SPEECH VARIATIONS IN FIRST NATIONS KINDERGARTEN CHILDREN ACROSS CANADA

by

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Abstract

The purpose of the study was to investigate the extent to which speech errors made by First Nations children compared with those of a non-Aboriginal population, and how the errors were related to a common heritage language background, age, gender, and English as a second language. Speech errors were determined by administering the *Diagnostic Evaluation for Articulation and Phonology*'s Diagnostic Screen in 374 kindergarten children on Cree, Dene, Ojibway, Maliseet, Mi'kmaq, and Innu reservations across Canada. The data were analyzed using statistical techniques, and in particular logistic and Ordinary Least Squares (OLS) regressions. Results of the regression models revealed that the types of speech errors differed by gender, significantly favouring boys in four speech error occurrences. English as a second language was a significant factor and more prevalent in one speech error for both Cree L1 children and Innu L1 children, relative to their respective heritage language background. This study makes an important contribution to the limited but critical research examining speech variations for First Nations. Its conclusions call for further research to explore speech variations at the community level in order to validate speech variations that can drive culturally-relevant and fair speech assessments. This will also provide language documentation for Speech-Language Pathologists and educators who work with First Nations children.

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1.0 Introduction

This thesis examines speech variations and differences in kindergarten children from 31 Canadian First Nations communities. This study is situated within a larger investigation called Confident Learners (CL). Confident Learners is an early-years literacy initiative designed to develop the reading skills of young children in 31 on-reserve First Nations schools across Canada. Its vision is a whole-school and whole-community approach to the science of literacy. Its main purpose is to build confidence in young children's literacy development while having a capacity-building mindset for educators, parents, principals, volunteers and community members in the child's literacy development (Willms, 2012). The primary researcher for this particular investigation worked as a research assistant on the implementation of the CL initiative to utilize the data for the current study as well as scoring the assessments results, with the goal being to provide schools with assessment results so they know the literacy performance of their students. Confident Learners is being conducted in affiliation with a First Nations advisory board to ensure the work is contextually relevant and sensitive to First Nations populations.

Four main goals guide this study. First, it examines differences in speech production and the extent to which kindergarten children's speech production differs from a normative population based on speech errors using the Diagnostic Screen sub-test from the *Diagnostic Evaluation for Articulation and Phonology* (DEAP; Dodd, Zhu, Crosbie, Holm, & Ozanne, 2006). Second, it seeks to quantify the extent to which speech errors are influenced by a common heritage language spoken in children's communities. Third, the results of this work sheds light on whether speech errors are related to age and gender, and fourth, how the speech errors vary amongst kindergarten children who have English as a second language. This thesis highlights how variations in speech based on heritage language background may be reflected, and to what degree, in a First Nations English dialect that is commonly spoken in their community. The participating communities may have varying degrees of English influence on its speakers associated with their remoteness, isolation, and English-speaking influence from mainstream English society. Thus, the presence of an English dialect may vary among the communities allowing the exploration of the potential presence and prominence of a dialect at the heritage language.

Some children enter school learning English as the language of instruction for the first time since their heritage language is their first language (L1). As these children were not exposed to the English language prior to entering kindergarten, their speech production may differ relative to the type and prevalence of speech errors in comparison with their English L1 counterparts from communities of the same heritage language.

Background of the Problem

Since society depends on the acquisition of strong communication skills, young children with speech or language difficulties can be disadvantaged with regard to their academic achievements (Dodd, 2013; Ruben, 2000). If left untreated in the early years, language difficulties may lead to additional problems in reading, spelling, and language achievement later in life (Lewis, Freebairn, & Taylor, 2000) and greater difficulties in academic, social and occupational areas (Bird & Akerman, 2005; McCormack, McLeod, McAllister, & Harrison, 2009). These negative outcomes may be greater in Aboriginal populations compared with non-Aboriginal populations due to issues such as otitis media (see literature review), lower school attendance, and lower birth weight (Daly & Smith, 2005; McTurk, Nutton, Lea, Robinson, & Carapetis, 2008). Aboriginals are descendants of the first inhabitants of Canada. In Canada, there are three distinct Aboriginal groups: First Nations, Métis, and Inuit. Aboriginals are groups of people who have faced similar experiences due to European colonialism, which has negatively affected their language and culture (Battiste, 2013). Since the sample of participants in this present study is composed solely of First Nations children, the term First Nations will be referred in the methodology chapter, and beyond.

Community members and educators in Aboriginal communities understand that speech and language development is critical during the early years of a child's life. Ball (2009) found that Aboriginal children in Canada have unique language learning. A great need exists for language therapy programs to preclude any speech difficulties or disorders that could hinder their general development as contributing community

members (Ball, 2009). Therefore, addressing speech and language concerns is crucial for Aboriginal children's development and success later in life (Battiste, 2000).

Children having speech or language difficulties are often referred to Speech-Language Pathologists (SLPs) for assessment and identification of specific difficulties, such as speech disorders or language impairments (Duchan, 2001). Once diagnosed, children can benefit from interventions or language therapy to correct the targeted speech or language difficulties (Sices, Taylor, Freebairn, Hansen, & Lewis, 2007). Many English speaking Aboriginal children have a linguistic variation, such as a dialect, that is different than Standard English (see Glossary for definition).

