listed in the order of the Vietnamese initial consonants according to the International Phonetic
Alphabet, (2) target words written orthographically, (3) transcription of all possibly acceptable pronunciations of each target word in Standard, Northern, Central, and Southern Vietnamese, (4) space for children’s actual productions to be transcribed online or re-transcribed, and (5) scoring parameters such as numbers of correct phonemes and phonological patterns (see Appendix N). The creation of the VSA demonstrated how to begin the development of a standardised assessment in answer to calls for culturally and linguistically appropriate resources in Majority World countries (cf. Hopf, 2018). The authorship of the VSA also illustrated knowledge exchange between Majority and Minority World countries to respond to the issues raised in communication specialist services in Majority World countries (cf. Cheng, 2013). The research version of the VSA was used to collect speech samples from 195 typically-developing children in Northern Vietnam for investigation of Northern Vietnamese children’s speech acquisition targeted in research aims 4 and 5.

**Aim 4: To investigate children’s acquisition of Northern Vietnamese phonemes (speech accuracy, phoneme acquisition, non-adult realisations, and phonological patterns) (Paper 4)**

This research aim was considered through a study to investigate 195 typically-developing children’s acquisition of Northern Vietnamese phonemes. This research study was described in Chapter 7 (Paper 4). The speech samples were collected using the research version of the VSA (Phạm, Le, & McLeod, 2016) as outlined in the preceding research aim. The data were analysed using Phon version 3.0.1 (Rose & Stoel-Gammon, 2015), an open source phonological analysis computer software adapted via collaboration between the software developers and the current researcher for the analysis of Vietnamese phonemes. Relational analyses were used to measure: (1) speech accuracy (the percentage of consonants, semivowels, vowels, tones, and whole words correct) including factors that influence speech accuracy, (2) phoneme
acquisition (the age of acquisition of consonants, semivowels, vowels, and tones using the criterion of 90% correct), (3) non-adult realisations, and (4) the phonological patterns. From these calculations this study highlighted four main findings. First, Northern Vietnamese-speaking children in older age groups achieved higher accuracy scores of consonants, semivowels, vowels, and tones than the younger age groups indicating the improvement of speech production accuracy with age. Second, by the age of 5;5-5;11, these Northern Vietnamese-speaking children had acquired all Vietnamese consonants, semivowels, vowels, and tones, with the exception of the initial-syllable consonants /ɲ, s, z, x/, the within syllable semivowel /w/, tone 3 (creaky thanh ngã), and tone 4 (dipping-rising thanh hỏi). Third, the typical non-adult realisations of Northern Vietnamese consonants, semivowels, and tones were described in common (>10%), occasional (5-10%) and rare (<5%) categories. Fourth, common phonological patterns (>10%) were fronting, stopping, deaspiration, aspiration, and semivowel deletion for younger children, and were fronting and deaspiration for older children. In addition, the findings highlighted that child age and maternal education but not child sex influenced the Northern Vietnamese-speaking children’s speech accuracy. Overall, the findings shared similarities with studies of other languages (e.g., Cantonese and English) as well as showing unique features of Vietnamese-speaking children’s acquisition.

Aim 5: To measure Northern Vietnamese-speaking children’s intelligibility (Paper 5).

This final research aim was achieved through a study to measure the intelligibility of 181 Northern Vietnamese-speaking children (aged 2;0-5;11) whose parents completed the ICS-VN (McLeod et al., 2012b). The study reported that the mean ICS-VN score of these Northern Vietnamese-speaking children was 4.43 (out of maximum 5.00) to indicate that these children were “usually” to “always” intelligible. The ICS-VN scores were rated as significantly different between communication
partners as the highest scores were rated for the children’s parents and the lowest for strangers. The higher scores were rated for children who had no parental concerns and the lower scores for those who had parental concerns about their speech and language skills. Additionally, factors significantly influencing the ICS-VN scores of Northern Vietnamese-speaking children were the children’s age, parents’ occupation level, and mothers’ educational level but not children’s sex or fathers’ educational level. Overall, this research study presented similar findings to those reported in other international studies that have used the ICS.

In summary, the five research aims within this doctoral research were achieved. Each of the research aims contributed towards targeting the over-arching research aim to describe Northern Vietnamese-speaking children’s speech acquisition. The description of Northern Vietnamese-speaking children’s speech acquisition presented in this doctoral research has made key contributions to the literature. The research has also contributed to development of theory by successfully applying the ICF-CY (World Health Organization, 2007) as a research framework and strengthening the evidence to support the Emergence Approach, a phonological theory proposed by Davis and Bedore (2013). In addition, the outcomes of this doctoral research have yielded implications for policy and practice. These contributions made are outlined below.

**Key Contributions to the Literature**

This doctoral research contributed to the literature by answering the call regarding the lack of reliable and culturally relevant normative data about Vietnamese speech acquisition by conducting the first comprehensive investigation of children’s speech acquisition in Northern Viet Nam. No previous study of Vietnamese speech acquisition has documented: (1) speech accuracy for all Northern Vietnamese phonemes, (2) factors that influence speech accuracy, (3) the age at which Vietnamese speech sounds are acquired, (4) children’s realisations compared to the adult targets, (5) typical
phonological patterns, and (6) children’s intelligibility. These results have been described within this doctoral research and captured the main features of Northern Vietnamese-speaking children’s speech acquisition. The results reporting speech accuracy, phoneme acquisition, non-adult realisations, and phonological patterns show that Vietnamese acquisition has unique characteristics as well as similarities with Cantonese and English acquisition (e.g., Dodd et al., 2003; Smit, 1993; So & Dodd, 1995; To, Cheung, & McLeod, 2013b). For example, similarities include the impact of age on children’s speech acquisition; as children’s speech became more adult-like as their age increased. Mother’s education and socioeconomic status were associated with changes in children’s speech development. Vowels were acquired earlier than consonants. The earlier acquired consonants were plosives and nasals. The later, and most difficult consonants were /ɲ, s, z, x/. There was an interaction between place and manner where nasals produced with anterior placement /m, n/ were acquired earlier than nasals with posterior tongue placement /ɲ, ŋ/. Fricatives were found to be difficult for the children to produce. This aligns with international trends found in many speech acquisition studies across languages that were summarized in McLeod and Crowe (2018). Phonological patterns such as fronting, stopping, and deaspiration were identified for studies in these different languages; however, backing was found as a typical phonological pattern in Northern Vietnamese and Cantonese cohorts but was an atypical in English-speaking children. Possibly due to high frequency of velar consonants such as /ŋ/ in Vietnamese and Cantonese. In addition, the results reporting Northern Vietnamese-speaking children’s intelligibility show many similarities with other international studies that have used the ICS (e.g., Hopf, McLeod, & McDonagh, 2017; McLeod, Crowe, & Shahaeian, 2015; McLeod, Harrison, & McCormack, 2012a; Neumann, Rietz, & Stenneken, 2017; Ng, To, & McLeod, 2014; Sprunt & Marella, 2018; van Doornik, Gerrits, McLeod, & Terband, 2018; Washington, McDonald,
McLeod, Crowe, & Devonish, 2017). These cross-linguistic studies reported that the mean ICS scores was above 4.00 (out of maximum 5.00) and indicated that the children’s speech was rated as “usually” to “always” intelligible.

Another contribution of this doctoral research is the methodological alignment of this Vietnamese study with international studies of speech acquisition. The research design and the protocol of speech assessment measurements applied in this doctoral research was informed by reviewing 29 previous studies of speech acquisition across languages, as described in Chapter 5 and found in Appendix B and three previous studies of Vietnamese speech acquisition. Consequently, this doctoral research aligns with other international studies of speech acquisition with regards to consideration of aspects in research design including participant selection, instruments, procedure, examiners, recording, reliability, data analysis, and reporting. No previous speech acquisition study in Viet Nam has fully taken these aspects into account.

The third contribution of this doctoral research was to introduce clinical assessment tools for the use with Vietnamese-speaking children. These tools included the VSA (Phạm, Le, et al., 2016), a key instrument used for direct speech assessment, and the ICS-VN (McLeod et al., 2012b), a parent-report scale to estimate children’s intelligibility when speaking with different communication partners. The VSA was created as part of this doctoral research by following the psychometric standards for assessment including conceptualisation and operationalisation (Frytak, 2000) and international guidelines for creation of a speech assessment (McLeod, 2012). Conceptualisation has been completed for the VSA, and it is currently undergoing operationalisation. The normative data for Northern Vietnamese-speaking children’s speech acquisition gained within this doctoral research is part of the ongoing operationalisation and standardisation of the VSA. The introduction of the VSA provides an example of how to begin the development of a standardised assessment
instrument in a Majority World country and demonstrates knowledge exchange between Minority and Majority World countries to support the development of communication specialist services for under-served populations (Cheng, 2013; Hopf, 2018). Additionally, the ICS-VN was validated and normed as part of this doctoral research, providing an example of how to validate an existing non-Vietnamese assessment scale for the Vietnamese language. No study to date in Viet Nam has focused on development and validation of standardised speech assessment instruments. In sum, the introduction of the VSA and the ICS-VN within this doctoral research answered the call regarding the lack of standardised speech assessment instruments available for the Vietnamese language (Appendices N and O).

Overall, this doctoral research provided new knowledge regarding normative data on speech acquisition in the Northern Vietnamese, methodological considerations for studying Vietnamese children’s speech, and development of clinical speech assessment tools for the Vietnamese language. These contributions of this doctoral research filled the current literature gap to provide the first in-depth account of Vietnamese speech acquisition for professionals working with Vietnamese-speaking children in Viet Nam and other countries.

**Key Contributions to Theory**

**ICF-CY.**

The ICF-CY (World Health Organization, 2007) was used as the conceptual framework to undertake this doctoral research on Northern Vietnamese-speaking children’s speech acquisition. All the components of the ICF-CY (i.e., Body Functions, Body Structures, Activities and Participation, Environmental and Personal Factors) and the interactions between these components were addressed throughout this doctoral research (Table VI).

The ICF-CY was applied to holistically consider children’s speech. For
example, in Paper 4 to address the Body Structures component, oromotor assessments were undertaken prior to the speech assessment to identify any structural difficulties that might impede the Body Functions of producing speech. To address the Body Functions component, hearing screening assessments were conducted to measure children’s hearing skills. In addition, speech assessments were conducted to collect speech samples produced by typically-developing Northern Vietnamese-speaking children to determine functional performance of speech sounds. Aspects of the Activities and Participation component were addressed in Paper 5 by measuring children’s intelligibility that was defined as the listener’s ability to retrieve children’s oral messages (Miller, 2013). The ICS-VN (McLeod et al., 2012b) was used to rate Northern Vietnamese-speaking children’s intelligibility within this doctoral research to showcase how children are understood by different interlocutors when they are involved in conversations. To address the Personal and Environmental Factors components, case history information of each participant was obtained through the parent and teacher questionnaires described in Papers 4 and 5 and found in Appendices H and K. The case history information of the participants addressed within the research included demographic information, overall development and medical history, speech and language status, language/dialect exposed to and spoken, personal, family, and community contexts. Future research could focus more on the impact of children’s speech competence on Activities and Participation (e.g., McCormack, McLeod, Harrison, & McAllister, 2010). All components of the ICF-CY were addressed throughout all the chapters and papers in this doctoral research. Consideration of these factors in association with Vietnamese children’s speech acquisition were upheld again through the lens of the phonological theory of the Emergence Approach (Davis & Bedore, 2013) describing child’s internal- and external-aspects as outlined in the following subsection. Overall, the ICF-CY proved a framework to guide the
classification of foundational aspects relating to children’s speech acquisition, identify factors influencing children’s speech performance, and direct the choice of instruments for data collection, analysis, and interpretation.

**Emergence Approach.**

As described in Chapter 5, the Emergence Approach (Davis & Bedore, 2013) was chosen as the theoretical framework that could explain characteristics of typically-developing Northern Vietnamese-speaking children’s speech acquisition explored in this doctoral research. The findings of this doctoral research provided evidence to support elements of the Emergence Approach to account for children’s speech acquisition.

The Emergence Approach assumes that the ambient language phonology, a child-external factor, has an influence on children’s speech acquisition due to similarities and differences between ambient languages (Davis & Bedore, 2013). On one side, the Emergence Approach accommodates similarities in children’s speech acquisition due to common phonological features shared across languages. On the other side, the approach accounts for differences in children’s speech acquisition that could be explained by the differences in the input and the speech sound systems (Davis & Bedore, 2013). Within this doctoral research ambient language phonology had an influence on Northern Vietnamese-speaking children’s speech acquisition and had both similar and unique characteristics in comparison with other languages (in particular Cantonese and English; for example, Dodd et al., 2003; Smit, 1993; So & Dodd, 1995; To et al., 2013b), as outlined below.

Universally, vowels were reported in many studies across languages to be acquired earlier than consonants (cf. McLeod & Crowe, 2018) and this acquisition pattern held true for Northern Vietnamese-speaking children. Further evidence to support the Emergence Approach’s assumption of similar speech acquisition
characteristics related to findings about Vietnamese phonological patterns reported in this doctoral research. Some frequently reported phonological patterns identified across languages such as fronting, stopping, and deaspiration were also found in the Northern Vietnamese-speaking cohort. This also supported the idea of universal trends proposed by (Jakobson, 1968) and phonological processes (or phonological patterns) proposed by (Stampe, 1979).

Furthermore, a comparable development path in tone acquisition was found between Vietnamese described in this doctoral research and Cantonese described in a number of studies (Cheung, 1990; So & Dodd, 1995; To et al., 2013b). These data from different languages converge to demonstrate that tones are the earliest acquired phonemes in children’s speech for those who acquire tone languages in their mother tongues. This early path could be explained by perceptual reorganisation of lexical tones that was reported to begin early (around 4 months old) and facilitated by tone hyperarticulation found in their mothers’ infant-directed speech from a sample of 22 native Cantonese infants (Rattanasone, Burnham, & Reilly, 2013). On the contrary, tones seem to be a challenging feature to be perceived and produced by speakers learning tone languages (e.g., Mandarin) as a second language regardless of their first language backgrounds from either different tonal (e.g., Cantonese) or non-tonal (e.g., English) languages (Hao, 2012). The inhibitory tone acquisition in non-native tone language speakers (e.g., English, French) may be explained as a result of declined perceptual reorganisation for lexical tones because of their failure to discriminate lexical tones (e.g., Cantonese, Thai) by 9 months old (Mattock & Burnham, 2006; Mattock, Molnar, Polka, & Burnham, 2008). These findings regarding the first and second language tone acquisition gathered from this doctoral research and other studies provided twofold evidence to support the significant role of interconnectivity between child-internal factors (e.g., tone perception and production) and child-external factors.
(e.g., exposure of specific features of the ambient phonology and infant-direct speech) as proposed in the Emergence Approach (Davis & Bedore, 2013).

Additionally, findings presented in this doctoral research also supported the assumption of the Emergence Approach that the language-specific patterns influence children’s speech acquisition and result in some of the differences regarding the rate and order of the speech acquisition. In other words, this doctoral research could contribute to the hypothesis that language-specific variations can lead to facilitating some acquisition patterns but slowing others compared to other languages as proposed by the Emergence Approach (Davis & Bedore, 2013). An example given to support this hypothesis were the differences regarding acquisition of different Northern Vietnamese tones reported in this doctoral research. Tones can have simple or complex contours. Northern Vietnamese tones 3 and 4 have complex contours that require the articulation of creaky feature for tone 3 and falling then rising features for tone 4 (Doàn, 2003; Hoàng, 1989). These two tones also have a low frequency of occurrence in Vietnamese (Nguyen, 2017; Pham, 2003). Northern Vietnamese tones 3 and 4 showed a delay in their acquisition compared to the acquisition of the other Northern Vietnamese tones (i.e., tones 1, 2, 5, and 6) within the current research. All nine Cantonese tones have simpler contours and were acquired early (Cheung, 1990; So & Dodd, 1995; To et al., 2013b). It could be explained that the articulatory complexity and low functional load of Northern Vietnamese tones 3 and 4 prolonged the period to be acquired.

The Emergence Approach hypothesises that speech develops in overlapping stages that “capture stable patterns of connections between the child’s internal capacities and the external environment” (Davis & Bedore, 2013, p. 49). This hypothesis was upheld by the findings in this doctoral research regarding typical phonological patterns. Phonological patterns were documented as part of the typical speech acquisition of Northern Vietnamese-speaking children and showed a gradual
decrease with increasing age. For example, more phonological patterns were found in younger age groups of Northern Vietnamese-speaking children than that in older age group. This finding regarding the reduction in phonological patterns in older children mirrors the work of researchers across the world (e.g., Cohen & Anderson, 2011; Haelsig & Madison, 1986; James, 2001).

This doctoral research also provided support for the impact of the child-internal factors (e.g., age and sex), and the child-external factors (e.g., maternal education) on children’s speech acquisition (Davis & Bedore, 2013). These factors influencing children’s speech acquisition have been reported across speech acquisition studies (e.g., Dodd et al., 2003; To, Cheung, & McLeod, 2013a). This doctoral research reported that children’s age and maternal education but not child sex were significantly linked with greater accuracy of children’s speech. Additionally, the findings reporting Northern Vietnamese-speaking children’s intelligibility showed significant effects of children’s age, parents’ occupation levels, and maternal education.

Overall, the Emergence Approach was able to explain the characteristics found in Northern Vietnamese-speaking children’s speech acquisition. Therefore, a number of findings presented within this doctoral research supported the application of the Emergence Approach to speech acquisition as a reliable phonological theory.

Implications for Policy and Practice

The findings of this doctoral research revealed important implications for policy and practice in Viet Nam and other parts of the world. New knowledge about typical speech acquisition of Northern Vietnamese-speaking children was presented in this doctoral research to inform policy and practice regarding the Vietnamese government’s Developmental Standard 15 “Trẻ biết sử dụng lời nói để giao tiếp” (The child uses speech to communicate), Item 65 “Nói rõ ràng” (To speak clearly) and a part of Item 70 “Kể về một sự việc, hiện tượng nào đó để người khác hiểu được” (To narrate an event
or a fact intelligibly to others). This doctoral research conceptualised constructs and criteria for quantifying children’s speech performance into measurable indicators (e.g., PCC, PVC, and PTC). These indicators provide finer-grained data that could aid in the enactment and understanding of the Standard 15 “The child uses speech to communicate” (see Appendix P). Furthermore, the methodological approach undertaken within this doctoral research was in alignment with the approach undertaken in other international studies in the field. Therefore, the research design and methodological approach applied in this doctoral research could be a model to be considered by researchers in Viet Nam to testing other domains of the Developmental Standards.

The findings of this doctoral research are of clinical value for professionals working in practice with Vietnamese-speaking children throughout the world regarding assessment, analysis, and intervention of children’s speech. First, phonological differences across Vietnamese dialects presented within this doctoral research highlighted the need for professionals to extend their knowledge about Vietnamese dialects and consider of the Vietnamese dialectal variants in their clinical decision-making when conducting assessments, analysis, and intervention for Vietnamese-speaking children. Second, Paper 1 of this doctoral research provides the international community with consistent conventions for using the International Phonetic Alphabet to transcribe Vietnamese consonants, vowels, and semivowels and superscript conventions for tones. Third, normative data about Northern Vietnamese-children’s speech described provided a benchmark to support professionals working with Northern Vietnamese-speaking children in deciding whether a child has typical or atypical speech development and whether the child requires intervention or not. The normative data gained through this doctoral research thus provided clinical knowledge for professionals in practice along with knowledge contributing to evidence-based literature. The research-based normative data about Northern Vietnamese speech acquisition could be
used to create clinical guidelines for professionals that could promote evidence-based practice as a consequence. Fourth, two research-based speech assessment tools (i.e., the VSA and the ICS-VN) developed and validated within this doctoral research can be used as reliable and valid tools by professionals to access Northern Vietnamese-speaking children’s speech. For example, the ICS-VN is available free online at: http://www.csu.edu.au/research/multilingual-speech/ics, the website contains the original version of the ICS in English and translated versions of the ICS in over 60 languages. Subsequent to research within the current doctoral research (described in Paper 5), the ICS-VN has been used by speech-language pathologists and other related professionals to measure Vietnamese-speaking children’s intelligibility in clinical practice and research projects in Viet Nam (e.g., McLeod, Le, & Phạm, 2018). The VSA will be disseminated to professionals working with Vietnamese-speaking children in Viet Nam and in other countries upon its completion of standardisation. Fifth, a number of speech analyses (e.g., speech accuracy scores and phonological patterns) applied within this doctoral research could provide greater insight into parameters for measuring children’s speech skills for professionals and to inform them how to set up intervention goals and select appropriate intervention approaches.

**Limitations**

This section presents broader limitations that may have impacted the doctoral research as a whole. A number of other limitations that were acknowledged within the individual papers of this doctoral research will not be replicated in this section.

The first limitation of this doctoral research relates to the research locations for data collection that was undertaken in Ha Noi and Hai Phong, two municipalities in the Red River delta of Northern Viet Nam. Northern Viet Nam spreads to additional nine provinces in the Red River delta, and 14 provinces in the Northern midland and mountain areas (General Statistics Office of Viet Nam, 2016). Thus, data collected in
this doctoral research may not be representative of the population living in the other
provinces in the Northern region where there may be lower living standards than that in
Ha Noi and Hai Phong.

The second limitation relates to the sample size of this doctoral research. A
small number of participants per age group may limit the statistical power and constrain
generalisability in speech acquisition studies (McCauley & Swisher, 1984). However, it
was not possible to collect data from a larger sample for this doctoral research because
of several reasons. The data collection undertaken within the context of the PhD
candidate’s fieldtrips occurred during the winter in Northern Viet Nam (summer in
Australia). A number of selected participants who were eligible for the direct
assessment were absent on the assessment days due to illness. Due to bad weather
conditions (the weather was below 10ºC), two out of four preschool sites were closed
for one week during the scheduled data collection period. Additionally, the author of
this doctoral research was the only examiner for the speech assessment to ensure
accurate online transcription of children’s actual responses. Although the research
assistant team involved in data collection assisted in setting up the assessment room and
taking the participants from their classroom to the assessment room, the research
assistants were unable to undertake online transcription of children’s responses during
the speech assessment; therefore, the PhD candidate was the only examiner taking
responsibility for all direct assessment sessions with individual participants. In addition,
a number of participants eligible for the direct assessment withdrew because their
parents requested the parent questionnaire and signed consent be returned. These
parents were concerned that their signature on the consent form may create political
problems for them, since it was the first time in their life that they have ever signed a
consent form for research participation. Although the consent form provided
information about ethical approval for undertaking this doctoral research, and verbal
explanation regarding ethical issues was additionally given to these parents, we respected their withdrawal of participation.

The third limitation to this doctoral research relates to data collection technique as the speech samples collected were single word data extracted from the VSA. Due to the time constraint and unavailability of assessment instruments, data collected from other measures were not applied; for example, speech perception, non-words, and stimulability. A small amount of connected speech was collected, but not analysed within this doctoral research. It was also not possible to analyse speech samples from age-matched children who had suspected speech sound disorders.

The fourth limitation was the breadth of analyses undertaken in Paper 4, as only relational analyses were presented. However, additional independent analyses could be applied in future research, including the acquisition of phonetic, syllable, and word-shape inventories by Northern Vietnamese-speaking children. In addition, the current doctoral research did not take into account the interactions between consonants and vowels, and between vowels and tones.

**Future Directions**

Directions for future research are outlined below and include some avenues that have been brought up to response to the limitations described in the previous section. This doctoral research reported Northern Vietnamese-speaking children’s speech acquisition from speech samples collected in Ha Noi and Hai Phong, the two biggest cities in Northern Viet Nam. To have a broader picture of Northern Vietnamese-speaking children’s speech acquisition, further research is required to collect speech samples from children living in the other provinces in Northern Viet Nam such as mountainous areas. Additionally, given the phonological differences between Northern, Central, and Southern Vietnamese (Phạm & McLeod, 2016), future replication studies should investigate speech acquisition of children who speak Central and Southern
dialects of Vietnamese. Further, since Vietnamese is one of the most commonly spoken home languages in many countries including the US, Australia, and Canada, it is important to examine Vietnamese speech acquisition by multilingual children of Vietnamese origin living in other countries. Motivated by the current doctoral research, researchers have begun to study speech acquisition of Southern Vietnamese-speaking children in Ho Chi Minh City (McLeod, Le, & Phạm, 2018) and Vietnamese-English-speaking children in Australia (McLeod & Verdon, 2018-2020).

Future studies should include other forms of data and measures to examine the complex interplay between different factors as proposed in the Emergence Approach (Davis & Bedore, 2013); for example, connected speech, speech perception, non-words, and stimulability. Future studies also should include a larger sample size. By reviewing 29 cross-sectional studies about speech acquisition (as described in Chapter 5), the smallest sample size was 12 and the largest was 1,756 participants ($M = 412.00$, $SD = 480.30$). It would be desirable to have a larger sample size across the targeted age ranges in future research as the larger sample may provide a higher statistical power for the study (To et al., 2013b).

The data collected for this doctoral research included speech samples of Northern Vietnamese-speaking children. The current doctoral research captured Northern Vietnamese-speaking children’s acquisition of consonants, semivowels, vowels, and tones using relational analyses. This dataset could be utilised in future research to comprehensively investigate children’s acquisition of Vietnamese phonetic, syllable, and word shape inventories using an independent analysis.

**Impact of this Research**

This doctoral research contributes to the literature by providing preliminary information about Northern Vietnamese-speaking children’s speech acquisition. The research provides an overview of differences in phonemes between Northern
Vietnamese and the other Vietnamese dialects in order to lay a foundation for consideration of dialectal variants in studying children’s speech. A broader understanding about tone languages in association with communication disorders was also provided to support the clinical value of tone as a parameter in studying speech acquisition. The research described the development of the VSA (Phạm, Le, et al., 2016) and the validation of the ICS-VN (McLeod et al., 2012b) for professionals to use to assess Northern Vietnamese-speaking children’s speech and intelligibility. Further, the research presented normative data regarding Northern Vietnamese-speaking children’s speech acquisition that could be used as a clinical guideline for professionals to support their clinical decision-making process. As mentioned previously, research is underway to replicate the current methods to examine children’s speech acquisition in Southern Viet Nam (McLeod et al., 2018) and Australia with bilingual Vietnamese-Australian children (McLeod & Verdon, 2018-2020).

The impact of this doctoral research has already been seen within the research and clinical practice contexts. First, the VSA (Phạm, Le, et al., 2016) has received two developmental grants from Trinh Foundation Australia for testing in Northern (in 2016) and Southern Viet Nam (in 2017). The ICS-VN has been available free online at: http://www.csu.edu.au/research/multilingual-speech/ics, the website that contains the original version of the ICS in English and translated versions of the ICS in over 60 languages. The ICS-VN was used in a study investigating Southern Vietnamese-speaking children’s speech acquisition to measure children’s intelligibility. The ICS-VN has also been used widely by speech-language pathologists and other related professionals to measure Vietnamese-speaking children’s intelligibility in clinical practice in Viet Nam.

The importance of this doctoral research was recognised at the 2017 American Speech-Language-Hearing Association (ASHA) Convention in Los Angeles where a
poster titled “Assessing Vietnamese Children’s Intelligibility” presenting part of this doctoral research was designated as one of the 55 Meritorious Posters in a total of 1,895 submitted posters. Additionally, at the same convention attended by over 15,000 people, the researcher was invited by the Cultural and Linguistic Issues topic committee to co-present results of this doctoral research in a 1-hour seminar titled “Vietnamese children’s speech and language: Latest clinical research” (Pham, Phạm, & McLeod, 2017).

**Final Summary and Concluding Remarks**

Vietnamese is one of the most commonly spoken languages in the world. Evidence-based information about typical speech acquisition of Northern Vietnamese-speaking children was previously unknown prior to this doctoral research. This doctoral research presents new knowledge about typical speech acquisition to inform policy and practice regarding the Vietnamese government’s Developmental Standard 15 “Trẻ biết sử dụng lời nói để giao tiếp” (The child uses speech to communicate), Item 65 “Nói rõ ràng” (To speak clearly) and a part of Item 70 “Kể về một sự việc, hiện tượng nào đó để người khác hiểu được” (To narrate an event or a fact intelligibly to others). The findings also provide emerging evidence for professionals in Viet Nam and other countries to assist with the identification of children with speech sound disorders based on data from typically-developing children. The thesis introduces and validates two assessment tools, i.e., the VSA (Phạm, Le, et al., 2016) and the ICS-VN (McLeod et al., 2012b) for clinical and research use with Vietnamese-speaking children. The research presented in this thesis is aligned with other international studies about speech acquisition providing a reference for future researchers in Viet Nam and a contextually relevant resource to the emerging speech-language pathology profession in Viet Nam.

**References**


Appendix A. Vietnamese Translated Publication (with permission)

XÂY DỰNG BỘ TRẮC NGHIỆM ĐÁNH GIÁ LỜI NÓI VIỆT: NGHIỆN CỦI ĐỊNH KHUNG

PHẠM THỊ BÊN1 - SHARYNNE MCLEOD2 - LÊ THỊ THANH XUÂN3

Abstract: Vietnamese is the official language of over 92 million people in Vietnam and nearly four million diaspora including in Australia, USA, and Canada. To date, there are no standardised speech assessments for Vietnamese children. This paper outlines the development of the Vietnamese Speech Assessment through collaboration between researchers in Vietnam and Australia. The word list contains all Vietnamese consonants, vowels and tones in at least two words with different sequence constraints. Further, the word list was developed to be within the vocabulary range of young children, frequently used by Vietnamese people in different regions, picturable, and either a noun or verb. Picture stimuli were identified and the test was piloted with Vietnamese speakers of different ages who spoke different dialects. A score sheet was designed to include acceptable dialectal pronunciations, and to enable calculation of percentage of consonants/ vowels/ semivowels/ tones correct and presence of phonological processes. The Vietnamese Speech Assessment is currently undergoing norming and standardisation.

Key words: assessment, children, speech, Vietnamese.

Tiếng Việt là ngôn ngữ chính thức của Việt Nam, được sử dụng bởi hơn 92 triệu người ở trong nước và gần 4 triệu người ở nước ngoài.


Nhóm tác giả xin bày tỏ lòng biết ơn Hiệp hội Âm ngữ tri liệu Ức, cơ quan giữ bản quyền của bài viết, đã cho phép chuyển ngữ sang tiếng Việt để đăng tập chỉ ở Việt Nam, để các nhà chuyên môn ở Việt Nam đã đăng tiếp cận. Nhóm tác giả cũng bày tỏ lòng biết ơn tổ chức Trinh Foundation (Ức) đã tài trợ việc thực hiện nghiên cứu và chuyển ngữ bài viết này.

1 Trường Đại học Sự phàm Hà Nội, Việt Nam.
2 Đại học Charles Sturt, Ức.
3 Bệnh viện Chính hình và Phục hồi chức năng Thành phố Hồ Chí Minh, Việt Nam.
như Úc, Mỹ và Canada. Gần đây, Bộ Giáo dục và Đào tạo đã ban hành Bố chỉ định phát triển trẻ em 5 tuổi và chuẩn 15, chỉ số 65 là "nơi rõ ràng" [2]. Các nhà chuyên môn cho rằng hỗ dẫn giáo lời nói của trẻ em Việt Nam thường thông qua các công cụ không chính thức để xác định trẻ náo đã đạt chuẩn [9]. Hiện nay, chưa có một bộ trắc nghiệm chuẩn hóa về lời nói của trẻ em bằng tiếng Việt (McLeod [18]; McLeod & Verdon [20]). Nhiều bộ từ thư đã được thiết kế và công bố trong các sách tham khảo, các bài báo, các luận văn, luận án và trên các trang mạng nhưng chưa được chuẩn hóa (Cameron & Watt [11]; Cheng [12]; Hwa-Froelich, Hodson, & Edwards [17]; Nguyễn Thị Ly Kha [6]; Nguyễn Thị Ly Kha & Phạm Hải Lê [7]; Phạm [23]; Tang & Barlow [27]; Vũ Thị Bích Hạnh & Đặng Thái Thu Hương [10]). Có nhiều trung tâm/trường/phòng khám/bệnh viện cũng tự thiết kế các bộ từ thư để sử dụng trong phạm vi hẹp tại cơ sở (Đucote [13]; Bệnh viện Nhi đồng 1 [1]; Lê Thị Thanh Xuân [5]; West [29]). Trong số đó, nhiều bộ từ thư được thiết kế sử dụng cho trẻ em nói phương ngữ Nam Bộ ở trong nước hoặc ở nước ngoài và có những hạn chế khi sử dụng để đánh giá cho trẻ em nói phương ngữ Bắc và Trung Bộ. Xuất phát từ thực trạng này, Bộ trắc nghiệm đánh giá lời nói Việt (tiền tiệm Anh là The Vietnamese Speech Assessment, VSA) đã được nghiên cứu để xây dựng phục vụ cho nghiên cứu và thực hiện trích lục ngữ âm tiengan Việt ở các vùng miền khác nhau của Việt Nam và ở các nước khác trên thế giới.

Qua trình xây dựng được chia làm hai giai đoạn là: định khung (conceptualisation) và định chuẩn (operationalisation) bộ trắc nghiệm dựa theo các tiêu chuẩn thành của công cụ đánh giá (Frytak [15]). Ngoài ra, quá trình xây dựng bộ trắc nghiệm còn vận dụng theo các hướng dẫn quốc tế về thiết kế công cụ đánh giá lời nói (McLeod [19]). Bộ trắc nghiệm được thiết kế thông qua sự hợp tác quốc tế giữa các nhà nghiên cứu của Việt Nam và Úc với sự hỗ trợ của tổ chức Trình Foundation (Úc), Trường Đại học Charles Sturt (Úc) và học bổng Chinh phủ Úc.

Việc xây dựng bộ trắc nghiệm này có thể sẽ khó thành công nếu như không có sự hợp tác quốc tế chặt chẽ và chuyên sâu về ngữ âm tiếng Việt, phương ngữ tiếng Việt, sự phát triển của trẻ em và xây dựng trắc nghiệm đánh giá lời nói giữa các nhà chuyên môn ở các nước có ngôn ngữ âm trị liệu phát triển với nhà chuyên môn của Việt Nam. Nhóm tác giả đã hợp tác tiếp nhiều lần để xác định các âm vị tiếng Việt được đặt bài bởi nhiều người khác nhau và đã bấn bạ về lợi ích cũng như các tiêu chuẩn của việc lựa chọn danh mục từ thư. Nhóm tác giả đã triệt khai nghiên cứu thử nghiệm trên phạm vi màu nhỏ ở Úc và ở Việt Nam, mỗi tác giả thực hiện phiên âm đặc biệt sao đó thảo luận về các dạng phát âm mà trẻ có thể phát âm cho mọi từ trong danh sách từ thư. Có thể nói, việc hợp tác giữa nhóm tác giả ở mức độ chuyên s
Xây dựng...

Xây dựng hình một khung suôn rỗ ràng trong giai đoạn định khẳng chắc rắc nghiêm trước khi tiến hành thử thập đầu liều trên mẫu lơn ở Việt Nam cho giai đoạn định chuẩn rắc nghiêm. Bài viết này trình bày một cách khách quát quan điểm xây dựng bộ rắc nghiêm ở giai đoạn thử nhất. Nghiên cứu định khẳng.

Giai đoạn 1: Nghiên cứu định khẳng cho Bộ rắc nghiêm đánh giá lối nói Việt

Định khẳng là việc xác định mục đích và tầm hoạt động (scope) của một bộ rắc nghiêm, đảm bảo bộ rắc nghiêm luôn giữ những gì mà nó nhằm tới thông qua các thuộc tính (properties) và đặc tính (features) của nó (Frytak [15]). Định khẳng một bộ rắc nghiêm bắt đầu từ việc như ra mục đích, đối tượng, các chỉ năng cần lưu lượng giá và tầm hoạt động/ sử dụng của nó (McLeod [19]).

Mục đích

Mục đích trước tiên của Bộ rắc nghiêm đánh giá lối nói Việt là mỏ tả khả năng của trẻ em trong việc phát âm các phụ âm, bản nguyên âm, nguyên âm và thanh điệu tiếng Việt ở các phương ngữ ở bần là Bắc, Trung và Nam Bộ. Khi các dù liệu chuẩn về lối nói của trẻ em được thu thập và phân tích, mục đích tiếp theo của Bộ rắc nghiêm đánh giá lối nói Việt là để chẩn đoán trẻ em rối loạn âm lối nói, và để hỗ trợ việc lên mục tiêu can thiệp cũng như xác định được mức độ tiến bộ của trẻ sau trرض liệu/ can thiệp về phát âm.

Đối tượng sử dụng của bộ rắc nghiêm


Các kiến năng đánh giá nhằm tới

Bộ rắc nghiêm đánh giá lối nói Việt được thiết kế thông qua hoạt động gợi ý sự vật các hoạt động về trong trrn nhân để thu thập mẫu lối nói của trẻ.
Tâm hoạt động (scope) và các thuộc tính của bộ trực nghiệm

Các thuộc tính của Bộ trực nghiệm đánh giá lời nói Việt bao gồm các dạng từ được lựa chọn và cách thực thi thấp màu lời nói của từng từ. Có 6 nội dung được xem xét để đảm bảo các thuộc tính của Bộ trực nghiệm đáp ứng được mục đích của trải nghiệm. Sáu nội dung bao gồm: (1) vị trí âm vĩ trong âm tiết, (2) hệ thống âm vĩ, (3) cách thức thú mà âm vĩ, (4) lựa chọn từ thứ, (5) minh họa cho danh sách từ thứ, và (6) cách thức tiến hành trải nghiệm.

Vị trí âm vĩ trong âm tiết

Hậu hết các từ trong tiếng Việt đều là từ đơn đơn âm. Âm tiết tiếng Việt là đơn vị nhỏ nhất trong phát âm và đặc trưng của tiếng Việt là ngôn ngữ đơn lập âm tiết tính. Cấu trúc của âm tiết tiếng Việt là:

| Don vị | Siêu đoạn tính | Thanh điệu | Văn
|--------|----------------|------------|-----
| Đơn tính | (Phụ âm đầu) | (Bản nguyên âm đệm) | Nguyên âm chính | (Phụ âm cuối/ bản nguyên âm cuối)

Nguyên âm chính và thanh điệu là hai thành phần cơ bản của âm tiết tiếng Việt, các thành phần còn lại có thể có hoặc không. Bộ trực nghiệm đánh giá lời nói Việt bao gồm các âm vị tiếng Việt ở các vị trí khác nhau của âm tiết và ở các dạng âm tiết khác nhau. Tiếng Việt không có nhóm phụ âm kép, do vậy, tất cả các âm vị tiếng Việt được thu thập trong trải nghiệm này đều là phụ âm đơn. Đặc trưng hình thái học không được xem xét trong danh sách từ thứ của trải nghiệm này bởi vì các hình vị tiếng Việt không thể hiện thị của động từ, giống hay số ít/ số ít (Pham [24]). Các từ thứ được lựa chọn trong bộ trực nghiệm là từ đơn đơn âm, ngoại trừ một trường hợp là từ vay mượn cho phụ âm đầu /p/ (ví dụ: pa-tè). Các từ chỉ loại (chẳng hạn: cải, con) không được gập trong danh sách các từ thứ, mặc dù các từ chỉ loại này luôn luôn được trước các danh từ tiếng Việt (Pham & Kohner [25]; Tran [28]). Ví dụ, từ thứ cho phụ âm đầu /p/ (th) là yêu cầu trẻ nói từ thó chứ không nói con thó, hoặc từ thứ cho phụ âm đầu /c/ (ch) là yêu cầu trẻ nói từ chương, chứ không nói cái chương.

Hệ thống âm vị tiếng Việt

Bộ trực nghiệm đánh giá lời nói Việt có chứa hậu hết các âm vị tiếng Việt, bao gồm phụ âm, bản nguyên âm, nguyên âm và thanh điệu để tương giúp khả năng của trẻ em nói tiếng Việt ở phương ngữ chính. Hệ thống âm vị tiếng Việt được sử dụng trong quá trình này dùng Bộ trực nghiệm này là dựa vào một nghiên cứu tổng quan về các âm vị tiếng Việt theo tiếng Việt chuẩn và phương ngữ Bắc, Trung, và Nam (Pham & McLeod [22]). Dựa vào nghiên cứu tổng quan này, hệ thống âm vị tiếng Việt chứa trong danh sách các từ thứ của bộ trực nghiệm này bao gồm:
xây dựng...

- 23 phụ âm đầu của tiếng Việt chuẩn, bao gồm: /p, b, tʰ, t, d, ċ, k, ?, m, n, ŋ, ɾ, v, s, s, ɾ, ɾ, ɾ, y, l/ và 4 biến thể âm vị, bao gồm: /ts, r/ ở phương ngữ Bạc /wa, j/ ở phương ngữ Nam;
- 6 phụ âm cuối của tiếng Việt chuẩn, bao gồm: /p, t, k, m, n, ŋ/ và 4 biến thể âm vị ở các phương ngữ, bao gồm: /c, p, k², ŋ⁹/;
- 1 bàn nguyên âm đệm /w/;
- 2 bàn nguyên âm cuối, bao gồm: /w, j/;
- 16 nguyên âm trong tiếng Việt chuẩn, trong đó bao gồm: 9 nguyên âm đơn dài là /i, e, u, o, a, x, u̯/; 4 nguyên âm đơn ngắn là /â, ŋ, ñ, 3/, và 3 nguyên âm đồi là /ie, uo, ur/. Ngoài ra, Bộ trắc nghiệm cũng bao gồm cả các từ thụ chống 10 biến thể âm vị nguyên âm ở ba phương ngữ, bao gồm: /l, i, i̯, o, o̯, ox, u, e, ã/;
- 6 thanh điệu theo tiếng Việt chuẩn và 2 biến thể của thanh sắc (thanh số 5) và thanh nặng (thanh số 6) xây ra ở các âm tiết có phụ âm cuối là các phụ âm tác vở thanh ip, ip, k/ (ví dụ trong từ thứ: hỏi, rể, khóc) ở ba phương ngữ.

Cách thức thu âm đầu tiếng Việt

Theo hướng dẫn lần sáng quốc tế về lấy mẫu tượng âm vị, mỗi âm vị thường được thu thập trong từ thứ với số lượng từ thứ từ 1 đến 5 từ trong các bộc cụ cấu từ mẫu từ đơn (McLeod [19]). Các nhà nghiên cứu đã khuyễn nghị mỗi âm vị nên xuất hiện ở ít nhất là 2 từ thứ để đảm bảo độ ổn định phát âm của mỗi âm vị (Eisenberg & Hitchcock [14]; Hua [16]). Vi thế, trong Bộ trắc nghiệm này, có ít nhất là hai từ thứ cho mỗi âm vị và các âm vị này được phát âm giống nhau ở cả ba phương ngữ. Vi dụ, hai từ thứ bát đầu bàng phụ âm /k/ (c, k, q) được phát âm giống nhau ở cả ba phương ngữ là: keo /ke²/, và có /ko²/ được lựa chọn. Nhóm tài giải cũng cung cấp lựa chọn để đảm bảo sự cân bằng về số lượng từ thứ cho từng âm vị.