Aboriginal children who speak with an Aboriginal English dialect may be targeted for specific instructional needs because there is a lack of linguistic and culturally suitable programs, assessments, and available services at their disposal. Other reasons why Aboriginal children are often targeted for specific instructional needs is because of the use of biased assessment tools, assessments conducted by non-Aboriginal educational professionals, and norms based on non-Aboriginal populations (Ball, Bernhardt, & Deby, 2005; Ball, Bernhardt, & Deby, 2007; Heit & Blair, 1993). SLPs and educators may be unaware of the necessity of using programs and assessments that could ensure that Aboriginal children learn and are assessed appropriately.

Statement of the Problem

With respect to the language development of young Aboriginal children, little consideration in research and practice has been given to speech and language variations among speakers who possess a dialect different than Standard English (Ball & Bernhardt, 2008). Researchers and community members are concerned as to whether

educators and Speech-Language Pathologists are doing enough to recognize various English dialects that may contain remnants of an Aboriginal language (Ball & Bernhardt, 2008; Ball & Lewis, 2004). Neglecting to take dialect into account could result in a misdiagnosis, or a miscategorization of a speech deficit or speech disorder when, in fact, speech differences marked as errors can stem from an Aboriginal English dialect accepted as typical speech in the home and community (Ball & Bernhardt, 2008; McGregor, Williams, Hearst, & Johnson, 1997; Pearce & Williams, 2013). Children with a specific dialect could be diagnosed as having a speech disorder and provided with language interventions, even though the necessity of such treatments may not be warranted (Goldstein & Iglesias, 2001), or ethical (Peltier, 2008), thus resulting in unreliable speech assessments (Toohill, McLeod, & McCormack, 2012).

In Canada, several Aboriginal languages, spoken prior to colonization, have been either lost or labeled as endangered (Battiste, 2013; Norris, 2004; UNESCO, 2010). Many older Aboriginal individuals are fluent in their heritage or home language (Cummins, 1983). However, there are fewer members of younger generations learning their heritage language.

With fewer children growing up learning their native language as their first language, research in language revitalization for Aboriginals is more crucial than ever (Norris, 2006). This includes placing importance on Aboriginal English dialect. In the case of most Canadian Aboriginals, heritage languages have blended with Standard English, which has led to the development of a variety of English dialects (Flanigan, 1987), thereby making Aboriginal English dialects the primary language for many, but not all, Aboriginal children. This tends to result in speech variability within the community, particularly among older speakers, (see Clarke, MacKenzie, Mailhot,

Hasler, & Penashue, 2007 for the Innu-aimun dialect in Sheshatshiu, Labrador). Identifying with a language, such as an Aboriginal English dialect that has remnants of a heritage language, is an important source of identity that affects well-being and healthy development. Further, having an identity through language makes Aboriginals better in dealing with adversity, knowing they have a sense of who they are and where they come from if they choose to integrate into the rest of Canada (Public Health Agency of Canada, 2013).

Sharla Peltier, an Aboriginal Speech-Language Pathologist, explains [with her work with Ojibway children that there has been a recent and growing popularity in investigating Aboriginal English dialects which has recently drawn researchers' and educators' attention to examining the educational implications for First Nation language and literacy learning (Peltier, 2010). Without benefiting from empirical evidence on factors affecting speech differences in Aboriginal English dialects and accurate and reliable language data in the Canadian Census (Battiste, 2013), SLPs may continue to use the same measures and instruments in their clinical settings for Aboriginal children who speak with an English dialect as they would for children speaking Standard English and for whom the assessments were designed (Goddard & Tuchscherer, 1997; Laing & Kamhi, 2003; Peltier, 2011; Washington, 1996). The lack of evidence and description of speech variations may lead to a possible misdiagnosis such as mistaking a speech error for a dialect. The DEAP considers a speech error is any deviation from the correct pronunciation (Dodd et al., 2006). When studying a population who speaks with a dialect, as the First Nations are commonly known to do (Ball & Bernhardt, 2008), a speech error may not always be considered an error, but simply part of a dialect that is commonly accepted by a First Nations community

instead of a true speech error that may require further evaluation for speech interventions. For the current study, the term error will be used with sensitivity since an error on the DEAP does not necessarily equate to an error for its speakers.

Research Questions

This study focuses on four areas of inquiry. First, it aims to identify the most prevalent speech errors produced by on-reserve First Nations kindergarten children. This will determine differences in speech errors among First Nations children on reservations relative to the normative sample from the DEAP Diagnostic Screen. Second, the study examines the relationship between speech errors based on a common heritage language to uncover potential evidence-based solutions as to why speech errors vary among the sample as a result of potential dialectical features. Third, this study investigates the relationship between speech error differences, gender, and age. Speech error differences in either age or gender could suggest that common speech errors might be derived from speech development and not a dialect. Lastly, the study explores speech error differences between First Nations children who have their heritage language as a first language (L1) and children whose first language is English. Questions remain with respect to First Nations children whose first language is not English since being assessed in their second language (L2) may lead to over- or under-representation in speech assessments (Stow & Dodd, 2005; Winter, 2001). The following research questions are addressed:

1. What are the most prevalent speech errors of First Nations children?
2. Do speech errors differ based on First Nations children's heritage language? If so, how?

3. What is the relationship between speech errors, age and gender in First Nations children?
4. To what extent do speech errors relate to English first language First Nations children compared with First Nations children who have a heritage language as their first language?

A total of 374 First Nations kindergarten children were assessed in Spring, 2014 with the DEAP (Dodd, et al., 2006) as part of the Confident Learners (CL) testing battery. Participating children were drawn from six different Canadian provinces. The children had been exposed to a variety of languages such as Cree, Ojibway, Maliseet, Dene, Mi'kmaq or Innu based on the First Nation community they lived on. Each language contains unique linguistic features that influence speech production in English (Ball, 2009).

Importance of the Study

This study adds to the sparse body of research on First Nations children's speech production, particularly for on-reserve children. The growth of the Aboriginal population in Canada has surpassed that of non-Aboriginal Canadians, 45% to 8% respectively, between 1996 and 2006 (Statistics Canada, 2010). Thus, relevant speech assessments need to reflect this growing population. This investigation provides evidence that speech variations can be associated with a heritage language, age, and gender, and English as a second language. Focusing on Aboriginal children is important for several reasons. First, little research has been published on speech errors (phoneme substitutions or omission) for this population. Second, a third of the Aboriginal population is under the age of fourteen (Avison, 2004, as cited in Battiste, 2013, p. 141), making it important to better understand First Nations children, and

third, addressing speech and language difficulties early on may help speech and language achievement in later life for this growing population. As First Nations children mature and become important contributors to their communities and mainstream Canadian society, it is crucial that speech or language issues can be addressed to facilitate success later in life.

Many First Nations people were forced to attend residential schools (Battiste, 2013), which stripped away their heritage language. Therefore, exploring current speech errors and their potential speech patterns from a Diagnostic Screen provides insight on the influence of colonialism in their spoken languages and Aboriginal English dialects. This study reveals speech errors and potential speech patterns of the children attending on-reserve schools. This relevant information can be shared with educators to help enhance their knowledge in this area (Goddard & Tuchscherer, 1997). Additionally, results from this study provide language documentation on various dialects spoken in the participating First Nations communities. This study can help foster awareness among SLPs and educators concerning the distinction between speech impairments and linguistic variations which must be considered when addressing the speech needs of children with an Aboriginal English dialect.

Nevertheless, there is a dire need for language documentation as several Indigenous languages have a history of orally-held knowledge that has traditionally been passed on by family and community members throughout several generations without it being deeply rooted in other forms of literacy (Cohen & Somerville, 1990, as cited in Dunn, 2001). By documenting the spoken dialect of on-reserve kindergarten children with a variety of Aboriginal English dialects, researchers and community leaders are able to identify linguistic consistencies to investigate whether they are

established by their heritage community language or a speech error requiring additional attention so children have a proper speech and language development to become effective readers and contributors in today's society. Despite all Aboriginal groups sharing a history of European colonization (Pesco & Crago, 2010), addressing linguistic variations further acknowledges that Aboriginal languages and people do not belong to one homogenous group. Each community provides a distinct language, tradition, customs, knowledge, and political and historical relationships (Peltier, 2010).

Summary

Examining the importance of taking dialect into account in assessments is crucial for accurate results on speech assessments. At present, little information on Aboriginal English dialects is known or acknowledged in schools, making Aboriginal children at-risk for miscategorization and misdiagnosing in speech assessments, and making them more susceptible to referral to SLPs than their Standard English speaking peers. The next chapter focuses on how Aboriginal English dialects came to be and the relationship between speakers of various dialects and the factors of age, gender, and English as a second language.

2.0 Literature Review

This chapter provides relevant empirical research on language loss and language revitalization in First Nations communities in Canada and examines how English linguistic variations and dialects influence their lives and communities. It also focuses on reviewing the literature pertaining to measures that assess children's speech and the role of dialect and heritage languages in assessment. Finally, an exploration of

age, gender, and English as a second language (L2), and their associations with speech, is examined.

Aboriginal Language Loss in Canada

Of the 1 400 700 Aboriginals in Canada, 240 815, about 17%, state that they could engage in conversation it at least one Aboriginal language (Statistics Canada, 2011). Despite the population increase of Aboriginal people in Canada (up from 1172 800 in 2006), knowledge of an Aboriginal language among the population has decreased 4.5% from 2006 to 2011 (Statistics Canada, 2011). Moreover, there is an ever-increasing number of individuals identifying as Aboriginal through ethnic mobility (i.e., more individuals have claimed an Aboriginal identity) in the last few decades (Statistic Canada, 2011). Despite this, the percentage of Aboriginals who can converse in their own language is still alarmingly low (Norris, 2006). The current numbers of Aboriginal languages spoken today in Canada is 60. These belong to 12 larger Aboriginal language families, such as Algonquian and Athapaskan (Statistics Canada, 2015), both of which are represented in the current study.

After decades of being denied the right to speak their mother tongue during an era of Residential Schools where, by 1960, over half of Aboriginal children (Miller, 1996) were taken from their families in response to government policy to assimilate them into Canadian culture fit into mainstream society and culture. The consequence was that children suffered the loss and a disconnection to their heritage language (Ball & Bernhardt, 2008; Battiste, 2013; Chrisjohn, Young & Maraun, 1997; King, 2012).