Việc lựa chọn từ thứ cũng được xem xét tính đa dạng về các kết hợp âm vị để đảm bảo danh sách từ thứ bao gồm những từ có các cấu trúc âm tiết, và thanh diệu khác nhau. Khi lựa chọn từ thứ, một lưu ý quan trọng cũng được xem xét và đề cập là sự kết hợp của nguyên âm chính hàng trước và nguyên âm chính hàng sau với các phụ âm đầu và phụ âm cuối (Cao Xuân Hao [3]; Đoàn Thíên Thuật [4]). Do vậy, hai từ thứ có chứa một phụ âm đầu được lựa chọn trong Bộ trắc nghiệm này bao gồm một từ có chứa nguyên âm chính hàng trước và một từ có chứa nguyên âm chính hàng sau. Vi dụ, hai từ thứ cho phụ âm đầu /b/ thì một từ có chứa nguyên âm chính hàng trước là bi /bi²/, và một từ có chứa nguyên âm chính hàng sau là bàng /bàng³/. Ngoài ra, nhóm tài giải Bộ trắc nghiệm còn xem xét cấu trúc âm hưởng của nguyên âm tròn môi và không tròn môi ở các nguyên âm chính hàng sau tác động đến việc phát âm các phụ âm cuối /k, ŋ/ trong một số âm tiết ([3]; [4]).
Vi dụ, từ thứ bùng /bùng/ được bố sung vào nhóm các từ thụ chứa phụ âm đầu là /b/ để thỏa mãn tiêu chí này.

Lựa chọn từ thứ

Trong Bộ trắc nghiệm đánh giá lối nói Việt, nhóm tác giả đã đưa ra các tiêu chuẩn để lựa chọn các từ thứ. Tiêu chuẩn về từ thứ được lựa chọn phải:

- Năm trong vốn từ của trẻ em nói tiếng Việt ở Việt Nam, ở Ức và ở Mỹ để làm sao trẻ có thể gọi được ngay tên các sự vật và hoạt động mà từ biểu thị càng nhiều càng tốt.
- Là từ toàn dân. Do đó, nếu từ nào có biến thể từ vựng (được gọi bằng từ khác ở phương ngữ khác) thì sẽ không được lựa chọn. Vi dụ, từ mè là từ quen thuộc với trẻ em nhưng không được lựa chọn bởi có thể trẻ sẽ gọi bằng các từ khác như: mà, mà, mà, mà hoặc u.
- Là từ được sử dụng phổ biến hiện nay chư không phải là từ cỏ hay tự ít dùng. Vi dụ, từ riêng không được lựa chọn vì ít dùng hiện nay, thay vào đó là các từ như hop hoặc thing.
- Là từ đảm bảo sự phù hợp văn hóa để lựa chọn và về trình độ nghĩa cho từ. Vi dụ, từ đau được lựa chọn hay vì từ dao bởi người Việt Nam vẫn còn bằng đau và có thể nhìn hình ảnh nghĩa là dao trẻ nhỏ sẽ thấy sợ.
- Là từ có thể minh họa được bằng tranh để trẻ nhớ có thể dễ dàng nhận ra và gọi ngay được tên của vật hoặc hoạt động mà từ biểu thị. Các hình ảnh minh họa cũng được xem xét đảm bảo tính tương phản để phân biệt về ý nghĩa. Vi dụ, từ gỡ được lựa chọn để kiêm tra phụ âm đầu /y/ (g) thì từ chim sẽ không được lựa chọn để kiêm tra cho phụ âm đầu /c/ (ch) vì có thể nhìn vào hình minh họa, trẻ nhỏ sẽ gọi tên lân hai hình ảnh minh họa này. Một vi dụ khác là, từ phở là một từ rất phù hợp để kiêm tra cho phụ âm đầu /b/ nhưng lại không được lựa chọn trong danh sách từ thứ bởi vì nhìn vào hình ảnh minh họa, trẻ có thể nhầm lẫn và gọi là bún.
- Được lựa chọn trong các cụ loại có bàn là danh từ (gồm 66 từ trong tổng số 77 từ) và động từ (gồm 11 từ trong tổng số 77 từ của bảng từ thứ được lựa chọn).

Minh họa cho danh sách từ thứ

Bộ trắc nghiệm đánh giá lối nói Việt bao gồm 77 từ đơn đơn âm, được minh họa bằng 77 tranh về màu. Thức xuất hiện của các từ trong danh sách từ thứ được sắp xếp dựa vào thứ tự của các phụ âm đầu tiếng Việt trong bảng phiên âm quốc tế (Phạm & McLeod [22]). Nhóm tác giả của Bộ trắc nghiệm đã thỏa luận ý tưởng phác thảo tranh minh họa cho từng từ thứ và gửi cho một họa sĩ ở Việt Nam để theo mô tả phác thảo của nhóm tác giả. Bàn thảo các tranh về minh họa cho từng từ thứ được thử nghiệm cho trẻ xem tranh
và gọi tên sự vật và hoạt động về trong tranh, sau đó chỉnh sửa cho những tranh chưa thực sự phù hợp về màu sắc hoặc một vài chi tiết nào đó. Bộ 77 tranh này được dōng thành một cuộn sách tranh. Trong cuộn sách tranh này, ở mỗi tổ, trang trên là tranh về hình hóa cho từ thư (Hình 2). Còn trang dưới là trang thông tin cho người đánh giá, bao gồm: hình ảnh hình hóa đang thu nhỏ của từ thư, các phiên âm theo các phương ngữ khác nhau của từ thư, và các bước dẫn đàm để thu màu lơi nói của từ thư đó (Hình 3).

Hình 2. Tranh về hình hóa cho từ thư nón ở trang trên

<table>
<thead>
<tr>
<th>Srt</th>
<th>Am vój</th>
<th>Chữ cái</th>
<th>Tự</th>
<th>TV chuẩn</th>
<th>PN bắc</th>
<th>PN trung</th>
<th>PN nam</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>/n/</td>
<td>n</td>
<td>nón</td>
<td>nón</td>
<td>nón⁴</td>
<td>nón⁵</td>
<td>nón⁵</td>
</tr>
</tbody>
</table>

Các bước dẫn đàm (Prompts)
1. Trả lời ngay (spontaneous): Đây là cái...
2. Gọi ý lượt: Cái này để đội lên đầu
3. Hai lựa chọn (binary): Nón hay Giày?
4. Bắt các giai đoạn (delayed imitation): "Nón", Con nháy lại

Hình 3. Trang thông tin cho trắc nghiệm viên cho từ thư nón ở trang sau
Thông tin ở trang dưới là để đánh cho người đánh giá. Cuốn sách tranh được đồng gay xóa giống như lịch để bạn để dễ dàng lật từng tờ cho mỗi tranh minh họa của từng từ thứ. Trong đội đội dân với người đánh giá và nhìn vào tranh minh họa ở mặt trước. Còn trước mặt người đánh giá là trang thông tin về tranh minh họa mà thể dang nhìn và trang thông tin được in ở mặt sau của tờ có tranh minh họa cho từ trước đó trong danh sách từ thứ.

Cách thực hiện hành trắc nghiệm

Bộ trắc nghiệm đánh giá lối nói Việt được xây dựng là một công cụ chuẩn hóa, do vậy cách thực hiện phải tuân thủ các bước theo yêu cầu. Đánh giá này có thể được sử dụng trong các nghiên cứu hoặc trong thực tiễn cung cấp dịch vụ ngữ âm trị liệu/ trị liệu ngữ âm. Các lỗi chỉ dẫn sẽ được cung cấp trong cuốn sách hướng dẫn thực hiện (manual) để đảm bảo các trắc nghiệm viên đều tuân thủ các bước đánh giá giống nhau.

Các mức độ của lỗi dẫn đầu

Trắc nghiệm viên cần đưa ra lỗi chỉ dẫn cho trẻ theo quy trình bốn bước cho mỗi từ thứ. Bốn bước này bao gồm: Bước 1 - Câu hỏi mở; Bước 2 - Cung cấp gợi ý hoặc nội dung; Bước 3 - Cung cấp hai lựa chọn (trong đó lựa chọn thứ nhất là từ thứ) và Bước 4 - Bắt chước giản đơn. Trẻ cần được khuyến khích để phân ứng ngay khi gợi tới tranh được ở bước 1 càng nhiều càng tốt. Câu hỏi mở ở Bước 1 cho mỗi từ thứ ở dạng như: Ngày là gì? Tuy nhiên, do nhiều từ thứ là danh từ và không cần phải nói từ chỉ loại (con, cái, chỉ đặc, ...) ở trước mỗi từ thứ, nên câu hỏi mở ở Bước 1 được điều chỉnh tùy thuộc vào từng từ. Vì dụ, với tranh minh họa cho từ vo, trắc nghiệm viên đặt câu hỏi: "Ngày là con...?" họ lên giọng ở cuối câu để hâm ấm câu hỏi và cho đối tượng trẻ nói từ vo để diễn vào chỗ bỏ lỡ của câu hỏi. Không đặt câu hỏi cho trẻ là: "Ngày là con gì?" vì trẻ có thể sẽ trả lời là con vo. Đề trẻ quen với việc không cần các từ chỉ loại trong trắc nghiệm này, trước khi thực hiện trắc nghiệm nên cho trẻ tập làm quen với từ 3 đến 5 từ với dạng câu hỏi ở Bước 1 để trẻ trả lời không có từ chỉ loại ở trước các từ thứ là danh từ, vì dụ: nhà (không nói ngoài nhà), nho (không nói chìm nho), gà (không nói con gà). Ngoài ra, nếu trẻ hay trả lời bằng câu lề lệ phép thì nhắc trẻ ở bài tập này con được phép chỉ nói mỗi từ mà trắc nghiệm viên cần con nói, không cần trả lời cả câu. Vì dụ khi trẻ nhìn tranh "con gà" và trắc nghiệm viên hỏi: "Ngày là con...?" và trẻ trả lời là: Con tranh có ngày là con gà, có thể nhắc trẻ: "trong bài tập này câu có, con chỉ cần nói mỗi từ gà, không cần nói cả câu và không cần nói từ con".

Và yêu cầu trẻ tập thêm với các từ khác cho quen mỗi bài đầu vào thực hiện trắc nghiệm.
Xây dựng...

Nếu ở Bước 1 trẻ không goed vật hoặc hoạt động về trong trang thi chuyển sang Bước 2 bằng cung cấp gì cho trẻ để trẻ có thể goed trẻ được. Vi dụ, hỏi thêm câu hỏi để gọi ý nói dung cho trang mình hoa con với là: Con gì có cái với? Nếu bước 2 đã đưa ra gọi ý mà trẻ vẫn chưa trả lời được thì chuyển sang lời dân đầm ở bước 3 là đưa ra hai lựa chọn, trong đó nói từ thứ ở lựa chọn thứ nhất. Vi dụ, bước 3 của trang mình hoa cho từ với với là: Voi hay Chân? Nếu trẻ không trả lời được ở bước 3 thì chuyển lời dân đầm ở bước 4 là yêu cầu bắt bướng bằng cách nhắc lại lời của trắc nghiệm viên, ví dụ: Voi, con nắc lại nào! Danh sách các lời chỉ dân và gọi ý cho mỗi từ thứ cùng đã được xây dựng và nếu ở mất sau của từng trang mình hoa để hỗ trợ cho trắc nghiệm viên trong việc thực hiện trắc nghiệm một cách thống nhất giữa các lần đánh giá và giúp các trẻ khác nhau.

Chấm điểm, phén âm, ghi âm và phân tích kết quả

Một phiếu chấm điểm được thiết kế trong đó bao gồm các cột: tên từ thứ theo cách ghi chính tả; phền âm quốc tế và cách phát âm của từ thứ theo tiếng Việt chuẩn, phương ngữ Bắc, Trung và Nam; cách phát âm của trẻ; và các cột để chấm điểm theo từng tiêu chí chấm điểm của âm với giọng làm sáng.

Trẻ được đánh giá cá nhân. Trong các cách phát âm của trẻ, trắc nghiệm viên cần phải ghi phền âm trực tiếp các cách phát âm của trẻ cho từng từ thứ bằng cách sử dụng các kiểu hiệu phền âm quốc tế. Các nhà nghiên cứu về lời nói của trẻ em đã khuyến nghị cần ghi phền âm cho phân ứng đầu tiên của trẻ khi goed vật hoặc hoạt động mà từng từ thứ biểu thị. Nếu trẻ nói không rõ mà trả lời ngụy và không phát âm được thì có thể yêu cầu trẻ nhắc lại. Phiếu chấm điểm này cùng yêu cầu trắc nghiệm viên phải ghi lại xem với mỗi từ thứ thì mức độ dân đầm cho câu trả lời là ở bước thứ mấy.

Các nhà nghiên cứu về lời nói của trẻ em đều khuyên ngụy rằng cần ghi âm hoặc ghi hình trẻ trong quá trình thực hiện đánh giá lời nói bằng Bỏ trắc nghiệm với sự cho phép được ghi âm/ ghi hình của trẻ, gia đình trẻ hoặc trưởng toán trẻ học. Một mic nhỏ cần được gắn gắn vào phía miệng của trẻ (trong khoảng cách 15 cm) để ghi được lời nói chất lượng tốt và máy quay cần ghi được cả khuôn mặt của trẻ. Các băng ghi âm này có thể được sử dụng để kiểm tra độ tin cậy giữa các trắc nghiệm viên khi chấm điểm và để ghi lại được sự thay đổi của trẻ trong quá trình lịnh hơi lời nói. Các băng ghi hình có thể được sử dụng để kiểm tra khả năng phát âm các phụ âm và nguyên âm của trẻ khi không quan sát được hình miếng của trẻ trong bướng ghi âm (ví dụ, hình miếng của trẻ khi phát âm các phụ âm hai mới).

Phiếu chấm điểm của Bỏ trắc nghiệm đánh giá lời nói Việt cung cấp các loại phân tích lời nói, bao gồm: phân tích số đơn (tỉ lệ phân trăm phụ âm đúng,
bản nguyên âm dùng, nguyên âm dùng, thanh điệu dùng) và phân tích các quy trình âm vần. Hướng dẫn về chấm điểm, phiên âm, ghi âm và phân tích sẽ được viết chi tiết trong Hướng dẫn sử dụng trắc nghiệm để hỗ trợ cho các trắc nghiệm viên sử dụng trắc nghiệm phục vụ nghiên cứu và thực tiễn làm sáng.

Giao đoạn 2: Định chuẩn Bò trắc nghiệm đánh giá lối nói Việt

Định chuẩn là quá trình lượng hóa và hiệu lực hóa của một công cụ đánh giá để đảm bảo nó có độ tín cậy và độ hiệu lực (Frytak [15]). Hiện nay, Bò trắc nghiệm đánh giá lối nói Việt đang trong giai đoạn định chuẩn. Sản phẩm cuối cùng của Bò trắc nghiệm đánh giá lối nói Việt sẽ bao gồm: công cụ đánh giá (sạch trang và phiếu chấm điểm), sách hướng dẫn về cách thực hiện lấy mẫu, chấm điểm, và phân tích kết quả. Sách hướng dẫn sẽ cung cấp dữ liệu chuẩn hóa. Ngoài ra, sách hướng dẫn cũng cung cấp các thông tin về độ hiệu lực (validity), bao gồm: độ hiệu lực nội dung (content), độ hiệu lực cấu trúc (construct), độ hiệu lực dự đoán (predictive) và độ hiệu lực tiêu chuẩn (concurrent) và độ tín cậy (reliability), bao gồm: độ tín cậy trong (internal consistency), độ tín cậy đánh giá - đánh giá lại (test-retest reliability), độ tín cậy nội bộ và liên nhân (intra- and inter-rater reliability).

Nhóm tác giả đã nghiên cứu độ hiệu lực nội dung của Bò trắc nghiệm đánh giá lối nói Việt. Độ hiệu lực nội dung được chỉ “mức độ nội dung mà các mục trong công cụ phản ánh nội dung chính của công cụ” (Frytak [15, 22]). Độ hiệu lực nội dung của Bò trắc nghiệm đánh giá lối nói Việt được thực hiện trước hết theo hiện ở việc nghiên cứu tổng quan về các tài liệu và các bộ công cụ đã xây dựng trước đó để định hình các nội dung ban đầu của Bò trắc nghiệm. Thêm lại, phương pháp chuyên gia được sử dụng để xác định các lĩnh vực cần đánh giá của bộ trắc nghiệm và xem xét, cân nhắc tính phù hợp và tính đại diện của từng mục trong trắc nghiệm trong phạm vi cấu trúc (construct) của trắc nghiệm. Nhóm tác giả xây dựng Bò trắc nghiệm đánh giá lối nói Việt đã thử nghiệm với 5 người lớn và 2 trẻ em nói ngoại Việt - Anh để kiểm tra sự phù hợp của bảng từ thử, phiếu chấm điểm và uốn nguồn được thời gian thực hiện trắc nghiệm. Người lớn thực hiện trắc nghiệm trong vòng từ 8 đến 10 phút, còn trẻ em thực hiện trong khoảng 20 phút. Sau lần thử nghiệm đầu tiên, nhóm tác giả đã thực hiện việc chỉnh sửa với các trang minh hoạ (ví dụ, thay đổi hình ảnh cho từ “pin” từ “đen pin” sang “cực pin”) và chỉnh sửa một số lỗi chỉ dẫn (ví dụ, lỗi chỉ dẫn cho từ “đặt” đã được thay đổi. Sau nghiên cứu thứ nghiệm, bộ trắc nghiệm đã được sử dụng thử mẫu lối nói của 342 trẻ em độ tuổi từ 2 đến 5 tuổi 11 tháng, gồm 222 trẻ ở miền Bắc, trong đó
Xây dựng... 43

có 27 trẻ cơ nguy cơ rối loạn âm lối nói và 120 trẻ ở miền Nam. Các mẫu lời nói này được sử dụng để phục vụ nghiên cứu định chuẩn. Các đặc điểm tâm trạng khác của bộ trắc nghiệm này bao gồm: độ ổn định trong, độ tin cậy đánh giá - đánh giá lại, độ tin cậy đối với và liên nhân, độ hiệu lực tiêu chuẩn, độ hiệu lực cấu trúc, phân tích nhận lỏ, độ nhạy và độ phân biệt/ độ đặc hiệu và chuẩn hóa đang được thực hiện trong giai đoạn định chuẩn của Bộ trắc nghiệm đánh giá lời nói Việt. Các thông tin này sẽ được trình bày trong cuốn Hướng dẫn sử dụng khi Bộ trắc nghiệm đánh giá lời nói Việt hoàn tất giai đoạn nghiên cứu xây dựng để công bố sản phẩm đến với người sử dụng.

Kết luận


TÀI LIỆU THAM KHẢO

Tiếng Việt

4. Đoàn Thiên Thất (2003), Ngữ âm tiếng Việt, Nxb ĐHQG Hà Nội, Hà Nội.


Tiếng Anh


### Appendix B. Methodological Aspects of Cross-Sectional Speech Acquisition Studies

<table>
<thead>
<tr>
<th>Authors</th>
<th>Country (City/State)</th>
<th>Language status</th>
<th>Participants</th>
<th>Speech sample</th>
<th>Speech Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Arlt and Goodban (1976)</td>
<td>USA (Illinois)</td>
<td>American English/ Mono</td>
<td>3;0-6;0 6 month interval</td>
<td>240 120/120 Typical (Medical &amp; school history)</td>
<td>Cr SW (48) OL (errors)</td>
</tr>
<tr>
<td>2. Chirlian and Sharpley (1982)</td>
<td>Australia (NSW)</td>
<td>Australian English/ Mono</td>
<td>2;0-9;6 6 month interval</td>
<td>1,375 Typical (Teachers, nurses, parents report)</td>
<td>Cr SW (64) OL IPA</td>
</tr>
<tr>
<td>3. Dodd, Holm, Hua, and Crobie (2003)</td>
<td>UK</td>
<td>British English/ Mono</td>
<td>3;0-6;11 6 month interval</td>
<td>684 326/358 Typical</td>
<td>Cr SW (30), IS OL + AR VR IPA</td>
</tr>
<tr>
<td>4. Dodd and McIntosh (2010)</td>
<td>Australia (Brisban e)</td>
<td>Australian English/ -</td>
<td>2;0-2;11 6 month interval</td>
<td>32 27/35 Typical (PLS4) Typical (PLS4)</td>
<td>Cr SW (32) OL + AR IPA</td>
</tr>
<tr>
<td>5. Kilmister and Laird (1978)</td>
<td>Australia (Brisan e)</td>
<td>Australian English/ Mono</td>
<td>3;0-9;0 6 month interval</td>
<td>1,756 Typical</td>
<td>Cr SW (64) OL IPA</td>
</tr>
<tr>
<td>6. Pearson, Velleman, Bryant, and Charko (2009)</td>
<td>USA</td>
<td>Mainstream American English/ Mono</td>
<td>4;0-12;11 -</td>
<td>557 Typical (Dialect Sensitive Language Test, Diagnostic Evaluations of Language Variation)</td>
<td>Cr SW (66) OL + AR IPA</td>
</tr>
<tr>
<td>7. Poole (1934)</td>
<td>USA</td>
<td>American English/ -</td>
<td>2;6-8;6 6 month interval</td>
<td>140 - Typical (Clinician judgment)</td>
<td>Cr SW () OL Ortho -</td>
</tr>
<tr>
<td>Study</td>
<td>Author(s)</td>
<td>Language</td>
<td>Language variation</td>
<td>Age</td>
<td>Test interval</td>
</tr>
<tr>
<td>-------</td>
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<td>-------------------</td>
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<td>--------------</td>
</tr>
<tr>
<td>10</td>
<td>Prather, Hedrick, and Kern (1975)</td>
<td>USA</td>
<td>General American English/ Mono</td>
<td>1;11-4;0</td>
<td>4 monthly interval</td>
</tr>
<tr>
<td>11</td>
<td>Smit, Hand, Freiling, Bernthal, and Bird (1990)</td>
<td>USA</td>
<td>American English (Standard Midwester n dialect)/ Mono</td>
<td>3;0-9;0</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Templin (1957)</td>
<td>USA</td>
<td>General American English/ Mono</td>
<td>3;0-8;0</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Wellman, Case, Mengert, and Bradbury (1931)</td>
<td>USA (Iowa)</td>
<td>English/ Mono</td>
<td>2;0-6;0</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Ahmadzadeh and Dyson (1998)</td>
<td>Jordan</td>
<td>Arabic/ Mono</td>
<td>2;0-6;4</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Ayyad, Bernhardt, and Stemberger (2016)</td>
<td>Kuwait</td>
<td>Arabic/ Mono</td>
<td>3;8-5;2</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Cheung (1990)</td>
<td>Hong Kong</td>
<td>Cantonese /</td>
<td>2;0-6;0</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>So and Dodd (1995)</td>
<td>Hong Kong</td>
<td>Cantonese /</td>
<td>2;0-6;0</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>To, Cheung, and McLeod (2013)</td>
<td>Hong Kong</td>
<td>Cantonese / Mixed; Mono &amp; Multi</td>
<td>2;4-12;4</td>
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</tr>
</tbody>
</table>