Despite Aboriginal people and their communities differing in beliefs, language, cultural practices, and educational pedagogies, one commonality between them is the history of European colonization. Aboriginals have long suffered, and their endeavour

to overcome those experiences has been continuous (Pesco & Crago, 2010). Aboriginals across Canada have suffered to various degrees from broken treaties and assimilation to homogenizing social situations, forced relocation, and changes of economic and cultural power pressured by dominant groups (i.e., English and French). As most Aboriginal languages contain a historical oral culture, heritage language speakers were forced to change their language through colonization. This language loss intensified as a result of elders and community members who spoke their language but did not pass on the language to subsequent generations, thereby creating communities where English or French was the only or dominant language spoken (Battiste, 2013; King, 2012). Unfortunately, these experiences led the majority of First Nations who spoke their native language to encounter a disruption in their heritage language and succumb to language loss.

Language loss goes beyond simply the means of communicating for Canadian Aboriginals. Researchers have stressed that the effects of losing the home language can have numerous impacts ranging from the loss of self-esteem, self-confidence, a sense of loss about who they are as a community, and their closeness with elders and family members (Grant, 1996; King, 2012). To their speakers and the general public, heritage languages are irreplaceable, and add meaningful social and cultural resources (Ruiz, 1984).

The only way to ensure that Aboriginal knowledge survives is through the transmission of language. Marie Battiste, in *Decolonizing Education* (2013), wrote:

> Aboriginal languages in Canada provide a direct and powerful means of understanding the legacy of Aboriginal knowledge and provide deep and lasting cognitive bonds, which affect all aspects of Aboriginal life. Through sharing a

> language, Aboriginal people create a shared belief of how the world works and what constitutes proper action. (p.33)

Language variations, including dialects, among the Aboriginal population, represent much more than simple speech production; they also hold elements of identity. Language to Canadian Aboriginals is a part of their cultural identity as people and of how knowledge is transmitted (Battiste, 2013; Wilson & Battiste, 2011). According to Chamberlin (2003):

> Language is the signature of both individual and collective identity, and even small differences of accent identify speakers of a community or a country. To give up these differences would be to give up something that seems essentially human, and that helps us understand who we are and where we belong. (p.15)

Exploring potential speech variations not only provides linguistic documentation of how First Nations speak, but also documents how their speech is meaningful to them as they strive for language revitalization through the elements of a common dialect.

Language Revitalization

Currently, in Canada, every Aboriginal language is considered endangered (Battiste, 2013) with several of those languages having also reached a critical stage with 10 or fewer speakers (Assembly of First Nations, 1990, as cited in Battiste, 2013, p. 145). Language revitalization is more urgent than ever because, once the speakers of the Aboriginal language have passed on, the language has been permanently eradicated (Hinton, 2001). As Aboriginal communities work towards language revitalization, they have two vital goals: 1) rebuild to strengthen their native languages to ensure their survival and continuation, and 2) for speakers to master the mainstream language(s) (Usborne, Caouette, Qumaaluk, & Taylor, 2009). These goals are not mutually

exclusive; they can be achieved through educational programs such as bilingual education (Baker, 2003) and active support from families and community members (Fishman, 1991, as cited in Usborne, et al., 2009). In June, 2005, the Task Force on Aboriginal Languages and Cultures delivered to the Minister of Canadian Heritage its report supporting Aboriginal language revitalization –*Towards a New Beginning: A Foundation Report for a Strategy to Revitalize First Nation, Inuit, and Métis Cultures*. The Task Force states in its report that the preservation of Aboriginal languages needs to be met with intelligent strategies and recommendations that ensure language and culture revitalization; that these implementations must be community-specific since each community strives for self-determination towards their goals and needs; and that unique plans that work for everyone involved in language revitalization are required. Strategies that represent and understand the community's needs, knowledge, and teachings that shy away from the biases of Eurocentric perspectives are needed (Battiste, 2013, p.32). Doing so will keep the heritage language speakers' linguistic needs in mind (Austin, 2010) as language is maintained by the active agency at the community level (Fillmore, 1996).

Language loss and language revitalization experienced by Aboriginal people are responsible, to a certain extent, for the emergence of various speech variations such as an Aboriginal English dialect (Ball & Bernhardt, 2008). Thus, language revitalization requires community-specific implementation, and a study of the speech production of its speakers must be examined to help understand and strengthen each community's culture, needs, and resources (Canadian Heritage, 2005).

Features of Aboriginal English dialects

Although Aboriginal English dialects have always been a direct reflection of the interaction with white settlers, they are important attributes to the Aboriginal identity and unity (Ball & Bernhardt, 2008). Ball and Bernhardt (2008) claim that Aboriginal dialects are the direct result of *depidginzation* and *decreolization*. A pidgin language consists of two languages where speakers of the languages have the need to communicate with each other (e.g., through resource sharing) but have no common structure and understanding between them. The initial stage of a pidgin language requires a simple grammatical structure that resembles the languages in contact that develops into a second language for its speakers, due mostly to social and economic advantages (Todd, 2003; Wardhaugh, 2002 p. 67). A creole develops when the next generation learns the pidgin language as their primary language. The grammatical structure becomes more complex because of elements that emerge not found in the foundational languages (Wardhaugh, 2002).

Despite the under-description on Aboriginal English dialects (Peltier, 2010), Battiste, Kovach, and Balzer (2010) maintain that Aboriginal English is unique in that, in addition to the merging of two languages, it facilitates social, familial and communal communication, which are values that children must bring into classrooms. Moreover, these dialects serve as both grammatical and cultural norms of language use that are unique to the community (Ball, Bernhardt, & Deby, 2005). Battiste (2013) called for Aboriginal dialects to be considered fully functional language systems that are able to meet the standards of the people who speak them, and provide pathways for language development in the same way as any other language (Pearson & Stephens, 1994). This must lead to assessments that respect that Aboriginal English dialects are the

foundation of the speakers' learning (Battiste, 2013). Non-treatment of Aboriginal English dialects may contribute to a hierarchy, in which Aboriginal children are oppressed, and pathologized (Ball, Bernhardt, & Deby, 2005). Consequently, several educators (e.g., in Australia) consider children with an Aboriginal English dialect as less educated, and speakers of an inferior version of Standard English (Butcher, 2008).