Languages other than English
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<thead>
<tr>
<th>Author(s)</th>
<th>Country</th>
<th>Language(s)</th>
<th>Age</th>
<th>Monolingual</th>
<th>Method</th>
<th>Stimuli</th>
<th>Response</th>
<th>Speaker</th>
<th>Examiner</th>
<th>Accuracy</th>
<th>Age of acquisition</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Archer, Champion, Tyrone, and Walters (2018)</td>
<td>Haiti</td>
<td>Haitian Creole/Mono</td>
<td>2;0-4;3</td>
<td>12 months</td>
<td>Typical (Report)</td>
<td>Typical (Report)</td>
<td>Cr</td>
<td>SW (89)</td>
<td>OL + AR</td>
<td>IPA</td>
<td>Inter: 92.6% (20% sample)</td>
<td>Author (certified SLP)</td>
</tr>
<tr>
<td>Clausen and Fox-Boyer (2017)</td>
<td>Denmark</td>
<td>Danish/Mono</td>
<td>2;6-4;11</td>
<td>6 months</td>
<td>Typical (Report)</td>
<td>Typical (Report)</td>
<td>Cr</td>
<td>SW (100)</td>
<td>OL + AR</td>
<td>IPA</td>
<td>Inter: 96%</td>
<td>SLTs or trained SLT students</td>
</tr>
<tr>
<td>MacLeod, Sutton, Trudeau, and Thordardottir (2011)</td>
<td>Canada</td>
<td>French/Mono</td>
<td>1;8-4;5</td>
<td>-</td>
<td>Typical (Parent's report)</td>
<td>Typical (Parent's report)</td>
<td>Cr</td>
<td>SW (40)</td>
<td>OL + VR</td>
<td>IPA</td>
<td>Inter: 94% (PCC)</td>
<td>Research assistants/native speakers</td>
</tr>
<tr>
<td>Pascoe and Mahura (2006)</td>
<td>South Africa</td>
<td>Setswana/First language</td>
<td>1;1-3;0</td>
<td>-</td>
<td>Typical (Parent’s &amp; day care’s report)</td>
<td>Typical (Parent’s report)</td>
<td>Cr</td>
<td>SW (28), Sent. Comp</td>
<td>OL + AR</td>
<td>IPA</td>
<td>Intra: 93%, Inter: 95%</td>
<td>Author</td>
</tr>
<tr>
<td>Phoon, Abdullah, Lee, and Murugaisag (2014)</td>
<td>Malaysia</td>
<td>Malay/Mono</td>
<td>4;0-6;0</td>
<td>6 months</td>
<td>Typical (Parent’s &amp; teacher’s report)</td>
<td>Typical (Parents’ &amp; teachers’ report)</td>
<td>Cr</td>
<td>SW (53)</td>
<td>OL + AR</td>
<td>IPA</td>
<td>Inter: 89.9% (11.7% sample)</td>
<td>Author (SLP)</td>
</tr>
<tr>
<td>Hua and Dodd (2000)</td>
<td>China (Beijing)</td>
<td>Putonghua/Mono</td>
<td>1;6-4;6</td>
<td>6 months</td>
<td>Typical (Parent’s &amp; teacher’s report)</td>
<td>Typical (Parents’ &amp; teachers’ report)</td>
<td>Cr</td>
<td>SW (44), CS</td>
<td>OL + AR</td>
<td>IPA</td>
<td>Inter: 94.6 – 98.5%</td>
<td>Trained examiner</td>
</tr>
<tr>
<td>Mahara and Pascoe (2016)</td>
<td>South Africa</td>
<td>Setswana/First language</td>
<td>3;0-6;0</td>
<td>6 months</td>
<td>Typical (Screening test)</td>
<td>Typical (Screening test)</td>
<td>Cr</td>
<td>SW (89)</td>
<td>OL + AR</td>
<td>IPA</td>
<td>Intra: 98%; Inter: 95% (25% of sample)</td>
<td>Qualified SLP, native speaker</td>
</tr>
<tr>
<td>Gangji, Pascoe, and Smoune (2015)</td>
<td>Tanzania (Dar es Salaam)</td>
<td>Swahili/Multi</td>
<td>3;0-5;11</td>
<td>6 months</td>
<td>Typical (Parent’s &amp; teacher’s report)</td>
<td>Typical (Parents’ &amp; teachers’ report)</td>
<td>Cr</td>
<td>SW (48)</td>
<td>OL + AR</td>
<td>IPA</td>
<td>Inter: 96.5% (C), 98% (V); inter: 93-100%</td>
<td>Author</td>
</tr>
<tr>
<td>Topbaş (2006)</td>
<td>Turkey</td>
<td>Turkish/Mono</td>
<td>1;3-8;0</td>
<td>12 months</td>
<td>-</td>
<td>-</td>
<td>Cr + L</td>
<td>SW (93), CS</td>
<td>OL + AR</td>
<td>IPA</td>
<td>Inter: 91%</td>
<td>Trained SLP students</td>
</tr>
<tr>
<td></td>
<td>Yalcinkaya, Muluk, and Budak (2010)</td>
<td>Turkey</td>
<td>Turkish</td>
<td>-</td>
<td>-</td>
<td>713</td>
<td>Typical (Screening test)</td>
<td>Cr</td>
<td>SW (123)</td>
<td>OL + AR</td>
<td>IPA</td>
<td>Inter: Cronbach Alpha: .84</td>
</tr>
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</tr>
<tr>
<td>28</td>
<td>Typical (Report &amp; observed)</td>
<td>1;0-7;0</td>
<td>446/307</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>29</td>
<td>Maphalala, Pascoe, and Smouse (2014)</td>
<td>South Africa</td>
<td>isiXhosa/First language</td>
<td>3;0-6;0</td>
<td>-</td>
<td>24</td>
<td>10/14</td>
<td>-</td>
<td>Typical (Screening test)</td>
<td>-</td>
<td>Cr</td>
</tr>
</tbody>
</table>

**Note.** Language status: Mono = Monolingual, Multi = Multilingual.
Participants: Sex (M/F) = Sex (Male/Female).
Speech sample: Design Cr = Cross-sectional, L = Longitudinal.
Technique: SW = Single words, CS = Connected speech, IS = Isolated speech sounds.
Recording: OL = Online, AR = Audio recording, VR = Video recording.
Transcription: IPA = International Phonetic Alphabet, Ortho. = Orthography.
Reliability including intra- and inter-judge: Intra = Intra-judge, Inter = Inter-judge.
Speech analysis: C = Consonant, I = Initial, M = middle, F = Final, V = Vowel, CL = Cluster, T = Tone; PCC = percentage of consonants correct; PSVC = percentage of semivowel correct; PVC = percentage of vowels and diphthongs correct; PTC = percentage of tones correct; PCE = Percentage of consonants in error; PSVE = percentage of individual semivowels in error, PVE = percentage of individual vowels in error, PTE = percentage of individual tones in error; PPP = Error patterns as percentage of phonological processes; WWP = percentage of whole word proximity.
Appendix C. Preschool Information Letter (English)

PRESCHOOL INFORMATION LETTER

Your preschool is invited to participate in the Children’s acquisition of consonants, semivowels, vowels, and tones in Northern Viet Nam study (hereafter referred to as the Vietnamese Children’s Speech Acquisition Study). This study is conducted through Charles Sturt University, Australia and is supported by a PhD scholarship provided by the Australian Government. This research aims to describe the age of acquisition of consonants, semivowels, vowels and tones, patterns of acquisition, and the intelligibility level of children aged 2:0 to 6:5 in Northern Viet Nam. The findings of this project will provide useful information to educators, speech pathologists, and policy makers about young Northern Vietnamese children’s speech acquisition.

This project will be conducted by the following research team:

Mrs. Ben Pham, Principal Researcher and PhD student, Charles Sturt University, Australia
Professor Sharynne McLeod, A/Professor Jane McCormack
Research Institute of Professional Practice, Learning and Education, Charles Sturt University, Australia

Information about the study

This study will investigate speech acquisition of Northern Vietnamese children aged 2:0-6:5. To date, there is limited information about Vietnamese children’s speech development. Findings from this study will inform families, educators, speech pathologists, policy makers, and the general public about ways children who speak Northern Vietnamese acquire speech and to assist identification of children with speech difficulties. Information gathered from this study will be published and may be used in future research about children’s speech undertaken by the researchers. This letter outlines what participation will mean for your preschool.

Procedure

This research will be conducted in two stages. If you consent to participate in this study, the children, families, and staff at your preschool will be asked to participate in the following stages:

Stage 1: Screening
The preschool will be asked to:
• Provide a time and space for researchers to visit your preschool and discuss the study with teachers and caregivers.
• Distribute information and questionnaires to caregivers of children aged 2:0-6:5 attending your preschool.
• Distribute questionnaires to the teachers of children whose caregivers have consented for teachers to provide information on their children. This will take teachers approximately 2 minutes per child to complete.
• Provide a space where teachers and caregivers can return their completed questionnaires (we will supply a file/box for this purpose).
• Complete a short questionnaire describing key characteristics of the preschool.
• Provide de-identified information on the children aged 2:0-6:5 attending your preschool (date of birth, living areas, and sex).
• Assist with collecting consent form and questionnaires from caregivers and teachers.

Caregivers will be asked to:
• Complete a questionnaire about their child’s skills and development.
• Complete a consent form

Teachers will be asked to:
• Complete a questionnaire about the children in their classes.

Stage 2: Assessment
The preschool will be asked to:
• Provide a quiet space for the researcher to conduct individual assessments with children whose caregivers and/or teachers identified as having typical development.
Children will be asked to:

- Participate in a screening hearing and otorhinolaryngology assessment with the principal researcher that will take approximately 10 minutes.
- Following the screening assessment, children who pass the hearing and otorhinolaryngology screening assessment will participate in the Vietnamese Speech Assessment with the principal researcher that will take approximately 30 minutes per child.
- Children who do not pass the hearing screening assessment will be given a second opportunity to undertake the test. If they do not pass the test the second time, they will be advised to follow-up with a qualified audiologist and provided with details regarding how to do so. Children who do not pass the otorhinolaryngology screening assessment will not be given a second opportunity to re-do the test as their teeth, tongue etc. will not change over a short period of time. If children do not pass these tests, this does not mean that they have non-typical development, but they require additional assessments by a qualified professional such as a dentist, audiologist, or doctor.

Caregivers will be asked to:

- Caregivers may attend their child’s assessments if they wish.
- The caregivers of children who participate in the study will receive a brief report describing their child’s skills upon completion of the study.

**Dissemination of Research Findings**

The findings of this research will inform the practice of educators, speech pathologists, and policy makers, and be of interest to the general public. Research findings will always be disseminated in ways that do not identify participants (child/family/teachers) or preschools unless permission has been received by individual children’s parents to use their photographs audio or video recordings for educational purposes and share audio data with PhonoBankTalkBank, an international database of children’s speech and language. The outcomes of this project will be accessible to participating families and preschools who have participated in this research. Research findings will be published in practitioner-focused journals and presented at practitioner-focused conferences and events. Researcher-oriented journals, conferences, and professional development events will also be key ways of disseminating the findings of this research. Findings may also be broadcast through media outlets when possible.

**Ethical Considerations**

The children’s names will not be used in this research. Instead, number codes will be used so information about them is anonymous. No data that could identify you, other individuals, your preschool, or your specific location will be released (except the photographs, audio, and video recordings that have been approved by the children’s parents). The researchers will take every precaution to maintain confidentiality, but cannot ensure that other children or parents will not identify participants to others. Your preschool’s participation in this study is entirely voluntary. If you decide to permit your preschool to participate, you are free to withdraw your consent and discontinue your preschool’s participation at any time. The staff and children at your preschool are not obliged to participate, but if they choose to participate, they may withdraw at any time also. Whatever your decision, it will not affect you or your preschool’s existing or future relations with Charles Sturt University (Australia) or the researchers conducting this study. If you decide to permit your preschool to participate, you are free to withdraw your consent and discontinue your preschool’s participation at any time. Information gathered from this study will be published and may be used in future research about children’s speech undertaken by the researchers.

**NOTE:** Charles Sturt University’s Human Research Ethics Committee has approved this project. If you have any complaints or reservations about the ethical conduct of this project, you may contact the Committee through the Executive Officer:

The Executive Officer  
Human Research Ethics Committee  
Office of Academic Governance  
Charles Sturt University  
Panorama Avenue, Bathurst, NSW 2795, Australia  
Tel: (02) 6338 4628  
Email: ethics@csu.edu.au

Any issues you raise will be treated in confidence and investigated fully and you will be informed of the outcome.

**Further Information**

If you have any further questions about this research please contact Principal Researcher Ben Pham (phone: +61 883197906, email: bpham@csu.edu.au), Professor Mel Leed (smcleod@csu.edu.au), and/or A/Professor McCormack (jmccormack@csu.edu.au) before signing this form.

Ben Pham, Charles Sturt University, Australia  
Professor Sharyn Leed, PhD, Charles Sturt University, Australia  
A/Professor Jane McCormack, PhD, Charles Sturt University, Australia

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THƯ NGÔ

Kính gửi: Trưởng mầm non…………………………………………………………..

Chúng tôi rất vui mừng khi được việc gửi đến các thân nhân các em tự 2 đến 6 tuổi ở miền Bắc Việt Nam. Để các em được học và chơi trong một môi trường phù hợp và an toàn, chúng tôi xin gửi một số thông tin về quá trình công bố và chung chức năng trong chương trình của các em.

Thành viên của nhóm thực hiện:

- Ths. Phạm Thị Đen, Chủ nhiệm đề tài, Giáo viên
- GS.TS. Sharyne McLeod và PG.SS. Jane McCormack, Trưởng Nhóm Charles Sturt, Úc

Thông tin chung về đề tài

Giai đoạn 1: Sáng học

- Cho phép những em nhỏ đến thăm trường, sắp xếp thời gian hợp lý cho buổi học, bố trí để em học hỏi, phát triển khả năng của em.
- Throttle cho phép học tập của em và phát triển các kỹ năng cho phù hợp của em từ 2 đến 6 tuổi đường theo học trí tưởng
- Phát triển các kỹ năng của em. Những kỹ năng được phát triển được giao cho em từ 2 đến 6 tuổi đường theo học trí tưởng.
- Điều chỉnh cấp độ để phù hợp với từng em.
- Trà lớn một phần từ của em để tình cảm của em.
- Điều chỉnh cấp độ để phù hợp với từng em.
- Hai giáo viên đứng đầu lớp cho em.

Giai đoạn 2: Dành giờ

- Trưởng mầm non sẽ.
- tragedi cho những em có một điều kiện y tế.
- Tự thị giải thích cho em.

THIẾP TRANG SAU
Công bố kết quả nghiên cứu

Kết quả nghiên cứu của đề tài này sẽ cung cấp để các nhà giáo dục, chuyên gia làm việc với các nhà hoạch định chính sách và có thể được công bố trên các phương tiện truyền thông. Kết quả nghiên cứu sẽ được công bố ở các hình thức khác nhau, trong đó có thể là báo chí, hội thảo, hội nghị, và các thông tin trên mạng. Các kết quả sẽ được cung cấp để hỗ trợ các nhà hoạch định chính sách và có thể được sử dụng trong các nghiên cứu tương đối tương tự.

Những lưu ý về việc đăng nghiên cứu

Nghiên cứu sẽ không được sử dụng trên nền tảng của trang mạng xã hội do đó các thông tin về đề tài này sẽ không được đăng. Các kết quả nghiên cứu chỉ được đăng tải trên các trang web của các cơ quan chính thức. Các thông tin về nếu nghiên cứu sẽ được đăng tải trên các trang web của các cơ quan chính thức. Các thông tin về nếu nghiên cứu sẽ được đăng tải trên các trang web của các cơ quan chính thức.

Trvan trong cảm ơn!

Phạm Thị Bên, Trưởng Đại học Charles Sturt, Úc
GS.TS. Sharyrne McLeod, Trưởng Đại học Charles Sturt, Úc
PGTS.TS. Jane McCormack, Trưởng Đại học Charles Sturt, Úc

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Preschool Information Letter (Vietnamese)
Appendix D. Preschool Consent Form (English)

CONSENT FORM – PRESCHOOL PRINCIPAL

<table>
<thead>
<tr>
<th>Your name/position</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Preschool’s name</td>
<td></td>
</tr>
<tr>
<td>Preschool’s address</td>
<td></td>
</tr>
<tr>
<td>Preschool’s phone number</td>
<td></td>
</tr>
<tr>
<td>Mobile phone number</td>
<td></td>
</tr>
<tr>
<td>Email</td>
<td></td>
</tr>
</tbody>
</table>

I have read and understood the information letter describing the Vietnamese Children’s Speech Acquisition Study. The purpose of the research has been explained to me, including the minimal risks associated with this research. I have been given the opportunity to ask questions about the research and have received satisfactory answers.

- I understand that the investigators involved in this project are Mrs. Ben Phạm (Principal investigator, PhD student), Professor Sharyrne McLeod (Associate researcher and Principal supervisor), and A/Professor Jane McCormack (Co-supervisor).
- I understand that the participation of this preschool is entirely voluntary. If this preschool does participate, individual staff members, families, and children are not obliged to participate. I understand that I am free to withdraw from participating in the research at any time, and that if I do I will not be subjected to any penalty or discriminatory treatment.
- I understand that withdrawing from this research will not affect my, or the preschool’s, existing or future relationship with Charles Sturt University, Australia.
- I understand that any information or personal details gathered in the course of this research about this preschool will remain confidential and that neither my name nor any other identifying information will be used or published without my written permission.
- I understand that information gathered may be used in future research.
- I understand that the preschool will support this research through:
  a) providing information describing key characteristics of this preschool,
  b) distributing information about this research to families and allowing the research team to recruit participants from this preschool,
  c) assisting in the distribution and collection of questionnaires from caregivers at my preschool,
  d) asking teachers to provide information about children in their classes (with caregivers’ consent),
  e) providing a quiet space for researchers to speak to caregivers, and for conducting assessment sessions.

NOTE: Charles Sturt University’s Human Research Ethics Committee has approved this project: If you have any complaints or reservations about the ethical conduct of this project, you may contact the Committee through the Executive Officer:

   The Executive Officer
   Human Research Ethics Committee
   Office of Academic Governance
   Charles Sturt University
   Panorama Avenue, Bathurst, NSW 2795, Australia
   Tel: (02) 6338 4628 Email: ethics@csu.edu.au

Any issues you raise will be treated in confidence and investigated fully and you will be informed of the outcome.

If you have any further questions about this research please contact Principal researcher Ben Phạm (Phone: +84 983197906, email: bpham@csu.edu.au) before signing this form.

Signed by: ____________________________ (Preschool Principal) Date: ____________________________

Please return this form to: Ben Phạm
Vietnamese Children’s Speech Acquisition Study, Charles Sturt University (Australia)
C/6 - Ben Phạm
Room 310, B3 Building, Hanoi National University of Education Dormitory
199 Tran Quoc Hoan Street, Cau Giay, Ha Noi, Phone: +84 983197906

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THU CHẤP THUẨN CỦA BAN GIÁM HÌNH TRƯỜNG MẦM NON

Họ và tên
Trường mầm non
Địa chỉ của trường
Số điện thoại của trường
Diễn điếu di động
Thư điện tử

Tôi đã đọc và hiểu các thông tin trong thư này về đề tài nghiên cứu Sự lĩnh hội lợi nói của trẻ em Việt Nam. Các thông tin về việc điều chỉnh nghiên cứu này đã được giải thích rõ ràng với tôi, kể cả những hạn chế có thể xảy ra. Tôi cũng đã có cơ hội thảo đổi với nhóm nghiên cứu về những bằng kinh nghiệm của mình về nghiên cứu và nhận được các câu trả lời thỏa mãn.

- Tôi biết nhóm tác giả thực hiện nghiên cứu này bao gồm chị Phạm Thị Bên (Chủ nhiệm đề tài), Nguyễn Thị Thanh, GS.TS. Sharyme McLeod (Thành viên nghiên cứu, Người hướng dẫn khoa học), và PGS.TS. Jane McCormack (Người đồng hướng dẫn khoa học).

- Tôi hiểu sự tham gia của trưởng trường và các giáo viên của trường này là hoàn toàn tự nguyện. Nếu trưởng trường và các giáo viên của trường này không thích với nghiên cứu này, họ có thể rút khỏi nghiên cứu mà không bị phạt. Điều này cũng không gây ảnh hưởng gì trong mối quan hệ giữa trường và chính quyền địa phương của tôi, trường, trưởng trường và trưởng đại học Charles Sturt, Úc.

- Tôi hiểu rằng bất cứ thông tin cá nhân hoặc thông tin nào về trường tôi thu thập trong nghiên cứu cũng sẽ được giữ bí mật, tên của tôi cũng như các thông tin nhận diện khác sẽ không được sử dụng hoặc công bố/ xuất bản nếu như không có sự cho phép của bản thân.

- Tôi cho phép các thông tin đã thu thập có thể được sử dụng trong các nghiên cứu sau này.

- Tôi cho phép trưởng trường sẽ tham gia hội thảo nhóm nghiên cứu các việc như sau:
  a) Cung cấp các thông tin cơ bản về nhà trường,
  b) Thông báo đến phụ huynh về nghiên cứu này và cho phép nhóm nghiên cứu lựa chọn khác để khảo sát trong trường của tôi,
  c) Hợp tác trong việc phát và nhận lại phiếu trong cuộc khảo sát của phụ huynh học sinh tại trường,
  d) Để giải giảm căng thẳng trong lớp học trong lớp học của học sinh (ví dụ cho phép của phụ huynh)
  e) Tạo điều kiện cho nhóm nghiên cứu có một kiến thức y tế để tạo độ với phụ huynh của trẻ cũng như thực hiện các buổi đánh giá trực tiếp trên thực tế trường.

LUỘC Y: Hội đồng bảo vệ danh nghiên cứu trường Đại học Charles Sturt đã thông qua đề tài nghiên cứu này. Nếu nhà trường có bất kỳ thắc mắc hoặc phản nhận về vấn đề đã được nghiên cứu, xin vui lòng liên lạc với Hội đồng bảo vệ chi tiết để được giải đáp:

- The Executive Officer
- Human Research Ethics Committee
- Office of Academic Governance
- Charles Sturt University
- Panorama Avenue, Bathurst, NSW 2795, Australia
- Tel: (02) 6338 4628
- Email: ethics@csu.edu.au

Mọi vấn đề băn khoăn thắc mắc sẽ được xem xét, giải quyết một cách căng thẳng và sẽ thông báo tới nhà trường.

Trước khi ký tên vào thư chấp thuận này, nếu nhà trường muốn biết thêm về nghiên cứu xin vui lòng liên lạc với chủ nhiệm đề tài nghiên cứu: Ths. Phạm Thị Bên 0983197906, thư điện tử: bpham@csu.edu.au.

Hiệu trưởng nhà trường

Ký tên:
Ngày:

Nếu không ghi lại thư này trực tiếp tại cuộc họp, xin ghi tờ dài chữ:
Phạm Thị Bên Đề tài nghiên cứu Sự lĩnh hội lợi nói của trẻ em Việt Nam
Phòng 310 nhà B3, Khu tập thể DHSP Hà Nội, Ngõ 199 Trần Quốc Hoàn, Cầu Giấy, Hà Nội. Điện thoại: 04983197906.
Appendix E. Preschool Questionnaire (English)

PRESCHOOL QUESTIONNAIRE

Please note that this information will only be seen by the research team.

Your preschool’s name: __________________________
Your role in the preschool: ______________________
Today’s date: ________________________________

Person completing the questionnaire: ______________________
Email address: ________________________________

GROUP CHARACTERISTICS
1. How many children are currently enrolled at your preschool?
2. On average, what is the general age range in months within the group? From _____ months to _____ months
3. How many children attend your preschool each day?
How many children aged 2:0-6:5 attend your preschool each day?
How many female children aged 2:0-6:5 attend your preschool?
How many male children aged 2:0-6:5 attend your preschool?
4. How many qualified staff are typically on your preschool at a time when most children have arrived? That is, staff with certificates, diplomas or above?
5. How many teaching assistants are typically on your preschool at a time when most children have arrived? That is, staff who do not have certificates, diplomas or above?
6. How many children within your preschool are from a non-Vietnamese speaking family background?
7. How many children within your preschool are from Ethnic Minority group backgrounds?
8. How many children within your preschool have a diagnosed disability? (e.g. intellectual, sensory, or physical impairment; autism spectrum disorder; developmental delay)

SERVICE CHARACTERISTICS
9. In your program, which of the following practices have you used (or will you use) this year to involve parents?*
   ☐ Parent orientation activities early in the year (e.g. meeting with the parents, written information sent to family)
   ☐ Parent participation in your program (e.g. as a volunteer or on a roster)
   ☐ Formal parent-teacher meetings about children’s progress
   ☐ Parent education programs or information sessions
   ☐ Social activities for parents that promote contact or support
   ☐ Regular newsletters about your program and events
   ☐ Other (please specify):

10. How much of the usual daily activity is described by the following? (Please tick one box per row)*


<table>
<thead>
<tr>
<th>Activity</th>
<th>Not at all</th>
<th>Somewhat</th>
<th>Quite a lot</th>
<th>Very much</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sitting and playing with children (puzzles, blocks, construction, drawing, etc.)</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Singing, telling stories, reading books</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Managing problem behaviour</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Giving individual attention in routine care (helping child with feeding, toileting, dressing, sleep, etc.)</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Organising space, equipment or toys, food and drink</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Teaching good health practices (hand washing, healthy eating, sun protection, etc.)</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Taking part in children’s active outdoor play (ball play, running, etc.)</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Watching or supervising child or children’s play</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Taking part in pretend play</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

Research use: 4 3 2 1

*This study uses questionnaires (or part of) developed for Growing Up in Australia: The Longitudinal Study of Australian Children (LSAC). These questionnaires are the property of the Commonwealth as represented by the Department of Social Services. LSAC is an initiative of the Australian Government Department of Social Services (www.dss.gov.au), and is being undertaken in association with the Australian Institute of Family Studies and the Australian Bureau of Statistics, with advice being provided by a consortium of leading researchers at research institutions and universities throughout Australia.

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CRICOS Provider Numbers for Charles Sturt University are 00055F (NSW), 01947G (VIC) and 02660B (ACT). ABN: 83 878 708 551

Preschool Questionnaire

345
Appendix E. Preschool Questionnaire (English)

PHIẾU TRUNG CẢM Ý KIÊN – TRƯỞNG MẦM NON

Đề tài nghiên cứu Sự hình hỏi lợi nói của trẻ em Việt Nam

PHIẾU NGẪM CỦA ỦY VIỆT NON

Hà y lên ý rằng chỉ có những thực hiện nghiên cứu đúng những thông tin cung cấp từ phiếu này,

Trần trọng cảm ơn sự tham gia của nhà trường với việc tái nghiên cứu Sự hình hỏi lợi nói của trẻ em Việt Nam.

Phiếu này với câu hỏi liên quan đến những thông tin của nhà trường.

Tên trưởng:

Chức vụ:

Họm nhân, ngày:

THÔNG TIN VỀ TRẺ TRƯỜNG TRƯỞNG

1. Năm học này có bao nhiêu trẻ nhập học tại trường?
2. Đở tuổi của trẻ học tại trường tính theo tháng là ở khoảng nào? Từ _______ đến _______
3. Mỗi ngày, lần bơi học trẻ bơi tự đứng lên đến _______ tự đứng học lớp bơi trẻ nào?
4. Mỗi ngày, lần bơi học trẻ bơi tự đứng lên đến _______ tự đứng học lớp bơi trẻ nào?
5. Số bơi học trẻ bơi tự đứng lên đến _______ tự đứng học lớp bơi trẻ nào?
6. Số bơi học trẻ bơi tự đứng lên đến _______ tự đứng học lớp bơi trẻ nào?
7. Số bơi học trẻ bơi tự đứng lên đến _______ tự đứng học lớp bơi trẻ nào?
8. Số bơi học trẻ bơi tự đứng lên đến _______ tự đứng học lớp bơi trẻ nào?
9. Số bơi học trẻ bơi tự đứng lên đến _______ tự đứng học lớp bơi trẻ nào?
10. Số bơi học trẻ bơi tự đứng lên đến _______ tự đứng học lớp bơi trẻ nào?

THÔNG TIN VỀ CÁC HOẠT ĐỘNG GIAO DỤC TẠI TRƯỜNG

9. Trong thời gian học, những hoạt động nào được thực hiện trong lịch học của trẻ em?

10. Trong thời gian học, những hoạt động nào được thực hiện trong lịch học của trẻ em?

11. Trong thời gian học, những hoạt động nào được thực hiện trong lịch học của trẻ em?

12. Trong thời gian học, những hoạt động nào được thực hiện trong lịch học của trẻ em?

13. Trong thời gian học, những hoạt động nào được thực hiện trong lịch học của trẻ em?

14. Trong thời gian học, những hoạt động nào được thực hiện trong lịch học của trẻ em?

15. Trong thời gian học, những hoạt động nào được thực hiện trong lịch học của trẻ em?

16. Trong thời gian học, những hoạt động nào được thực hiện trong lịch học của trẻ em?

17. Trong thời gian học, những hoạt động nào được thực hiện trong lịch học của trẻ em?

18. Trong thời gian học, những hoạt động nào được thực hiện trong lịch học của trẻ em?

19. Trong thời gian học, những hoạt động nào được thực hiện trong lịch học của trẻ em?

20. Trong thời gian học, những hoạt động nào được thực hiện trong lịch học của trẻ em?

21. Trong thời gian học, những hoạt động nào được thực hiện trong lịch học của trẻ em?

22. Trong thời gian học, những hoạt động nào được thực hiện trong lịch học của trẻ em?

23. Trong thời gian học, những hoạt động nào được thực hiện trong lịch học của trẻ em?

24. Trong thời gian học, những hoạt động nào được thực hiện trong lịch học của trẻ em?

25. Trong thời gian học, những hoạt động nào được thực hiện trong lịch học của trẻ em?

26. Trong thời gian học, những hoạt động nào được thực hiện trong lịch học của trẻ em?

27. Trong thời gian học, những hoạt động nào được thực hiện trong lịch học của trẻ em?

28. Trong thời gian học, những hoạt động nào được thực hiện trong lịch học của trẻ em?

29. Trong thời gian học, những hoạt động nào được thực hiện trong lịch học của trẻ em?

30. Trong thời gian học, những hoạt động nào được thực hiện trong lịch học của trẻ em?

Nếu không ghi lại phiếu này trực tiếp tại cuộc họp, xin gửi tới địa chỉ: Phạm Thị Huyền, Phòng 310, Nhà B3, Khu tập thể trưởng Đại học Sở phỹ Hà Nội, Ngày 199 Trần Quốc Hoan, Cầu Giấy, Hà Nội. Điện thoại: +84 938 919 900.

www.csu.edu.vn

CSUPOS Provider Numbers for Charles Sturt University are 000056 (NSW), 019479 (VIC) and 029008 (ACT). ABN: 83 878 798 561
Appendix F. Parent Information Letter (English)

PARENT INFORMATION LETTER

Your child’s preschool is participating in the Children’s acquisition of consonants, semivowels, vowels, and tones in Northern Viet Nam study (hereafter referred to as the Vietnamese Children’s Speech Acquisition Study). This study is conducted through Charles Sturt University, Australia and is supported by a PhD scholarship provided by the Australia Government. The findings of this project will provide useful information to parents, educators, speech pathologists, and policy makers about Vietnamese children’s speech.

This project will be conducted by the following research team:

Mrs Ben Pham, PhD student, School of Teacher Education, Charles Sturt University, Australia
Professor Sharyne McLeod, and A/Professor Jane McCormack
Research Institute of Professional Practice, Learning and Education, Charles Sturt University, Australia

Information about the study

The Vietnamese Children’s Speech Acquisition Study aims to inform families, educators, speech pathologists, policy makers, and the general public about Vietnamese children’s speech acquisition and to assist identification of children with speech difficulties. To date, there is limited information about Vietnamese children’s speech development. The study will describe the age of acquisition of consonants, semivowels, vowels and tones, patterns in speech acquisition, and the intelligibility level of children aged 2:0 to 6:5 in Northern Viet Nam. Information gathered from this study will be published and may be used in future research about children’s speech undertaken by the researchers.

What will happen?

This information sheet describes each stage of the Vietnamese Children’s Speech Acquisition Study that we request your participation from you or your child.

Caregiver questionnaire

You, as a caregiver of a child in the age from 2:0-6:5, will be asked to complete a short questionnaire about your child’s speech, language, movement, social, and behavioural skills, history, and development. The questionnaire may be completed at home or at preschool.

Teacher questionnaire

Your child’s teacher will be asked to fill out a short questionnaire about your child’s development.

Child assessment

- Your child will be asked to participate in a screening hearing and otoromotor assessment with the principal researcher that will take approximately 10 minutes.
- If your child passes the hearing and otoromotor screening assessment (does not demonstrate any difficulties), they will participate in the Vietnamese Speech Assessment and/or the International Speech Assessment with the principal researcher that will take approximately 30 minutes per child.
- If your child does not pass the hearing screening assessment, he/she will be given a second opportunity to undertake the test. If they do not pass the test the second time, you will be advised to follow-up with a qualified audiologist and provided with details regarding how to do so.

The assessment will involve your child listening and speaking. You are welcome to attend the assessment. Your child will be photographed, audio and video recorded during the child assessment. The purpose of this is to allow the researchers to look closely at your child’s speech skills during the analysis phase of the study. These recordings and photographs will not be accessed by anyone other than the researchers without your written consent. If you give consent, they may be shown to others for educational purposes.

Study feedback to caregivers

On completion of the study you will receive a summary of your child’s assessment results. A qualified special educator and/or speech pathologist will be available to discuss any questions or concerns you may have arising out of the results of the assessment.

Pleased turn over
Dissemination of Research Findings

The findings of this research will inform the practice of educators, speech pathologists, and policy makers in Viet Nam and Australia, and be of interest to the general public. Research findings will always be shared in ways that do not identify participants (child, family, teachers, school) unless expressly requested to do otherwise. If you give permission on the consent form, the audio tapes, video tapes, and photographs also may be used during presentations of the research for educational purposes, disseminating information about the Vietnamese Children’s Speech Acquisition Study and sharing audio data with PhonBank/Talk-Bank, an international database of children’s speech and language. The outcomes of this project will be accessible to families and schools who have participated in this research. Research findings will be published in journals and presented at conferences, and other events. Findings may also be broadcast through media outlets.

Ethical Considerations

Your child’s name will not be used in this research; instead number codes will be used so information about them is anonymous. No information that could identify you or your child will be released (except the photographs, audio, and video recordings if you have provided consent for this to occur). The researchers will take every precaution to maintain confidentiality. Your participation in this study is entirely voluntary. Electing not to participate in this study will not affect you or your child’s existing or future relations with Charles Sturt University or the researchers conducting this project. If you decide to participate, you are free to withdraw your consent and discontinue your participation at any time. Information gathered from this study will be published and may be used in future research about children’s speech undertaken by the researchers.

NOTE: Charles Sturt University’s Human Research Ethics Committee has approved this project. If you have any complaints or reservations about the ethical conduct of this project, you may contact:

Human Research Ethics Committee
Office of Academic Governance
Charles Sturt University
Panorama Avenue, Bathurst, NSW 2795, Australia
Tel: (02) 63384628 Email: ethics@csu.edu.au

Any issues you raise will be treated in confidence and investigated fully and you will be informed of the outcome.

Further Information

If you have any further questions about this research please contact Mrs Ben Pham (Phone: +61.4 22959679 or +61.4 98119906, email: bpham@csu.edu.au), Professor McLeod (smcleod@csu.edu.au), or A/Professor McCormack (jpmccormack@csu.edu.au) before signing this form.

Ben Pham, Charles Sturt University, Australia
Professor Sharynne McLeod, PhD, Charles Sturt University, Australia
A/Professor Jane McCormack, PhD, Charles Sturt University, Australia
THƯ NGỎ

Nhờ nhận được thư của bạn gửi,

Trương Đài học Charles Sturt, Úc
GSTS, Sharynne McLeod và PGS.TS. Jane McCormack, Trương Đài học Charles Sturt, Úc

THÔNG TIN CHUNG VỀ ĐẾ TÀI

Người nhận này sẽ tìm hiểu qua trình lồng hội lợi ích của trẻ em từ 2 đến 6 tuổi ở miền bắc Việt Nam. Để tránh nạn của trẻ em từ 2 đến 6 tuổi ở miền bắc Việt Nam. Để tránh nạn của trẻ em,

CÁC HƯỚNG DẪN BÁO GÓP

Thư này xin giới thiệu sự lựa chọn những hoạt động mà quỹ phụ huynh và con của mình có thể tham gia vào nghiên cứu như sau:

PHIÊN TRỌNG CUNG CẤP KHÔNG PHỤ HUYNH

Anh/chị, là phụ huynh có con từ 2 đến 6 tuổi, sẽ trả lời cho một phiên trong và cần kỹ lưỡng về lợi ích, ngôn ngữ, văn hóa, các kỹ năng xã hội và hành vi cũng như tin tức và sự phát triển của con mình. Anh/chị có thể đăng phiên này ở nhà hoặc ở trường rồi nộp lại cho nhóm nghiên cứu của chúng tôi.

PHIÊN TRỌNG CUNG CẤP GIẢO VIỆN

Giao viễn của con anh/chị cũng sẽ trả lời một phiên trong và cần kỹ lưỡng về sự phát triển của cha.

DÀNH GIÁ TRẺ

Con của anh/chị có thể sẽ được tham gia vào buổi đánh giá miễn phí để

- Sáng lọc thông luc và cấu trúc và vấn đề không giống với chủ nhân để tại trong khoảng 10 phút.
- Nếu con anh/chị đặt yêu câu trong đánh giá sáng lọc thông luc và cấu trúc và vấn đề không giống với chủ nhân để tại trong khoảng 30 phút.
- Nếu con anh/chị không đặt yêu câu trong đánh giá sáng lọc thông luc sẽ được đánh giá sáng lọc thông luc lận thứ hai. Nếu vẫn không đặt yêu câu trong đánh giá sáng lọc thông luc sẽ được đánh giá sáng lọc thông luc lần thứ hai. Nếu vẫn không đặt yêu câu trong đánh giá sáng lọc thông luc sẽ được đánh giá sáng lọc thông luc lần thứ hai.

Đánh giá chi yêu câu con anh/chị nghèo và nói. Anh/chị có thể để tham dự bồi dưỡng đánh giá cùng con những không bao giờ.

BÁO CÁO GÌ PHỤ HUYNH

Sau khi đánh giá, anh/chị sẽ nhận được một bản báo cáo về kết quả đánh giá của con mình. Khi xem báo cáo kết quả đánh giá con mình, nếu anh/chị có bất kỳ câu hỏi hay khác mức gì, anh/chị có thể trả lời hoặc xin tư vấn từ nhóm nghiên cứu của chúng tôi.

TIẾP TRĄNG SAU

www.csu.edu.au
CRICOS Provider Numbers for Charles Sturt University are 000356F (NSW), 01947G (VIC) and 02248G (ACT). ABN: 83 878 708 551
Công bố kết quả nghiên cứu

Kết quả nghiên cứu của đề tài này sẽ công bố đến các nhà giáo dục, chuyên viên âm ngữ trị liệu và các nhà hoạch định chính sách và có thể được công bố trên các phương tiện truyền thông. Kết quả nghiên cứu sẽ được tổng bối ở các hình thức khác nhau nhưng đều không tiếc lô dân tính của những người đã tham gia (treo) giải định của tre/ giáo viên/trường mẫu mực, trừ khi có điều kiện được làm như vậy. Nếu nhà/chi ký tên vào thư chính phủ, các bằng sáng chế, ghi hình và ảnh chụp sẽ có thể được sử dụng trong việc bảo cáo kết quả nghiên cứu phụ thuộc các mục đích giáo dục, công bố thông tin về đề tài nghiên cứu Sự liên hệ lịch trị với các đề em về Việt Nam và chỉ số các đề liệu ghi âm với cơ sở dữ liệu nơi cuối của tre em có tên gọi là PhongBank/TalkBank. Gia đình của tre và nhà trường cũng sẽ được đăng tiếp cận được kết quả nghiên cứu. Chúng tôi sẽ đăng tải, báo cáo các kết quả nghiên cứu ở các tạp chí khoa học chuyên ngành, các hội thảo khoa học chuyên ngành hoặc các sự kiện khoa học có liên quan ở các Việt Nam, Úc và các nước khác.

Nhung lieu ý và đồ đạc nghiên cứu


Chúng tôi sẽ cung cấp các kết quả nghiên cứu được thu thập từ nghiên cứu này và những kết quả này có thể được chung tôi sử dụng trong các nghiên cứu sau này về lợi ích của tre em do nhóm nghiên cứu thực hiện.


Human Research Ethics Committee
Office of Academic Governance
Charles Sturt University
Panorama Avenue, Bathurst, NSW 2795, Australia
Tel: (02) 6334628 Email: ethics@csu.edu.au

Mọi thông tin sẽ được giữ kín một cách cẩn thận và thông báo tới ảnh/chi phương án giải quyết.

Thương hiétude

Nếu ảnh/chi muốn biết thêm thông tin về đề tài nghiên cứu này trước khi ký tên vào thư chấp thuận, xin vui lòng liên lạc với chủ nhiệm đề tài, Ths. Phạm Thị Bền, số điện thoại tại Việt Nam: 0983197906 hoặc thư điện tử: bpham@csu.edu.au, và hoặc GS. McLeeod (smcleod@csu.edu.au), và hoặc PG. Mccormack (jmccormack@csu.edu.au).

Trần trọng cảm ơn!

Phạm Thị Bền, nghiên cứu sinh, Trường Đại học Charles Sturt, Úc
GS.TS. Sharynn McLeeod và GS.TS. Jane McCormack, Trường Đại học Charles Sturt, Úc.

www.csu.edu.au
CRICOS Provider Numbers for Charles Stuart University are 00065F (NSW), 01947G (VIC) and 02660B (ACT). ABN: 83 878 708 651

Parent Information Letter (Vietnamese)
Appendix G. Parent Consent Form (English)

CONSENT FORM – PARENTS

Your name
Your child’s name
Your child’s date of birth
Your relationship to the child
Your address
Home phone number
Mobile phone number
Email (if you have)

I have read and understood the information letter describing the Vietnamese Children’s Speech Acquisition Study. The purpose of the research has been explained to me, including the minimal risks associated with this research. I have been given the opportunity to ask questions about the research and have received satisfactory answers.

- I understand that the investigators involved in this project are Mrs. Ben Pham (Principal investigator, PhD student), Professor Sharynne McLeod (Associate researcher and Primary supervisor), and Associate Professor Jane McCormack (Co-supervisor).
- I understand that my participation is entirely voluntary. I understand that I am free to withdraw from participating in the research at any time, and that if I do I will not be subjected to any penalty or discriminatory treatment. I understand that withdrawing from this research will not affect my, or the preschool’s, existing or future relationship with my preschool, and Charles Sturt University, Australia.
- I understand that any information or personal details gathered in the course of this research will remain confidential and that neither my name, my child’s name, nor any other identifying information will be used or published without my written permission.
- I understand that information gathered may be used in future research about children’s speech undertaken by the researchers.
- I understand this research may involve:
  a) completing a questionnaire
  b) assessment of my child by a qualified special educator and/or speech pathologist
  c) my child being audio and video recorded during the assessment
  d) my child being photographed during the assessment
  e) that the audio tapes, video tapes, and photographs will be used for analysis of my child’s speech
  f) that the audio tapes, video tapes, and photographs also may be used during presentations of the research for educational purposes and disseminating information about the Vietnamese Children’s Speech Acquisition Study if I give permission for this to occur (on the next page)
  g) that the audio/video data will be shared with Talk Bank, an international database of children’s speech and language if I give permission for this to occur (on the next page).