Phonological processes of different Aboriginal languages

To explore features of Aboriginal English dialects relevant to the current study, a description of the phonological processes of the heritage languages is discussed in this section. Scholars in linguistics and education have documented that Aboriginal English dialects are often tied by regional variability; however, they share some linguistic features within the same heritage language (Heit & Blair, 1993; Leap, 1993; Peltier, 2010). The diverse phonological processes in several Aboriginal communities in Canada demonstrate the heterogeneity of speech production based on a different heritage language. This points to the urgency of looking at the variability in speech production in different communities.

Cree phonological processes

The Cree, Ojibway, Mi'kmaq, Maliseet, and Innu-aimun languages all belong to the Algonquian language family (Clarke et al., 2007). The Cree language system is found among 10 communities in the study's population. The Cree language is rooted in the Algonquian language family, which encompasses about 83 475 speakers who claim it as their mother tongue. Moreover, 55.2 % of those speakers reported saying that their heritage language is the most spoken language in the home (Statistic Canada, 2011). Several Cree dialects are prominent in Canada, such as the: Plains Cree, Swampy Cree,

Woods Cree, Moose Cree and Atikamekw; with Plains Cree being the most widely used.

Wolfart (1996) examined and compared the phonology differences in Plains Cree dialect with Standard Canadian English using the International Phonetic Alphabet (IPA, 1989). The author's investigations led him to conclude that Plains Cree contains less phonological inventory than English, with only 10 or 11 sounds (Wolfart & Carroll, 1973). For example, with the voicing contrasts: the stops /p/, /t/, and /k/ are typically voiceless and unaspirated. Further, Plains Cree does not contain various liquids or fricatives that are present in English (/f/, /v/, /θ (e.g., th in the word *thank*)/, /ð (e.g., th in word *the*), /z/, /sh/, and /ge/. Ball and Bernhardt (2008) used Wolfart's 1996 findings to link them to possible implications for practices in Speech-Language Pathology for First Nations. They suggest that creating cultural appropriateness by investigating as to why First Nations may produce certain sounds differently will provide fair results on speech assessments. They argued that because of the smaller phonological inventory, individuals who speak Plains Cree English may speak with a smaller inventory compared with their English counterparts. For example, they stress that several substitutions for various phonemes (the smallest units of speech that are used to distinguish sounds in language; Carroll, Bowyer-Crane, Duff, Hulme, & Snowling, 2011) are often made for those individuals of Plains Cree English. For example, the fricatives /f/ and /v/ may be replaced with the stopping sounds /p/ and /b/; the fricatives /θ/ and /ð/ may be substituted with /t/ and /d/; alveolar and post-alveolar fricatives such as /z/, /sh/, and /ge/ may be reduced to /s/. The classification of voiced and voiceless stops may be subjective primarily by the phonetic environment of its speakers. Furthermore, Ball, Bernhardt, and Deby (2005) state that, in several

Aboriginal English dialects, when a word ends in more than two consonants, the final consonant is frequently deleted.

Based on knowledge of common phonetic substitutions, we can hypothesize that in communities where Plain Cree English is the primary spoken dialect, children may exhibit those phoneme manipulations on speech assessments. Moreover, similar substitutions may be found in other First Nations communities in the present study because of evidence that supports commonalities across various communities, particularly within the same language family. For further evidence of language commonalities, the next section focuses on the Innu-aimun language.

Innu-aimun phonological processes

The Innu-aimun Algonquin language contains around 10 965 speakers (Statistics Canada, 2011). Clarke and her colleagues (2007) provided extensive work on the Innu-aimun dialect (also commonly known as Montagnais) spoken in the Sheshatshiu community in Labrador. Innu has approximately 11 sounds. The Innu-aimun dialect does not contain the fricatives /f/ and /v/, and thus, like the Plains Cree dialect, substitutions in English with the stopping sounds /p/ and /b/ may also be apparent. Moreover, like Plains Cree, the Sheshatshiu dialect does not contain the fricatives /θ/ and /ð/. Therefore, if they speak in English they may substitute /t/ with /d/; alveolar and post-alveolar fricatives such as /z/, and /ge/ may be condensed to /s/. An example of a difference between the two dialects, is that Plains Cree dialect does not contain the post-alveolar fricative /sh/, while the Sheshatshiu dialect does contain the phonetic sound. Innu speakers may produce /sh/ in English the same as their English-speaking counterparts. Moreover, Clarke and her colleagues note that the Sheshatshiu dialect also has similar linguistic features as the Mushuau (or Naskapi)

dialect of Natuashish, another Labrador community. Since there is a lack of literature on phonological differences between the two communities, in this study I will assume that children assessed in both Labrador communities will follow similar speech patterns based on the same community language, similar history, and geographical location.