NOTE: Charles Sturt University’s Human Research Ethics Committee has approved this project. If you have any complaints or reservations about the ethical conduct of this project, you may contact the Committee through the Executive Officer:

The Executive Officer
Human Research Ethics Committee
Office of Academic Governance
Charles Sturt University
Panorama Avenue, Bathurst, NSW 2795, Australia
Tel: (02)6338 4628
Email: ethics@csu.edu.au

Any issues you raise will be treated in confidence and investigated fully and you will be informed of the outcome.

PLEASE TURN OVER
If you have any further questions about this research please contact Principal Researcher Ben Pham (Phone: +61 4 2295 9679 (Australia), or +84 983 197 906 (Viet Nam), or email: bpham@csu.edu.au), Professor McLeod (smcleod@csu.edu.au), and/or A/Professor McCormack (jmccormack@csu.edu.au), before signing this form.

I consent to my child participating in the Vietnamese Children’s Speech Acquisition Study.

Signed by: ___________________________ (Caregiver) Date ____________________________

I consent to my child’s teacher completing a similar questionnaire

Signed by: ___________________________ (Caregiver) Date ____________________________

I consent to audio/video recordings of my child and photographs of my child being used for future research, educational purposes, and the purpose of disseminating information about the Vietnamese Children’s Speech Acquisition Study, and I consent to audio/video recordings being shared with PhonBank/TalkBank, an international database of children’s speech and language.

Signed by: ___________________________ (Caregiver) Date ____________________________

Please return this form to:

Ben Pham
Vietnamese Children’s Speech Acquisition Study
C/ - Ben Pham, Room 310, B3 Building Ha Noi National University of Education Dormitory
199 Tran Quoc Hoan Street, Cau Giay, Ha Noi, Phone: (+84) 0983197936.

www.csu.edu.au
CRICOS Provider Numbers for Charles Sturt University are 00009F (NSW), 01947G (VIC) and 02605B (ACT). ABN: 83 876 708 551

Consent: Parent
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<td>Ngay sinh của trẻ</td>
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<td>Mối quan hệ với trẻ (bố mẹ/ông/ý bà)</td>
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<td>Địa chỉ gia đình</td>
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<td>Số điện thoại gia đình</td>
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<td>Số điện thoại di động</td>
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<td>Thức ăn từ (nếu có)</td>
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Tôi đã đọc và hiểu các thông tin trong thư ngỏ mã tâ về đề tài nghiên cứu Sự linh hối lợi tổ chức trẻ em Việt Nam. Các thông tin về mục đích của nghiên cứu này đã được giải thích rõ ràng với tôi, kể cả những hạn chế thể hiện ra. Tôi cũng đã có cơ hội trả lời với nhóm nghiên cứu về những băn khoăn thắc mắc của mình về nghiên cứu và nhận được các câu trả lời thỏa mãn.

- Tôi hiểu rằng nhóm nghiên cứu đã tổ chức các buổi nói chuyện, Hội thảo, và các hoạt động khác để thu thập thông tin về trẻ và có can thiệp trong nghiên cứu cũng sẽ được giữ bí mật, tên của tôi và tên của con tôi cũng như các thông tin liên quan khác sẽ không được sử dụng hoặc công bố nếu như không có sự cho phép của tôi và ban công bố này.

- Tôi hiểu rằng các thông tin đã thu thập có thể được sử dụng trong các nghiên cứu sau này.

- Tôi hiểu rằng nghiên cứu này có thể sẽ bao gồm:
  a) tra lời phương trình của bạn
  b) đánh giá con tôi do một chuyên viên âm nhạc trực tiếp, và/hoặc giáo dục đặc biệt thực hiện
  c) ghi âm và ghi hình con tôi trong lúc đánh giá
  d) chụp ảnh con tôi trong lúc đánh giá
  e) các bằng gia đình, ghi hình và ảnh chụp sẽ được sử dụng cho việc phân tích lợi tổ chức con tôi
  f) các bằng gia đình, ghi hình và ảnh chụp cũng có thể sẽ được sử dụng trong các báo cáo nghiên cứu và mục đích giáo dục và có thể trong báo tin công bố về đề tài nghiên cứu Sự linh hối lợi tổ chức trẻ em Việt Nam nếu như tôi ký tên cho phép (ở trang sau).
  g) các bằng gia đình, ghi hình sẽ được chia sẻ trên cơ sở dữ liệu quốc tế về lợi tổ chức và nghiên cứu trẻ em có tên gọi là Talk Bank nếu như tôi ký tên cho phép (ở trang sau).

LUY: Hội đồng Đạo đức nghiên cứu về con người của trường Đại học Charles Sturt đã cho phép thực hiện nghiên cứu này. Nếu bất cứ chi tiết nào khác, tôi có thể liên hệ với nhóm nghiên cứu để kiểm tra xem liệu tôi có phải chọn được chi tiết này, xin vui lòng liên hệ với Hội đồng đạo đức tại Đại học hoặc theo địa chỉ sau:

The Executive Officer
Human Research Ethics Committee
Office of Academic Governance
Charles Sturt University
Panorama Avenue, Bathurst, NSW 2795, Australia
Tel: (02) 63892028 Email: ethics@csu.edu.au

Bất kỳ thắc mắc nào cũng được giải quyết chính xác trong và ngoài thư bao đến anh/ chị phương án xử lí.
Trước khi ký tên vào thư chấp thuận này, nếu anh/chị muốn hiểu thêm về đề tài nghiên cứu, xin vui lòng liên hệ với chu Nhiệm đề tài, chị Phạm Thị Bến, số điện thoại tại Việt Nam, 0983197906, hoặc thư điện tử: bpham@csu.edu.au, GS. McLeod (smcleod@csu.edu.au), và/hoặc PGS. McCormack (jmccormack@csu.edu.au).

Tôi đồng ý cho phép con tôi tham gia vào đề tài nghiên cứu Sự lãnh hội lợi nói của trẻ em Việt Nam.
Phụ huynh ký tên: ____________________________ Ngày: ____________________________

Tôi đồng ý cho phép giáo viên đang dạy con tôi trả lời liệu pháp tư duy kiến về con tôi
Phụ huynh ký tên: ____________________________ Ngày: ____________________________

Tôi đồng ý cho phép các bằng hình ảnh/ảnh chụp con tôi được sử dụng trong các nghiên cứu sau này, cho các mục đích giáo dục và công bố các thông tin về đề tài nghiên cứu Sự lãnh hội lợi nói của trẻ em Việt Nam; và tôi cho phép các bằng hình ảnh/ảnh chụp con tôi được chia sẻ trên cơ sở dữ liệu quoc tế về ngôn ngữ và lợi nói trẻ em PhonBank/TalkBank.
Phụ huynh ký tên: ____________________________ Ngày: ____________________________

Nếu không gửi thư này trực tiếp tai cuộc họp, xin gửi lại cho trường hoặc giáo viên hoặc tôi địa chỉ:
Phạm Thị Bến, Đề tài nghiên cứu Sự lãnh hội lợi nói của trẻ em Việt Nam
Phòng 310 Nhà B3 khu tập thể Trường Đại học Sư phạm Hà Nội

www.csu.edu.au

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Appendix H. Parent Questionnaire (English)

Charles Sturt University

Vietnamese Children’s Speech Acquisition Study

PARENT QUESTIONNAIRE

Please complete this questionnaire if your child is from 2.0 to 6.5 years old. Please note that your completion of this questionnaire is taken as your consent to participate in the Vietnamese Children’s Speech Acquisition Study. Only the research team will see this information. It will not be shown to your child’s teacher.

<table>
<thead>
<tr>
<th>Your child’s name:</th>
<th>Your child’s gender: male/female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Your child’s date of birth:</td>
<td>Your relationship to child:</td>
</tr>
<tr>
<td>Your name:</td>
<td>Your ethnic group:</td>
</tr>
<tr>
<td>Your hometown:</td>
<td>Your contact phone number:</td>
</tr>
<tr>
<td>Your address:</td>
<td>Your contact email address:</td>
</tr>
</tbody>
</table>

1. Please list any concerns about your child’s learning, development, and behaviour b.

2. Do you have any concerns about b

Questions from Parents’ Evaluation of Developmental Status (PEDS) were included in this table with permission from Glascoe (2000). Permission to replicate the questions in this Appendix was not granted.

3. Please list any other concerns b

4. Please indicate any areas of speech and language in which your child has difficulty (tick as many as appropriate) b

<table>
<thead>
<tr>
<th></th>
<th>No</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Reluctant to speak</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) Speech not clear to family</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) Speech not clear to others</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d) Difficulty finding words</td>
<td></td>
<td></td>
</tr>
<tr>
<td>e) Difficulty putting words together</td>
<td></td>
<td></td>
</tr>
<tr>
<td>f) Doesn’t understand you when you speak</td>
<td></td>
<td></td>
</tr>
<tr>
<td>g) Doesn’t understand others when they speak</td>
<td></td>
<td></td>
</tr>
<tr>
<td>h) Voice sounds unusual</td>
<td></td>
<td></td>
</tr>
<tr>
<td>i) Stutters, stammers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>j) Lisps</td>
<td></td>
<td></td>
</tr>
<tr>
<td>k) Persistent hearing loss</td>
<td></td>
<td></td>
</tr>
<tr>
<td>l) Cleft lip and/or palate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>m) Developmental delay</td>
<td></td>
<td></td>
</tr>
<tr>
<td>n) Other (please describe)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>o) Don’t know</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Research use 0 1
5. Has your child ever had

<table>
<thead>
<tr>
<th>Question</th>
<th>No</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) A developmental assessment?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) Special education assessment and intervention?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) Speech pathology assessment and intervention/therapy?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d) Tongue tie cut?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>e) Tonsils or adenoids removed (VA cut)?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>f) Frequent ear infections</td>
<td></td>
<td></td>
</tr>
<tr>
<td>g) Ongoing medical problems?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

6. The following questions are about how much of your child’s speech is understood by different people. Please think about your child’s speech over the past month when answering each question. Tick one circle for each question.

<table>
<thead>
<tr>
<th>Question</th>
<th>Always</th>
<th>Usually</th>
<th>Sometimes</th>
<th>Rarely</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Do you understand your child?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) Do immediate members of your family understand your child?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) Do extended members of your family understand your child?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d) Do your child’s friends understand your child?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e) Do other acquaintances understand your child?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>f) Do your child’s teachers understand your child?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>g) Do strangers understand your child?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

7. Does your child

<table>
<thead>
<tr>
<th>Question</th>
<th>No</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) speak Northern Vietnamese at home?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) hear Northern Vietnamese at home?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) speak a language rather than Vietnamese as his/her first language?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d) speak other language(s). What language(s)?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

8. Do you speak

<table>
<thead>
<tr>
<th>Question</th>
<th>No</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Northern Vietnamese?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) Central Vietnamese?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) Southern Vietnamese?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d) An ethnic minority language(s) as your first language?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>e) A language rather than Vietnamese as your first language?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9. Does your spouse speak

<table>
<thead>
<tr>
<th>Question</th>
<th>No</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Northern Vietnamese?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) Central Vietnamese?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) Southern Vietnamese?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d) An ethnic minority language(s) as your first language?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>e) A language rather than Vietnamese as your first language?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

356
<table>
<thead>
<tr>
<th>Question</th>
<th>No</th>
<th>Yes</th>
<th>Don’t know/Don’t apply</th>
</tr>
</thead>
<tbody>
<tr>
<td>10. Has your child lived in Central or Southern Viet Nam, or another country for more than one year?</td>
<td>□</td>
<td>□</td>
<td>0</td>
</tr>
<tr>
<td>11. Has your child’s mother (you) lived in Central or Southern Viet Nam, or another country for more than one year?</td>
<td>□</td>
<td>□</td>
<td>0</td>
</tr>
<tr>
<td>12. Has your child’s father (you) lived in Central or Southern Viet Nam, or another country for more than one year?</td>
<td>□</td>
<td>□</td>
<td>0</td>
</tr>
<tr>
<td>13. When did your child say his/her first real word which meant something (e.g., drink)?</td>
<td>□</td>
<td>□</td>
<td>0</td>
</tr>
<tr>
<td>Before 12 months</td>
<td>□</td>
<td>□</td>
<td>1</td>
</tr>
<tr>
<td>12 -18 months</td>
<td>□</td>
<td>□</td>
<td>2</td>
</tr>
<tr>
<td>18 - 24 months</td>
<td>□</td>
<td>□</td>
<td>3</td>
</tr>
<tr>
<td>Later</td>
<td>□</td>
<td>□</td>
<td>4</td>
</tr>
<tr>
<td>Don’t know</td>
<td>□</td>
<td>□</td>
<td>-2</td>
</tr>
<tr>
<td>14. Does any family member have difficulties with speech, language, literacy or hearing that have lasted or are expected to last, for six months or more?</td>
<td>□</td>
<td>□</td>
<td>0</td>
</tr>
<tr>
<td>Family member</td>
<td>No</td>
<td>Yes</td>
<td>Don’t know/Don’t apply</td>
</tr>
<tr>
<td>a) Mother</td>
<td>□</td>
<td>□</td>
<td>0</td>
</tr>
<tr>
<td>b) Father</td>
<td>□</td>
<td>□</td>
<td>0</td>
</tr>
<tr>
<td>c) Sister(s)</td>
<td>□</td>
<td>□</td>
<td>0</td>
</tr>
<tr>
<td>d) Brother(s)</td>
<td>□</td>
<td>□</td>
<td>0</td>
</tr>
<tr>
<td>e) Grandmother(s)</td>
<td>□</td>
<td>□</td>
<td>0</td>
</tr>
<tr>
<td>f) Grandfather(s)</td>
<td>□</td>
<td>□</td>
<td>0</td>
</tr>
<tr>
<td>g) Aunt(s)</td>
<td>□</td>
<td>□</td>
<td>0</td>
</tr>
<tr>
<td>h) Uncle(s)</td>
<td>□</td>
<td>□</td>
<td>0</td>
</tr>
<tr>
<td>i) Cousin(s)</td>
<td>□</td>
<td>□</td>
<td>0</td>
</tr>
<tr>
<td>j) Other relative (describe)</td>
<td>□</td>
<td>□</td>
<td>0</td>
</tr>
<tr>
<td>15. Was your child ever breast fed?</td>
<td>□</td>
<td>□</td>
<td>0</td>
</tr>
<tr>
<td>Yes (more than 9 months)</td>
<td>□</td>
<td>□</td>
<td>2</td>
</tr>
<tr>
<td>Yes (less than 9 months)</td>
<td>□</td>
<td>□</td>
<td>1</td>
</tr>
<tr>
<td>No</td>
<td>□</td>
<td>□</td>
<td>0</td>
</tr>
<tr>
<td>Don’t remember</td>
<td>□</td>
<td>□</td>
<td>-2</td>
</tr>
<tr>
<td>16. Has your child ever done the following? (Tick all that apply)</td>
<td>□</td>
<td>□</td>
<td>0</td>
</tr>
<tr>
<td>a) Used a dummy? (more than 9 months)</td>
<td>□</td>
<td>□</td>
<td>0</td>
</tr>
<tr>
<td>b) Used a bottle? (more than 9 months)</td>
<td>□</td>
<td>□</td>
<td>0</td>
</tr>
<tr>
<td>c) Sucked on his/her thumb or fingers? (more than 9 months)</td>
<td>□</td>
<td>□</td>
<td>0</td>
</tr>
<tr>
<td>17. Has your child ever had any difficulty with eating or drinking (other than being picky)?</td>
<td>□</td>
<td>□</td>
<td>0</td>
</tr>
<tr>
<td>Yes, please provide details (e.g., not able to suckle, tube-fed, slow-feeding, texture aversion, refusing solids, persistent choking)</td>
<td>□</td>
<td>□</td>
<td>1</td>
</tr>
<tr>
<td>Don’t know</td>
<td>□</td>
<td>□</td>
<td>-2</td>
</tr>
</tbody>
</table>
18. What adults live at home with this study child?

<table>
<thead>
<tr>
<th>Option</th>
<th>Research use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mother</td>
<td>1</td>
</tr>
<tr>
<td>Father</td>
<td>2</td>
</tr>
<tr>
<td>Grandparents</td>
<td>3</td>
</tr>
<tr>
<td>House keeper/nannies</td>
<td>4</td>
</tr>
<tr>
<td>Other (please specify relationship to child):</td>
<td>5</td>
</tr>
</tbody>
</table>

19. Does your child have any older brothers or sisters (living at home)?

<table>
<thead>
<tr>
<th>Option</th>
<th>Research use</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>0</td>
</tr>
<tr>
<td>Yes</td>
<td>1</td>
</tr>
</tbody>
</table>

20. Does your child have younger brothers or sisters (living at home)?

<table>
<thead>
<tr>
<th>Option</th>
<th>Research use</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>0</td>
</tr>
<tr>
<td>Yes</td>
<td>1</td>
</tr>
</tbody>
</table>

21. What was the highest education the child’s mother completed?

<table>
<thead>
<tr>
<th>Option</th>
<th>Research use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Postgraduate degree</td>
<td>1</td>
</tr>
<tr>
<td>Bachelor university or college degree</td>
<td>2</td>
</tr>
<tr>
<td>Certificate</td>
<td>3</td>
</tr>
<tr>
<td>High school or below (Senior)</td>
<td>4</td>
</tr>
<tr>
<td>High school or below (Junior)</td>
<td>5</td>
</tr>
<tr>
<td>Primary school education or below</td>
<td>6</td>
</tr>
<tr>
<td>Never attended school</td>
<td>7</td>
</tr>
<tr>
<td>Still at general education school</td>
<td>8</td>
</tr>
<tr>
<td>Don’t know</td>
<td>-2</td>
</tr>
</tbody>
</table>

22. What was the highest education the child’s father completed?

<table>
<thead>
<tr>
<th>Option</th>
<th>Research use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Postgraduate degree</td>
<td>1</td>
</tr>
<tr>
<td>Bachelor university or college degree</td>
<td>2</td>
</tr>
<tr>
<td>Certificate</td>
<td>3</td>
</tr>
<tr>
<td>High school or below (Senior)</td>
<td>4</td>
</tr>
<tr>
<td>High school or below (Junior)</td>
<td>5</td>
</tr>
<tr>
<td>Primary school education or below</td>
<td>6</td>
</tr>
<tr>
<td>Never attended school</td>
<td>7</td>
</tr>
<tr>
<td>Still at general education school</td>
<td>8</td>
</tr>
<tr>
<td>Don’t know</td>
<td>-2</td>
</tr>
</tbody>
</table>

23. What is the child’s mother’s occupation? ________________

24. What is the child’s father’s occupation? ________________

Please return the completed questionnaire in the box provided. If you have any questions about this questionnaire or the Vietnamese Children’s Speech Acquisition Study, please contact the principal researcher (Phone: +84 983197906, email: bpham@csu.edu.au). The researcher may contact you again.
## Appendix H. Parent Questionnaire (Vietnamese)

### PHIÊU TRUNG CÂU Ý KIẾN PHỤ HỮNH


<table>
<thead>
<tr>
<th>Họ và tên trẻ:</th>
<th>Giới tính của trẻ: Nam/ Nữ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ngày sinh của trẻ:</td>
<td>Mối quan hệ với trẻ (Ba/Mẹ/Ông/ Thúy)...</td>
</tr>
<tr>
<td>Họ và tên phụ huynh:</td>
<td>Dân tộc:</td>
</tr>
<tr>
<td>Quê quán:</td>
<td>Số điện thoại liên hệ:</td>
</tr>
<tr>
<td>Nơi ở hiện tại:</td>
<td>Thư điện tử (nếu có):</td>
</tr>
</tbody>
</table>

1. Hãy liệt kê những lo lắng của anh/chị về khả năng học hỏi, sự phát triển và hành vi của trẻ.

2. Anh/chị có lo lắng về:


3. Hãy liệt kê những lo lắng khác của anh/chị về trẻ.

4. Hãy cho biết khả năng nhanh trong lĩnh vực lo lắng và ngàn nguy mà trẻ có khả năng (đánh dấu vào các ô phù hợp):

<table>
<thead>
<tr>
<th>Khó khăn</th>
<th>C0</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Nói ngáp, ngừng, ế ờ</td>
<td>☐</td>
</tr>
<tr>
<td>b) Nói không rõ với mọi người trong gia đình</td>
<td>☐</td>
</tr>
<tr>
<td>c) Nói không rõ với những người khác</td>
<td>☐</td>
</tr>
<tr>
<td>d) Khỏe hạn tính từ để nòi</td>
<td>☐</td>
</tr>
<tr>
<td>e) Khỏe hạn ghen các từ với nhau khi nói</td>
<td>☐</td>
</tr>
<tr>
<td>f) Không hiểu anh/chị nói</td>
<td>☐</td>
</tr>
<tr>
<td>g) Không hiểu người khác nói</td>
<td>☐</td>
</tr>
<tr>
<td>h) Âm thanh giọng nói nghe rã lũy tai</td>
<td>☐</td>
</tr>
<tr>
<td>i) Nói lặp</td>
<td>☐</td>
</tr>
<tr>
<td>j) Nói bài hơi, nhiều âm giọng/ Lisps</td>
<td>☐</td>
</tr>
<tr>
<td>k) Mất thính lực cố định</td>
<td>☐</td>
</tr>
<tr>
<td>l) Sqrt nói và/hoặc chế vởm (hố hàm êch)</td>
<td>☐</td>
</tr>
<tr>
<td>m) Chẩn phát triển</td>
<td>☐</td>
</tr>
<tr>
<td>n) Khắc (xin nên cụ thể):</td>
<td>☐</td>
</tr>
<tr>
<td>o) Không biết</td>
<td>☐</td>
</tr>
</tbody>
</table>

Đánh cho người nghiên cứu: 0 1

---

**Source:** www.csu.edu.au

CRICOS Provider Numbers for Charles Sturt University are 00005F (NSW), 01947I (VIC) and 029660B (ACT). ABN: 83 876 708 551.
5. Trẻ đa tênh:

<table>
<thead>
<tr>
<th>a) Đánh giá phát triển?</th>
<th>Không</th>
<th>Có</th>
<th>Không biết</th>
<th>Không nhớ</th>
</tr>
</thead>
<tbody>
<tr>
<td>b) Đánh giá và can thiệp giáo dục đặc biệt?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) Đánh giá và can thiệp, trị liệu ngôn ngữ?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d) Phẫu thuật cắt phanh/thẳng lưỡi?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e) Nào V.A hoặc cắt amidan?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>f) Viêm tai thường xuyên</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>g) Đang điều trị bệnh?</td>
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</tbody>
</table>

Đánh cho người nhận cửu 0 1 2

6. Những câu hỏi dưới đây là về mục đề lót nôi của trẻ được những người khác hiểu như thế nào. Vui lòng suy nghĩ về lót nôi của trẻ trong thang quan khi trẻ lót tênh câu hỏi. Đánh đầu vào mỗi mục đề cho mỗi câu hỏi:

<table>
<thead>
<tr>
<th>a) Bố mẹ có hiểu trẻ nôi không?</th>
<th>Luôn luôn</th>
<th>Thường xuyên</th>
<th>Thỉnh thoảng</th>
<th>Hiếm khi</th>
<th>Không bao giờ</th>
</tr>
</thead>
<tbody>
<tr>
<td>b) Các thành viên cùng sống trong gia đình có hiểu trẻ nôi không?</td>
<td></td>
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<td></td>
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<td></td>
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<tr>
<td>c) Họ hàng của gia đình có hiểu trẻ nôi không?</td>
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<td></td>
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<tr>
<td>d) Các bạn của trẻ có hiểu trẻ nôi không?</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e) Những người quen khác có hiểu trẻ nôi không?</td>
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<tr>
<td>f) Các giáo viên của trẻ có hiểu trẻ nôi không?</td>
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<tr>
<td>g) Những người lá có hiểu trẻ nôi không?</td>
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</tbody>
</table>

Đánh cho người nhận cửu 5 4 3 2 1

7. Trẻ có

<table>
<thead>
<tr>
<th>a) ngoại Viêt ngọng miền bắc ở nhà?</th>
<th>Không</th>
<th>Có</th>
</tr>
</thead>
<tbody>
<tr>
<td>b) tiếng Việt ngọng miền bắc ở nhà?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) tiếng trẻ muốn nói là tiếng mẹ đẻ?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d) được tiếng trẻ nói ngẫu nhiên. Là (những) tiếng gì? (ví dụ: tiếng Anh):</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Đánh cho người nhận cửu 0 1

8. Mục của trẻ nôi

<table>
<thead>
<tr>
<th>a) Tiếng Việt ngọng miền bắc?</th>
<th>Không</th>
<th>Có</th>
</tr>
</thead>
<tbody>
<tr>
<td>b) Tiếng Việt ngọng miền trung?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) Tiếng Việt ngọng miền nam?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d) Tiếng đắn tu giọng số là tiếng mẹ đẻ?</td>
<td></td>
<td></td>
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<tr>
<td>e) Tiếng nước người là tiếng mẹ đẻ?</td>
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</tbody>
</table>

Đánh cho người nhận cửu 0 1

9. Bổ của trẻ nôi

<table>
<thead>
<tr>
<th>a) Tiếng Việt ngọng miền bắc?</th>
<th>Không</th>
<th>Có</th>
</tr>
</thead>
<tbody>
<tr>
<td>b) Tiếng Việt ngọng miền trung?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) Tiếng Việt ngọng miền nam?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d) Tiếng đắn tu giọng số là tiếng mẹ đẻ?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>e) Tiếng nước người là tiếng mẹ đẻ?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Đánh cho người nhận cửu 0 1
10. Trẻ từng sống ở miền trung hoặc miền Nam Việt Nam hoặc ở nước ngoài hơn một năm trở lên

11. Miệng của trẻ từng sống ở miền trung hoặc miền Nam Việt Nam hoặc ở nước ngoài hơn một năm trở lên

12. Bò của trẻ từng sống ở miền trung hoặc miền Nam Việt Nam hoặc ở nước ngoài hơn một năm trở lên

13. Khí nạo trẻ nói từ đầu tiên mà tổ có ý nghĩa (ví dụ: cháu nói “uống”)?

   - Trước 12 tháng tuổi
   - 12 - 18 tháng tuổi
   - 18 - 24 tháng tuổi
   - Más hơn 24 tháng tuổi
   - Không biết/ Không nhớ

14. Các thành viên trong gia đình của trẻ có ai có khó khăn về lời nói, ngôn ngữ, đọc viết hoặc suy nghĩ không, những khó khăn này kéo dài từ hơn 6 tháng trở lên?

   a) Mẹ
   b) Bố
   c) Chị/ em gái
   d) Anh/ em trai
   e) Bố ngoại/ ngoại
   f) Ông ngoại/ ngoại
   g) Bố/ mẹ
   h) Bác/ chiều/ chú
   i) Anh em họ
   j) Các họ hàng khác (nêu cụ thể):

   Dính cho người nhận câu 0 1 -2

15. Trẻ có bú mẹ không?

   - Có (hơn 9 tháng)
   - Có (dưới 9 tháng)
   - Không
   - Không nhớ/Không biết

16. Trẻ có từng sử dụng những thứ sau? (đánh dấu vào tất cả nếu có)

   a) Ngâm nướu vào giá (hơn hơn 9 tháng)
   b) Bao bình (hơn hơn 9 tháng)
   c) Mút ngọn tay (hơn hơn 9 tháng)

   Dính cho người nhận câu 0 1 -2

17. Trẻ có từng gặp khó khăn về ăn uống (khác với việc ăn uống trong vài ngày)?

   - Không
   - Có, xin vui lòng chỉ chi tiết (ví dụ như: không biết mặt, ăn bằng ngón, ăn chậm, ấm so do ăn có chút xao, từ clashed độ ăn đặc, nghiên kẻ dài)

   Dính cho người nhận câu 0 1 -2

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18. Những ai là người lớn sống cùng nhà với trẻ?

- Mẹ
- Bố
- Ông bà
- Người giúp việc
- Người khác (thêm)

Dành cho người nhận câu: [ ] 1

19. Trẻ có anh trai hoặc chị gái sống cùng nhà không?

- Không
- Có (Mã anh/chị: )

Dành cho người nhận câu: [ ] 0

20. Trẻ có em trai hoặc em gái sống cùng nhà không?

- Không
- Có (Mã em: )

Dành cho người nhận câu: [ ] 0

21. Trình độ học vấn cao nhất của mẹ là?

- Sau đại học
- Cử nhân đại học/cao đẳng
- Trung cấp nghề
- Trung học phổ thông
- Trung học cơ sở
- Tiểu học
- Không đi học
- Văn dằng đi học phổ thông
- Không biết

Dành cho người nhận câu: [ ] 1

22. Trình độ học vấn cao nhất của bố là?

- Sau đại học
- Cử nhân đại học/cao đẳng
- Trung cấp nghề
- Trung học phổ thông
- Trung học cơ sở
- Tiểu học
- Không đi học
- Văn dằng đi học phổ thông
- Không biết

Dành cho người nhận câu: [ ] 1

23. Ngành nghiệp của mẹ là?

24. Ngành nghiệp của bố là?


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Appendix I. Preschool Teacher Information Letter (English)

PRESCHOOL TEACHER INFORMATION LETTER

You are invited to participate in the Children’s acquisition of consonants, semi-vowels, vowels, and tones in Northern Viet Nam study (hereafter referred to as the Vietnamese Children’s Speech Acquisition Study). This study is conducted through Charles Sturt University, Australia and is supported by a PhD scholarship provided by the Australian Government. This research aims to describe the age of acquisition of consonants, semi-vowels, vowels and tones, patterns of acquisition, and the intelligibility level of children aged 2;0 to 6;5 in Northern Viet Nam. The findings of this project will provide useful information to educators, speech pathologists, and policy makers about young Northern Vietnamese children’s speech acquisition.

This project will be conducted by the following research team:
Mrs. Ben Pham, Principal Researcher and PhD student, Charles Sturt University, Australia
Professor Sharyne McLeod, A/Professor Jane McCormack, Charles Sturt University, Australia

Information about the study

This study will investigate speech acquisition of Northern Vietnamese children aged 2;0-6;5. To date, there is limited information about Vietnamese children’s speech development. Findings from this study will inform families, educators, speech pathologists, policy makers, and the general public about ways children who speak Northern Vietnamese acquire speech and to assist identification of children with speech difficulties. Information gathered from this study will be published and may be used in future research about children’s speech undertaken by the researchers.

Procedure

This information sheet describes each stage of the Vietnamese Children’s Speech Acquisition Study that we request participation from you and the children in your class. This will take you approximately 2 minutes per child to complete.

Teacher questionnaire

You, as a teacher of children aged 2;0-6;5, will be asked to fill out a short questionnaire about the development of children in your class.

Caregiver questionnaire

Children’s caregivers will be asked to complete a short questionnaire about their child’s speech, language, movement, social, and behavioural skills, history, and development.

Child assessment
- Children will be asked to participate in a screening hearing and oromotor assessment with the principal researcher that will take approximately 10 minutes.
- Children who pass the hearing and oromotor screening assessment will participate in the Vietnamese Speech Assessment and/or the International Speech Assessment with the principal researcher that will take approximately 30 minutes per child.
- Children who do not pass the hearing screening assessment will be given a second opportunity to undertake the test. If they do not pass the test the second time, they will be advised to follow-up with a qualified audiologist and provided with details regarding how to do so. Children who do not pass the oromotor screening assessment will not be given a second opportunity to re-do the test as their teeth, tongue etc. will not change over a short period of time. If children do not pass these tests, this does not mean that they have non-typical development, but they require additional assessments by a qualified professional such as a dentist, audiologist, or doctor.

The researchers will conduct these assessments in a quiet room identified by the Preschool director throughout the day. One child at a time will be assessed. The researchers envisage limited disruption to the preschool routine.

Please turn over

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Dissemination of Research Findings

The findings of this research will inform the practice of educators, speech pathologists, and policy makers, and be of interest to the general public. Research findings will always be disseminated in ways that do not identify participants (child/ family/teachers) or preschools unless permission has been received by individual children’s parents to use their photographs audio or video recordings for educational purposes. The outcomes of this project will be accessible to participating families and preschools who have participated in this research. Research findings will be published in practitioner-focused journals and presented at practitioner-focused conferences and events. Researcher-oriented journals, conferences, and professional development events will also be key ways of disseminating the findings of this research. Findings may also be broadcast through media outlets when possible.

Ethical Considerations

The children’s names will not be used in this research. Instead, number codes will be used so information about them is anonymous. No data that could identify you, other individuals, your preschool, or your specific location will be released (except the photographs, audio, and video recordings that have been approved by the children’s parents). The researchers will take every precaution to maintain confidentiality but cannot ensure that other children or parents will not identify participants to others. Your participation in this study is entirely voluntary. If you decide to participate, you are free to withdraw your consent and discontinue your participation at any time. Whatever your decision, it will not affect you or your preschool’s existing or future relations with Charles Sturt University (Australia) or the researchers undertaking this study. Information gathered from this study will be published and may be used in future research about children’s speech undertaken by the researchers.

NOTE: Charles Sturt University’s Human Research Ethics Committee has approved this project. If you have any complaints or reservations about the ethical conduct of this project, you may contact the Committee through the Executive Officer:

The Executive Officer
Human Research Ethics Committee
Office of Academic Governance
Charles Sturt University
Panorama Avenue, Bathurst, NSW 2795, Australia
Tel: (02) 6338 4628 Email: ethics@csu.edu.au

Any issues you raise will be treated in confidence and investigated fully and you will be informed of the outcome.

Further Information

If you have any further questions about this research please contact Principal Researcher Ben Pham (phone: +61 983197906, email: bpham@csu.edu.au), Professor McLeod (smcleod@csu.edu.au), and/or A/Professor McCormack (jmccormack@csu.edu.au) before signing this form.

Ben Pham, Charles Sturt University, Australia
Professor Sharyn McLeod, PhD, Charles Sturt University, Australia
A/Professor Jane McCormack, PhD, Charles Sturt University, Australia

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CRICOS Provider Numbers for Charles Sturt University are 00005F (NSW), 01947G (VIC) and 02965B (ACT). ABN: 83 678 708 551

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Appendix I. Preschool Teacher Information Letter (Vietnamese)

THƯ NGÔ

Kính gửi: Thầy/cô …………………………………………………………………………………………….

Chúng tôi trân trọng mời tham gia vào dự tài nghiệp của mình (tiếng Việt: Điều này là để tài Sử lịnh hội lỗi nói về một số vấn đề của tôi em Việt Nam). Để tài hiện của này do trường Đại học Charles Sturt (Úc) chịu trách nhiệm chuẩn bị trình bày. Bên cạnh sự bảo trợ của các nhà giáo dục, các chuyên viên về giáo dục và các nhà hình học chính sách thì lợi nói về em Việt Nam.

Nhóm nghiên cứu tham gia thực hiện đề tài:
Thứ, Phụ Nữ Türkçe, Chủ nhiệm đề tài, Nghiên cứu sinh Trường Đại học Charles Sturt, Úc
GS.TS. Sharynne McLeod và PGST. Jane McCormack, Trường Đại học Charles Sturt, Úc

Thông tin chung về đề tài

Nghiên cứu này sẽ tìm hiểu quá trình hình thành lợi nói của trẻ em từ 2 đến 6 tuổi ở miền Bắc Việt Nam. Cho đến nay, các thông tin về sự phát triển lợi nói của trẻ em Việt Nam rất hạn chế. Kết quả nghiên cứu của đề tài sẽ cung cấp cho gia đình, các nhà giáo dục, các chuyên viên về giáo dục và các nhà hình học chính sách và công chung những thông tin về việc trẻ em nói tiếng Việt để linh hoạt nói một số vấn đề và tư duy tình dục nhận diện ra những trẻ em có khó khăn về lợi nói. Các thông tin thu thập được trong nghiên cứu này sẽ được công bố và có thể sử dụng trong các nghiên cứu sau này do nhóm nghiên cứu thực hiện về lợi nói của trẻ em.

Tiện trình nghiên cứu

Thư ngỏ này xin mời tất cả giáo viên các gia đình trong để tài nghiên cứu Sử lịnh hội lỗi nói của trẻ em Việt Nam mà chúng tôi mong muốn có sự tham gia của thầy/cô và trẻ ở trong lớp của mình. Thầy/cô chỉ tốn khoảng 2 phút để diễn thông tin về từng trẻ.

 Phiếu trang cao cấp giáo viên
Thầy/cô, những người là giáo viên của trẻ từ 2 tuổi trở lên 6 tuổi sẽ收到 một phiếu trang cao cấp để kiểm tra về sự phát triển của trẻ trong lớp học của mình.

 Phiếu trang cao cấp phụ huynh
Phụ huynh của trẻ cũng được mời tham gia trả lời Phiếu trang cao cấp để kiểm tra về sự phát triển của con họ.

Đánh giá trẻ

Trước hết:
• Được đánh giá sáng tạo và học thức của trẻ và vận động về việc sử dụng những mối quan hệ để tái tải trong khoảng 10 phút.
• Đối với những câu đặt yêu cầu trong đánh giá học thức và vận động, việc sử dụng giáo dục hòa đồng với việc nói không bao gồm công sức Đánh giá Lời nói tiếng Việt và hoặc bố công dụng Đánh giá quốc tế về Lời nói với chủ nhiệm đề tài trong khoảng 30 phút mỗi chủ.
• Những câu đặt yêu cầu trong đánh giá sáng tạo học thức sẽ được đánh giá tính dục và đôi khi não để học lập đường cho trẻ huấn luyện và kỹ năng lực để có thể hoạt động trong một môi trường mới trẻ cần phải kiểm tra thêm từ nhà đi, nhà hình học hoặc bác sĩ.

Nhóm thực hiện nghiên cứu sẽ tiến hành đánh giá trẻ trong một một phòng học yên tĩnh do nhà trường chỉ định được sử dụng trong cả ngày. Đánh giá lần lượt từng trẻ một. Nhóm nghiên cứu sẽ hạn chế tổ chức với các hoạt động thường ngày của có và trở lại lớp.
Công bố kết quả nghiên cứu

Kết quả nghiên cứu của đề tài này sẽ công bố đến các nhà giáo dục, chuyên viên âm ngự trị liệu và các nhà hoạch định chính sách và có thể được công bố trên các phương tiện truyền thông. Kết quả nghiên cứu sẽ được công bố ở các hội thảo học thuật khác nhau nhưng không liên tục đánh truyệt của các khách thể khoa sát để tham gia (trên/ giả định của trẻ/giao viên) và trường mầm non trừ khi phụ huynh của trẻ có nhận thể động ertz cho phép sự dùng ảnh chụp và bằng ghi hình, ghi âm của con họ cho các mục đích giáo dục. Các khách thể khoa sát là giả định của trẻ và nhà trường cũng sẽ để đăng tiếp cận được kết quả nghiên cứu. Kết quả nghiên cứu của đề tài này sẽ đăng tải ở các tạp chí khoa học chuyên ngành, được báo cáo tại các hội thảo khoa học chuyên ngành hoặc các sự kiện khoa học có liên quan ở cả Việt Nam và nước ngoài.

Thông tin về đề dự đọc nghiên cứu

Người chịu tham dự nghiên cứu sẽ không được sử dụng tên riêng của trẻ mà dùng số đã mà hối do để các thông tin về trẻ là khuyết danh. Nếu không thể nhận diện ra thầy/cô, các cá nhân hay trường đã tham gia vào nghiên cứu này, trừ ảnh chụp, bằng ghi âm hoặc ghi hình sẽ được thực hiện nếu phụ huynh của trẻ cho phép. Mọi nghiên cứu sẽ quan liệt chặt chẽ để duy trì sự riêng tư, nhưng có thể không đảm bảo được là các trẻ và các phụ huynh ở lớp khác có thể sẽ nhận ra các bạn tham gia vào nghiên cứu này so với các bạn khác.

Sự tham gia của thầy/cô vào đề tài nghiên cứu này là hoàn toàn tự nguyện. Nếu thầy/cô đồng ý tham gia vào đề tài nghiên cứu này, thầy/cô cũng cống thể chấm dứt việc tham gia vào bất kì lúc nào. Dù thầy/cô đồng ý tham gia hay không, hoặc đăng tham gia và xin chấm dứt, đều sẽ không ảnh hưởng gì đến mối quan hệ hợp tác hiện tại và sau này với trường Đại học Charles Sturt (Úc) và với nhóm thực hiện nghiên cứu này. Thông tin thú thật từ đề tài nghiên cứu này sẽ được công bố và có thể sử dụng trong các nghiên cứu sau này về lợi ích của trẻ em do nhóm nghiên cứu thực hiện.

Lưu ý: Hội đồng Đạo đức nghiên cứu với cơ quan của trường DH Charles Sturt đã thông qua nghiên cứu này. Nếu quý trường có bất kì thắc mắc hay phản biện về những vấn đề đạo đức nghiên cứu, xin liên lạc với Hội đồng Theo dấy chi dưới đây:

The Executive Officer
Human Research Ethics Committee
Office of Academic Governance
Charles Sturt University
Panorama Avenue, Bathurst, NSW 2795, Australia
Tel: (02) 6338 4628 Email: ethics@csu.edu.au

Mọi vấn đề thắc mắc sẽ được giải quyết một cách cần trọng và thế thông báo đến quý trường.

Thông tin liên lạc

Nếu thầy/cô muốn biết thêm thông tin về nghiên cứu này trước khi ký vào thu thập thuận, xin vui lòng liên lạc với Chuyên viên đề tài, Ths. Phạm Thị Bền, số điện thoại tại Việt Nam: 0983197906 hoặc thư điện tử: bphung@csu.edu.au hoặc GS. McLeod (smcleod@csu.edu.au) và hoặc PGS. McCormack (jmccormack@csu.edu.au).

Trân trọng cảm ơn!

Phạm Thị Bền, Nghiên cứu sinh Trường Đại học Charles Sturt, Úc
GS.TS. Sharynne McLeod và PGS.TS. Jane McCormack, Trường Đại học Charles Sturt, Úc

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CRICOS Provider Numbers for Charles Sturt University are 00005F (NSW), 01947G (VIC) and 02960B (ACT). ABN: 83 678 708 551
Appendix J. Preschool Teacher Consent Form (English)

CONSENT FORM – PRESCHOOL TEACHER

Your name /position:

Preschool’s name:

Preschool’s address: Preschool’s phone number:

Your mobile phone number: Your email:

I have read and understood the information letter describing the Vietnamese Children’s Speech Acquisition Study. The purpose of the research has been explained to me, including the minimal risks associated with this research. I have been given the opportunity to ask questions about the research and have received satisfactory answers.

- I understand that the investigators involved in this project are Mrs. Bùi Phạm (Principal investigator, PhD student), Professor Sharynne McLeod (Associate researcher and Principal supervisor), and A/Professor Jane McCormack (Co-supervisor).
- I understand that my participation is entirely voluntary. I understand that I am free to withdraw from participating in the research at any time, and that if I do I will not be subjected to any penalty or discriminatory treatment. I understand that withdrawing from this research will not affect my, or the preschool’s, existing or future relationship with my preschool, and Charles Sturt University, Australia.
- I understand that any information or personal details gathered in the course of this research will remain confidential and that neither my name nor any other identifying information will be used or published without my written permission.
- I understand that information gathered may be used in future research about children’s speech undertaken by the researchers.
- I understand this research may involve:
  a) completing a questionnaire
  b) assessment of children in my class by a qualified special educator and/or speech pathologist
  c) children in my class being audio and video recorded during the assessment
  d) children in my class being photographed during the assessment
  e) that the audio tapes, video tapes, and photographs will be used for analysis of the children’s speech
  f) that the audio tapes, video tapes, and photographs also may be used during presentations of the research for educational purposes and disseminating information about the Vietnamese Children’s Speech Acquisition Study if their parents give permission this to occur.