Ojibway phonological processes

By contrast, Ojibway phonetic inventory is wider than Cree and Innu-aimun dialects. This Algonquian language contains roughly 19 275 speakers (Statistics Canada, 2011). Ojibway contains 18 consonants and 11 vowels. Like Cree and Innu-aimun, Ojibway does not contain the fricatives /f/ and /v/. Thus, Ojibway native speakers may replace /v/ with /b/, as Plains Cree speakers have been found to do. Speech-Language Pathologist Sharla Peltier, who works with Aboriginal children in Ontario, where several Ojibway and Cree communities reside, suggests that Ojibway children in these areas will make distinct substitutions with certain sounds when speaking English; for example, substituting /ð/ with /d/, /θ/ with /t, /r/ with /n/, /n/ with /l/, /sh / with /s/, all are seen as typical (Peltier (2008).

Mi'kmaq phonological processes

With 8 030 speakers (Statistic Canada, 2011) this Algonquian language and people are predominantly found in New Brunswick and Nova Scotia. Over 400 years ago, English and French settlers came into Mi'kmaq territory, which made contact with the Mi'kmaq language, and English had the most influence on their heritage language (Inglis, 2004). The Mi'kmaq phonological system contains 11 consonants, 5 long vowels, and 6 short vowels. As with the other Algonquian languages, they do not contain the fricatives /f/ and /v/. Maintenance of the Mi'kmaq language has been

difficult because there are so few fluent speakers in the communities, and concern about not getting back their language the way it previously was is a critical and urgent issue (Inglis, 2004). To date, there has been no recorded or published works on Mi'kmaq English dialects. The lack of research parallels the paucity of fluent speakers and difficulty to achieve language revitalization. Languages with a greater number of speakers have a better chance of surviving in comparison with languages with a smaller number of speakers (Norris, 1998).

Maliseet phonological processes

There are roughly 485 individuals who claim Maliseet as their native tongue (Statistics Canada, 2016). These individuals are mostly found in New Brunswick. This Algonquian language (commonly known as Maliseet-Passamaquoddy) contains 17 letters, which means that it has a larger inventory than Cree, for example, but still without the fricatives /f/ and /v/. This language has noticed some rapid decline in the number of speakers in the last 3 decades (Levine & Leavitt, 2012) with most of their speakers over the age of 40 (LeSourd, 2009). To date, there is no research available on its dialect with English, making the current study important for Maliseet communities as they strive for language revitalization.

Dene phonological processes

Unlike the other languages found in the study population that belong to the Algonquian language family, Dene belongs to the Athabaskan languages whose populations reside in Northwestern Canada and the United States. The Dene language is spoken in the Northwest Territories, Northern Alberta, and Saskatchewan. This language has more phonological contrasts than Standard English; thus, there could be sounds that are unfamiliar in Standard English (Ball & Bernhardt, 2008). More

specifically, Dene has 39 consonants (Cook, 2004) that possess from “creaky voice” (when vocal folds are compressed and makes a slow release that vibrates) to lateralization of sibilants (when sounds such as /s/ and /z/ come out “sloppy”(two features that may be ruled as disordered speech if not labeled as a dialect (Ball & Bernhardt, 2008). As such, Dene children may produce more English phonemes as lateralized, and, if SLPs and educators are unfamiliar with these differences, they could be miscategorised and seen as a “disorded” speech.

English as a Second Language and Speech Production

Another phenomenon that influences the ability for speech production is whether the children come to school having only knowledge in their heritage language. This poses many challenges for children when the language of instruction in the school is English and differs from the language spoken at home.

Not only can a speech variation come from a dialect, but, in addition, several children arrive in school not having the language of instruction the same as their mother tongue (L1); thus, English L2 speakers are assessed with the same standardized assessments as their English L1 peers. Children who have English as L2 do not arrive in school with the same degree of academic preparedness compared with their English as L1 counterparts due to lack of exposure in the language of instruction (Brice, Miller, & Brice, 2006) and they begin their schooling with a risk for poor academic outcomes (Dodd, So, & Lam, 2008). This differential of preparedness can be dysfunctional when children are presented with academic tasks and pragmatic learning (e.g., reading, speaking English) that can lead to these children not being able to benefit fully from academic teachings to their full ability (Brice, 2002; Brice, Miller, & Brice, 2006). Also, this can cause difficulties in accurately depicting speech difficulties during

screening assessments for children who may be at risk in L2, because at this stage children are still learning and acquiring the elementary L2 receptive and expressive skills (Bourgoin, 2014). Thus, educators may not fully recognize speech differences that may be due to learning a new language and possible speech impairment.

Experiences of colonialism on Canadian Aboriginals mean that several Aboriginal communities do not speak English as their primary language but communicate in their heritage language that is distinct from Standard English. Aboriginal children who come to an English school speaking their heritage language are typically recognized as students learning English as a second language. For these English language learners, having little exposure to the English language and language of instruction in the classroom may cause difficulties in speaking English. These difficulties may be heightened when first immersed in English instruction because they have an additional task of both learning English as a language and learning the academic material in English whereas children who have English as L1 and are instructed in English need only to concentrate on learning curricular content (Cummins, 2001). Therefore, learning English as L2 at an elementary level may affect children's ability to apply and express language (Brice, Miller, & Brice, 2006). Exploring children's speech at a young age holds great significance.

However, children acquiring a second language are not at a disadvantage when it comes to their academic learning. Even children who are below-average in academic achievement in their L1 perform well on L2 speaking and listening assessments (Genesee, 2007). Genesee (2007) suggests that L2 speech and listening skills are easier to learn at the elementary level than at a secondary level due to the natural-language learning proclivity. Aboriginal children are often not exposed to speech and expressive

language in their language of instruction in comparison with their listening and comprehension language. This is due to the typical and important cultural component of listening. Young children learn that listening to their elders is a sign of respect, and they therefore do not have the same opportunity of expressing themselves at a young age in comparison with children in public schools. For example, a teacher's comment to a child does not always require a response from the child, according to the child (Lowell & Devlin, 1998).

As mentioned, children who are assessed in L2 can be misdiagnosed in speech assessments if L2 is not taken into account (Pearce & Williams, 2013; Stow & Dodd, 2005; Winter, 2001). Unilingual English SLPs rely first and foremost on speech assessments in English, regardless of the primary language of the children (Skahan, Watson, & Lof, 2007). A misdiagnosis in speech assessments can lead to an over- or under-identification of a speech difficulty. Lidz and Peña (1996) implemented a model that allowed SLPs to differentiate language difficulties from speech difficulties with Latino American preschool children. They found that when children's first language and heritage dialect were not taken into account, this led to an over-identification of speech difficulties. A number of negative effects are almost ensured, including needless speech therapy, depleted school financial resources, overloading SLPs with cases and educational costs for children who are removed from classroom settings and missing out on valuable learning time.

On the other hand, L2 children can also be under-identified because of speech variability. Concerns may ensue that may place children at risk for not receiving adequate attention to their speech and language needs. This may arise when a SLP

assumes that speech difference is due to L2 and not get the proper attention needed to address difficulties or deficits (Wilson, Wilson, Coleman, & Coleman, 2000).

Effect of Age and Gender on Speech Production

At around the age of 5 children learn that the combination of speech sounds can make up words in their first language (Harris, Botting, Myers, & Dodd, 2011). Thus, children who have English as a first language by the age of 5 will more likely understand the requirements of speech sounds to make words than children who are learning English as L2. Moreover, Poole (1934) suggests that the phonological development of boys and girls are roughly the same from the ages of 2.5 to 5.5 years. Subsequently, around 5.5 year old girls show rapid growth in their phonological acquisition in comparison to boys, with girls' phonological acquisition complete around 1 year before boys. More recently, Smit, Hand, Freilinger, Bernthal, and Bird (1990) suggest that girls look as if they acquire speech sounds at an earlier age than boys, though this effect was only found statistically significant in specific age groups (i.e., 4.0, 4.5, and 6.0 years).

Regarding gender and speech production, typically girls perform better than boys of the same age on linguistic tasks (Hyde & Linn, 1988; Shriberg, 1994). Hyde and Linn (1988) performed a meta-analysis of over 170 studies and found that gender only explained 1% of the total variance in language acquisition with the exception of speech production, where girls performed better than boys. Consequently, boys are more likely than girls to be diagnosed with language disorders (Weindrich, Jennen-Steinmetz, Laucht, Esser, & Schmidt, 1998). Weindrich and colleagues (1998) found gender differences in expressive disorders could be identified as early as age 2 and articulation disorders as early as age 4.5. These differences in speech production could

be due to several factors such as rates in brain maturation (Hyde & Linn, 1988), earlier development of speech organs (Darley & Winitz, 1961) and variations in socialization (Moore, 1967, as cited in Dodd, Holm, Hua, & Crosbie, 2003). Girls were also known to produce cluster reductions in a less frequent manner than boys (Dodd, 2013).

Gender differences can also be found in the frequency of dialect use (Chambers, 1995; Washington & Craig, 1998; Wolfram, 1969). Cross-cultural gender differences have been studied in African American English (Seymour & Seymour, 1981; Washington, 1996; Washington & Craig, 1998). Boys are more likely to speak with a dialect than girls. Also, it is the frequency and not the form of dialect that changes with gender. The authors suggest that girls have greater mobility and exposure to mainstream culture where Standard English is primarily spoken. Washington and Craig (1998) found these gender differences in children as young as 5 and 6 years old. This supports research stating that a favourable view of masculinity traits between boys is associated with a larger use of dialect. These differences have been shown in children as young as 6 in regards to the final /r/ sound in Scottish English (Romaine, 1978). Romaine (1978) suggests that girls take on a language variant above their level of consciousness, while boys take on a language variant that is below their level of consciousness, favouring a less likely Standard English usage.

Hearing Loss and Impairment

Otitis media is a frequently diagnosed ear infection in children. This can occur when a rapid onset of fluid enters the middle ear and causes inflammation. Chronic otitis media has been known to cause issues in speech and language development in children in special populations (Roberts, Burchinal, & Zeisel, 2002). This has been found in Aboriginal populations. Aboriginal children can be at a disadvantage with

regards to their communication skills due to high numbers of otitis media in Canadian Aboriginals. The infection occurs primarily in early infancy and is related to hearing loss (Lowell & Devlin, 1998). A chronic ear infection that persists up to the age of 10 can cause mild to moderate hearing loss (Ball & Peltier, 2014). Large numbers of Canadian Aboriginal children in remote communities are found to have otitis media; in some communities, it was found around 40 times more likely than children living in urban spaces (Bowd, 2005). Otitis media can occur in children with a poor diet, non-maintenance of breastfeeding, bottle feeding, exposure to tobacco smoke, or wood burning during infancy. Often, Aboriginal children come from remote communities where access to medical care is sparse, which leaves a potential hearing issue unattended until chronic damage has been done to the child's hearing. Moreover, hearing loss due to otitis media can worsen with age, which disadvantages children in social and occupational areas, and creates difficulties with language acquisition, such as speech production that includes phonological substitution. For example, the assimilation error (described in detail in chapter 3) of replacing /m/ with /n/ was found to occur in children ages 4-8 with hearing impairment who either had a hearing aid or cochlear implant (Skoruppa & Rosen, 2014). The researchers acknowledge that, other than for their own work, there has been no direct exploration of specific phonological variation and its connection to speech, which makes this area of inquiry relatively new.