NOTE: Charles Sturt University’s Human Research Ethics Committee has approved this project. If you have any complaints or reservations about the ethical conduct of this project, you may contact the Committee through the Executive Officer: The Executive Officer Human Research Ethics Committee Office of Academic Governance Charles Sturt University Panorama Avenue, Bathurst, NSW 2795, Australia Tel: (02) 6338 4628 Email: ethics@csu.edu.au Any issues you raise will be treated in confidence and investigated fully and you will be informed of the outcome.

If you have any further questions about this research please contact research team: Ben Phạm (Phone: +84 983197906, email: bpham@csu.edu.au), Professor McLeod (smcleod@csu.edu.au) and/or A/Professor McCormack (jmccornack@csu.edu.au) before signing this form.

Signed by: ____________________________  (Teacher)  Date: ____________________________

Please return this form to: Ben Phạm, Vietnamese Children’s Speech Acquisition Study C/- Ben Phạm, Room 310, B3 Building, Ha Noi National University of Education Dormitory 199 Tràc Que Hoàn Street, Cau Giay, Ha Noi, Phone: +84/0 983197906

www.csu.edu.au  Consent: Preschool Teacher |  
CRICOS Provider Numbers for James Cook University are 00035F (NSW), 01947T (VIC) and 02000B (ACT). ABN: 63 878 708 551

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THÚ CHẤP THUẬN CỦA GIÁO VIÊN MẦM NON

Họ và tên/ Chức vụ: 

Trương mầm non: 

Địa chỉ của trường: Sổ điện thoại của trường: 

Điển thị nơi đóng: Thư điện tử: 

Tôi đọc và hiểu các thông tin trong thư ngỏ về đề tài nghiên cứu Sự lãnh hội lợi nói của trẻ em Việt Nam. Các thông tin về mục đích của nghiên cứu này đã được giải thích rõ ràng với tôi, kể cả những hạn chế có thể xảy ra. Tôi cũng đã có cơ hội trao đổi với nhóm nghiên cứu về những bất ngờ hoặc thắc mắc của mình về nghiên cứu và nhận được các câu trả lời thỏa đáng.

- Tôi biết nhiễm tác giả thực hiện nghiên cứu này bao gồm Ths. Phạm Thị Bén (Chủ nhiệm đề tài, Nhà nghiên cứu sinh), GS. TS. Sharyne McLeod (Thành viên nghiên cứu, Người hướng dẫn khóa học), và PGS.TS. Jane McCormack (Người đồng hướng dẫn khóa học).

- Tôi hiểu sự tham gia của tôi vào nghiên cứu này là hoàn toàn tự nguyện. Nếu thông tin của tôi được sử dụng trong nghiên cứu, tôi có quyền yêu cầu xóa bỏ thông tin từ nghiên cứu này. Tôi hiểu rằng việc tham gia vào nghiên cứu này không gây hại cho tôi, không gây ảnh hưởng gì đến môi trường học tập và tương lai của tôi, không gây ảnh hưởng đến những người không nói được sử dụng hoặc công bố/xuất bản nếu như không có sự cho phép bằng văn bản.

- Tôi cho phép các thông tin đã thu thập có thể được sử dụng trong các nghiên cứu sau này về lợi nói của trẻ em do nhóm nghiên cứu thực hiện.

- Tôi hiểu rõ sự tham gia vào nghiên cứu này sẽ bao gồm:
  a) Diễn ra trong trường của tôi
  b) Thực hiện trong lớp học của tôi
  c) Sử dụng các đoạn video
  d) Sử dụng dữ liệu ghi âm

- Tôi hiểu rõ việc tham gia vào nghiên cứu này sẽ không gây hại cho tôi.

LUU Y: Hội đồng đạo đức nghiên cứu trường Đại học Charles Sturt đã thông qua đề tài nghiên cứu này. Nếu thay đổi có bất kỳ thay đổi hoặc cần phải đổi thì phải thông báo tới ghi chú.

THE EXECUTIVE OFFICER
Human Research Ethics Committee
Office of Academic Governance
Charles Sturt University
Panorama Avenue, Bathurst, NSW 2795, Australia
Tel: (02) 6382 4628 Email: ethics@csu.edu.au

Mọi vấn đề ban đầu khác mặc sẽ được xem xét, giải quyết một cách chính đáng và sẽ thông báo tới nhà trươ

Trước khi tiến vào thư pháp chuyên nghiệp, nếu thay đổi có bất kỳ thay đổi hoặc cần phải đổi thì phải thông báo tới ghi chú.

Phòng 310 nhà B3 thuộc Tổ DHSP Hà Nội, số 199 Trần Quốc Hoàn, Cầu Giấy, Hà Nội. Điện thoại: 0983197906

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Consent: Preschool Teacher (Vietnamese)
Appendix K. Preschool Teacher Questionnaire (English)

PRESCHOOL TEACHER QUESTIONNAIRE

Please complete for the following children aged 2-0-6.5 in your class. Use as many pages as necessary.

<table>
<thead>
<tr>
<th>Number</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Date of birth</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sex (Male or Female)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Please list any concerns you have about this child’s learning, development and behaviour</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you have concerns about 1 (Please rate as the following):</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. No</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. A little</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Questions from Parents' Evaluation of Developmental Status (PEDS) were included in this table with permission from Glasgow (2000). Permission to replicate the questions in this Appendix was not granted.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Please indicate any areas of speech and language in which your child has difficulty (tick as many as appropriate) 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Reluctant to speak</td>
</tr>
<tr>
<td>b. Speech not clear to family</td>
</tr>
<tr>
<td>c. Speech not clear to others</td>
</tr>
<tr>
<td>d. Difficulty finding words</td>
</tr>
<tr>
<td>e. Difficulty putting words together</td>
</tr>
<tr>
<td>f. Doesn’t understand you when you speak</td>
</tr>
<tr>
<td>g. Doesn’t understand others when they speak</td>
</tr>
<tr>
<td>h. Voice sounds unusual</td>
</tr>
<tr>
<td>i. Stutters or stammers</td>
</tr>
<tr>
<td>j. Lisps</td>
</tr>
<tr>
<td>k. Persistent hearing loss</td>
</tr>
<tr>
<td>l. Cleft lip and palate</td>
</tr>
<tr>
<td>m. Developmental delay</td>
</tr>
<tr>
<td>n. Other</td>
</tr>
<tr>
<td>o. Don’t know</td>
</tr>
</tbody>
</table>

Please return the completed questionnaire in the box provided. If you have any questions about this questionnaire or the Vietnamese children’s speech acquisition study, please contact the principal researcher (phone: +84 9831 97906, email: bphamj@csu.edu.au).

*Parents’ Evaluation of Developmental Status (PEDS) questionnaire (Glascoe, 2000). * Growing up in Australia: the Longitudinal Study of Australian Children (LSAC). This study uses questionnaires (or part of) developed for Growing up in Australia: the Longitudinal Study of Australian Children (LSAC). This study uses questionnaires (or part of) developed for Growing up in Australia: the Longitudinal Study of Australian Children (LSAC). These questionnaires are the property of the Commonwealth as represented by the Department of Social Services. LSAC is an initiative of the Australian Government Department of Social Services (www.dss.gov.au), and is being undertaken in association with the Australian Institute of Family Studies and the Australian Bureau of Statistics, with advice being provided by a consortium of leading researchers at research institutions and universities throughout Australia.

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CRICOS Provider Numbers for Charles Sturt University are 00005F (NSW), 01947G (VIC) and 02960E (ACT). ABN: 63 878 708 551
### PHẾU TRUNG CÂU Y KIẾN GIẢO VIÊN MÃM NON

Hãy điền thông tin vào phiếu dưới đây cho từng trẻ ở trong lớp của thầy/ cô. Mỗi phiếu trả lời thông tin cho 5 trẻ, thầy/ cô có thể sử dụng thêm các tổ phiếu khác cho các trẻ tiếp theo.

<table>
<thead>
<tr>
<th>Số thứ tự</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tên của trẻ</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ngày tháng năm sinh</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Giới tính (Nam/ Nữ)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thầy/ cô có bảo lãnh về (Hãy viết các câu trả lời theo 1 trong 3 cách dưới đây: 1. Không 2. Có 3. Mốt chút)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Các câu hỏi ở trong bảng này sẽ dùng các câu hỏi trong Thang đánh giá của chương trình phát triển trẻ em (Questions from Parents’ Evaluation of Developmental Status, PEDS) với sự cho phép của tác giả Glasse (2000).
- Chúng tôi không xin phép để đánh lại các câu hỏi trong phụ lục này.

| Hãy đánh dấu vào khía cạnh được liệt kê dưới đây trong lĩnh vực loại nổi và ngôn ngữ mà trẻ có khó khăn (Có thể đánh dấu x vào nhiều yếu, nếu thấy phù hợp)* |   |   |   |   |   |
|--------------------------------------------------|---|---|---|---|
| a. Nói ngắn ngủi/ ẻ  |   |   |   |   |   |
| b. Nói không rõ với một người trong gia đình |   |   |   |   |   |
| c. Nói không rõ với nhiều người khác |   |   |   |   |   |
| d. Khó tìm từ để nói |   |   |   |   |   |
| e. Khó kết nối các từ với nhau để nói |   |   |   |   |   |
| f. Không hiểu thầy/ cô nói |   |   |   |   |   |
| g. Không hiểu người khác nói |   |   |   |   |   |
| h. Giọng nói nghe là |   |   |   |   |   |
| i. Nói lặp |   |   |   |   |   |
| j. Nói bất hợp nghĩa |   |   |   |   |   |
| k. Màt thành lục cơ đỉnh |   |   |   |   |   |
| l. Sinté nói và/ hoặc che vòm |   |   |   |   |   |
| m. Chậm phát triển |   |   |   |   |   |
| n. Khác |   |   |   |   |   |
| o. Không biết |   |   |   |   |   |

Hãy điền các thông tin trong phiếu và gửi lại cho nhóm thực hiện nghiên cứu. Nếu thầy/ cô có điều gì chưa rõ về phiếu hỏi hoặc việc để lại nghiên cứu Sư phạm hỗ trợ nội bộ của trẻ em Việt Nam, xin vui lòng liên lạc với chủ nhiệm để tài, Ths. Phùng Thị Bên (số điện thoại 0983197906 hoặc thư điện tử: bpham@csu.edu.au).

* Thang đánh giá của chương trình phát triển (Questions from Parents’ Evaluation of Developmental Status, PEDS, Glasse, 2000). 

Lớn lên ở Úc: Nghiên cứu theo chiều dài varios trẻ em ở Úc (Growing up in Australia: the Longitudinal Study of Australian Children, LSAC) để tài này sử dụng phần của câu hỏi được liệt kê trong bối cảnh nghiên cứu Lớn lên ở Úc: Nghiên cứu theo chiều dài varios trẻ em ở Úc (LSAC). Các cuộc hỏi này thường được sử dụng như khi khảo sát các trẻ em ở Úc. LSAC cũng là một chương trình của Cục dịch vụ xã hội chính phủ Úc (www.abs.gov.au) và được phối hợp thực hiện với Học viện giáo dục Úc và các câu lạc bộ giáo dục của (www.edu.gov.au) và Cục thống kê quốc gia Úc (www.abs.gov.au) cùng với những tổ chức và nhà tổ chức các nghiên cứu điều nghiên tài các quan trọng nhất của sự phát triển học thuật trong lĩnh vực học xã hội của Úc.

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CRCID: Provider Numbers for Charles Sturt University are 00035F (NSW), 01947G (VIC) and 02960B (ACT). ABN: 83 878 708 661

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Appendix L. Children Assent Form (English)

Vietnamese Children’s Speech Acquisition Study

ASSENT FORM FOR ASSESSMENT – CHILD

Child’s name: __________________ Date of birth: __________________

Participant ID: __________________ Assessment Date: __________________

Hi, my name is __________. Today we are going to do some fun activities together, like listening and talking. I might have some more games for us to play another day too.

It will take a little while to do all the activities but you can say “stop” if you don’t want to talk or if you need a rest at any time – that’s okay.

I’d like to video and tape record what we say, so that I can listen to it later and don’t forget anything you tell me. Just so you know, some other people might listen to the recording we make or watch the video. Does this sound okay to you?

I think some other people might like to know about or use some of the things that you tell me. If I show other people, I won’t use your name. What pretend name could I use instead of your name?

________________________

Does all this sound okay to you?

Please “sign” your name or draw you in the box below to indicate that you agree to participate.
THƯ CHẤP THUẬN ĐÁNH GIÁ CỦA TRẺ EM

Họ và tên trẻ: ____________________________
Ngày sinh: ____________________________
Mã số khách thể: ____________________________
Ngày đánh giá: ____________________________

Chào (ccon) ____________________________
Tên cỏ là Phạm Thị Bên.

Hôm nay, chúng ta sẽ cùng nhau thực hiện một số hoạt động cụ thể và vui mà con chỉ cần nghe và nói thôi.
Hai cơ chủ mình sẽ cùng nhau tham gia nhé! Nhưng nếu con không thích chơi cùng cõ nữa hoặc con không muốn nói, con có thể bảo: “Có ơi, đừng lấy”. Nếu con thấy gì, con có thể bảo: “Có ơi, con muốn nghĩ một ít”. Con có đồng ý không nào?

Có sẽ quay bằng và gì lại lời mà cơ chủ mình nói. Đế cõ có thể nghĩ lại và không quên được những gì con nói với cơ hôm nay. Các cơ chủ khách cũng có thể nghe hoặc xem các bạn này. Con sẽ đồng ý chưa?

Mỗi người có thể muốn biết về những gì con nói với cơ hôm nay. Nếu cơ cho mọi người xem, cơ sẽ không đồng ý tên thật của cơ.

Vậy, giờ với là con có cần tân khách, tên đấy sẽ là gì nhé?

________________________

Con đồng ý để cơ chủ mình cùng tham gia hoạt động chỗ?

Nếu con đồng ý, cơ chủ thể “hy” tên của cơ hãng cách vẻ cơ hỏng viết tên cơ vào ở dưới đây cho cơ nhé!

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CRICOS Provider Numbers for Charles Sturt University are 00005F (NSW), 01947G (VIC) and 02986B (ACT). ABN: 83 879 708 561 372
Appendix M. Hearing Screening Form (English)

Hearing Screening

Child’s name: __________________________ Date of birth: __________________________
Participant ID: __________________________ Assessment Date: __________________________

Background Noise

<table>
<thead>
<tr>
<th>Ambient noise</th>
<th>dBA</th>
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</thead>
</table>

Audiometry

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Right (Red)</th>
<th>Left (Blue)</th>
</tr>
</thead>
<tbody>
<tr>
<td>500Hz</td>
<td></td>
<td></td>
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<tr>
<td>1000Hz</td>
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<td></td>
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<tr>
<td>2000Hz</td>
<td></td>
<td></td>
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<tr>
<td>4000Hz</td>
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</tbody>
</table>

- Pass
- Refer
- Incomplete

Presentation: Present tones at 40dB for each frequency at least 2 times, and no more than 4 times.

Pass criteria: Positive response at all frequencies in both ears.
Appendix M. Hearing Screening Form (Vietnamese)

Kiểm tra sức khỏe tim mạch

Họ tên trẻ: __________________________ Ngày sinh: __________________________
Mã số khách thể: __________________________ Ngày đánh giá: __________________________

Ẩm thanh nhẹ

Tiếng ồn xung quanh: __________ dBA

Kết quả đo sức khỏe

<table>
<thead>
<tr>
<th>500Hz</th>
<th>1000Hz</th>
<th>2000Hz</th>
<th>4000Hz</th>
<th>Kết quả</th>
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<tbody>
<tr>
<td>Tai phải (màu đỏ)</td>
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<td></td>
<td>Đạt</td>
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<td>Tai trái (màu xanh)</td>
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<td>Cần đi khám tiếp</td>
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Thực hiện: Đo ở mức 40đB đối với mỗi tần số ít nhất 2 lần và nhiều nhất 3 lần.
Tiêu chí Đạt: Phân tân với tất cả các tần số ở cả hai tai.
**Appendix N. Vietnamese Speech Assessment Scoresheet**

<table>
<thead>
<tr>
<th>S. No</th>
<th>Tên</th>
<th>Initial Consonants</th>
<th>Vietnamese Transcription</th>
<th>Child's pronunciation</th>
<th>Mức độ dịch giả's opinion</th>
<th>Nhân giai đoạn</th>
<th>Điểm cộng</th>
<th>Điểm cộng</th>
<th>Điểm cộng</th>
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<td>1.</td>
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**PHƯƠNG VIỆN/SCORESHEET**

*Đánh giá lối nói tiếng Việt/Vietnamese Speech Assessment*

Phân hành nghiên cứu 2016, Trường Đại học Charles Sturt, Úc/Research version 2016, Charles Sturt University, Australia

Nhóm tác giả: giaiขาว: Bùi Thị Bích (bhuan@csu.edu.au), Lê Thị Thanh Xuân, Sharyne McLeod (emcLeod@csu.edu.au)

Tên của trẻ (Child's name): 
Ngày sinh (Date of birth): 
Giới tính (Gender): 
Tuổi (Age): 
Ngày đánh giá (Assessment date): 

Chú thích: (Notes):

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Authors: Bùi Thị Bích (bhuan@csu.edu.au), Lê Thị Thanh Xuân, Sharyne McLeod (emcLeod@csu.edu.au)

ABN: 83 878 798 511
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<th>STT</th>
<th>Tiếng Việt</th>
<th>Tiếng Anh</th>
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<tbody>
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Appendix O. Intelligibility in Context Scale: Vietnamese

Thang do Tinh de hieu theo ngu cang: Tieng Viet
Intelligibility in Context Scale (ICS): Vietnamese

(McLeod, Harrison, & McCormack, 2012)
Bien dich: Nguyen Thuy Chau va Hoi Thi Ngoc (Trinh Foundation and Vung Tao Hospital, Vietnam, 2012).
Hieu dinh: Pham Thi Bien (Daikoku Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Untended License.
Translated by: Chau Thuy Nguyen, and Thu Thi Ho (Trinh Foundation and Pham Ngoc Thach University of Medicine, Vietnam, 2012). Revised by: Ben Pham (Charles Sturt University, Australia & Ho Nai National University of Education, Vietnam, 2015)

Họ và tên trẻ (child's name): __________________________
Ngày sinh (child's date of birth): __________çı Nam/Nữ (Male/Female): __________
Trẻ nói tiếng (Language(s) spoken): __________________________
Ngày thực hiện (Current date): __________________________
Tuổi của trẻ (Child's age): __________________________
Người thực hiện Thang do Tinh de hieu theo ngu cang (Person completing the ICS): __________________________
Mối quan hệ với trẻ (Relationship to child): __________________________

Những câu hỏi dưới đây là về lối nói của con anh/chị được những người khác hiểu như thế nào. Vui lòng suy nghĩ về lối nói của trẻ trong thời gian qua khi trả lời từng câu hỏi. Khoản ấn tượng một số cho mỗi câu hỏi. (The following questions are about how much of your child’s speech is understood by different people. Please think about your child’s speech over the past month when answering each question. Circle one number for each question.)

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<th>Hiếm khi</th>
<th>Không bao giờ</th>
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TỔNG DIỆM (TOTAL SCORE) = /35
TỔNG DIỆM TRUNG BÌNH (AVERAGE TOTAL SCORE) = /5

1. Anh/chị có hiểu con mình nói không? (Do you understand your child?)
   5 4 3 2 1

2. Các thành viên cùng sống trong gia đình có hiểu con nói không? (Do immediate members of your family understand your child?)
   5 4 3 2 1

3. Họ hàng của gia đình có hiểu con nói không? (Do extended members of your family understand your child?)
   5 4 3 2 1

4. Các bạn của con có hiểu con nói không? (Do your child’s friends understand your child?)
   5 4 3 2 1

5. Những người quen khác có hiểu con nói không? (Do other acquaintances understand your child?)
   5 4 3 2 1

6. Các giáo viên của con có hiểu con nói không? (Do your child’s teachers understand your child?)
   5 4 3 2 1

7. Những người lạ có hiểu con nói không? (Do strangers understand your child?)
   5 4 3 2 1

Phân b阄 năm của Thang do Tinh de hieu theo ngu cang có thể được sao chép lại. (This version of the intelligibility in Context Scale can be copied.)

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Appendix P. A Snapshot Demonstrating the Alignment between the Developmental Standards and this Doctoral Research (English)

The Vietnamese Government's Developmental Standards for 5-Year-Old Children

Standard 15 “The child uses speech to communicate”

Item 65 “To speak clearly”

Item 70 “To narrate an event or a fact intelligibly to others”

To align with these Developmental Standards, Ben Phạm's doctoral research titled “Children’s acquisition of consonants, semivowels, vowels, and tones in Northern Viet Nam” revealed evidence that by 5 years of age Northern Vietnamese-speaking children can:

- Produce all initial-syllable consonants correctly, except the initial-syllable consonants: /j/ (nh), /w/ (x), /z/ (d/g/l/r), and /k/ (kh)
- Produce all final-syllable consonants correctly
- Produce all semivowels correctly, except the within syllable semivowel /w/ (u/o)
- Produce all vowels and diphthongs correctly
- Produce all tones correctly, except tones 3 (creaky, thanh ngã) and 4 (dipping-rising, thanh hỏi)
- Produce speech intelligibly most of the time, even to strangers.

Appendix P. A Snapshot Demonstrating the Alignment between the Developmental Standards and this Doctoral Research (Vietnamese)