Summary

This chapter demonstrates the urgency of providing culturally relevant assessments to Aboriginal children for accurate results that take any potential dialect into account. As Aboriginal English dialects are a result of language loss and language revitalization, the importance of implementing a true language is clear. A description

of how children with their heritage language as a first language and being instructed in English are impacted was explored. It is clear that these children face the possibly of misdiagnosis on assessments. The current study aims to fill the literature gap dealing with the lack of potential speech differences that may be related to a heritage language, and for educators and SLPs to take these differences into account when administering speech assessments.

3.0 Methods

This study employs a cross-sectional design based on the one-time testing of each child participant to identify speech errors made by on-reserve First Nations kindergarten children from 31 communities across Canada. Speech errors made by the First Nations kindergarten children is studied using four different approaches. First, the difference in speech errors between the study's participants and a normative population (that was used to set the standard speech errors and patterns for the DEAP's Diagnostic Screen) was analyzed. Second, how speech errors are associated based on a similar heritage language spoken in children's respective community is described. Third, speech differences based on age and gender is explored and fourth, how speech errors differ when children speak English as a second language (L2) is investigated. The study was conducted as part of the Confident Learners (CL) initiative using extant data. Children were assessed with the CL testing battery to investigate a number of literacy skills.

Funding for Confident Learners was provided by Aboriginal Affairs Northern Development Canada (AANDC) through the University of New Brunswick (UNB) and The Learning Bar. Confident Learners, where the data was collected, received Research Ethics Board (REB) review from the University (on file as REB 2013-078). The current study also received research ethics review through the UNB Research Ethics Board and is on file as REB 2016-051.

Participating First Nations communities agreed to allow their kindergarten and Grade 3 students to be assessed on their literacy development for research purposes. In addition to the REB approval, Confident Learners adheres to the ethical research

guidelines with First Nations populations through the principles of Ownership, Control, Access, and Possession (OCAP; First Nations Centre, 2007) which recognize a set of standards governing how First Nations data should be collected, protected, used, and shared.

Participants

A total of 377 children in 31 on-reserve First Nations schools were recruited to participate in this study for assessing a range of literacy skills in May and June, 2014. An initial 32 First Nations communities partnered with CL but the assessment team was unable to reach one community due to poor weather conditions at the time of the assessments. Moreover, one Cree First Nations reserve had two schools. Children were completing kindergarten at the time assessments were conducted. Three children did not complete the DEAP. Data for the remaining 374 children (180 boys, and 194 girls) were analyzed for the current study. These children were not tested for hearing impairment or hearing loss. The children were between the ages of 61 and 87 months (M=70.75) at the time of testing. The number of children in each heritage language varied considerably: A total of 150 children from 15 Ojibway communities; 123 from 10 Cree communities; 17 from one Dene community, 26 from two Mi'kmaq communities; 12 from one Maliseet community; and 46 from two Innu communities. All children living in the same community had the same heritage language background as that of their community.

A total of 315 children identified English as their primary language and 16 children had Cree as a first language (L1); thirty-two had Innu as L1, one participant claimed Dene as L1, and one participant claimed French as a primary language. It was not possible to collect the L1 of the remaining nine children from the Dene community

due to incomplete responses. Thus, Dene was not included for analysis in the fourth research question. Data from the lone child who claimed French as a first language was also not included for analysis for the fourth question. As a result, only Cree and Innu possessed a sample size large enough for analysis on this question.

Instrumentation

Speech articulation and phonology. The *Diagnostic Evaluation for Articulation and Phonology* (DEAP; Dodd, et al., 2006) was administered to investigate the speech errors of each child. The DEAP is a comprehensive standardized assessment that measures disparity diagnoses of speech disorders in children in a well-controlled manner. The DEAP is comprised of three main assessments, one of which is a five-minute Diagnostic Screen assessment used for the general screening of speech errors, and phonological and articulation disorders. The current study included measures from two tasks of the Diagnostic Screen: *Single-Word Production,* and *Single-Word Inconsistency,* which examine phonological error patterns and single-word inconsistencies. *Single-Word Production* allows the assessor to test several American English phonemes rapidly through utilizing ten pictures to determine whether further speech assessment is required. *Single-Word Inconsistency* allows the assessor to test the consistency of the child's word production using 10 pictures from the Single-Word Production task. This task was modified and utilized to meet the study's purposes as described below.

The DEAP provides a *Phonological Error Pattern Analysis* that was established by normative collected data for the Single-Word Production task. These patterns are: gliding (e.g., /l/ to /w/), vocalization of liquids (e.g., /er/ to /a/), deaffrication (e.g., /dge/ to /sh/), cluster reduction (e.g., /pt/ to /p/), fronting (e.g., /tch/

to /ts/), weak syllable deletion (e.g., /um/ in umbrella), stopping (e.g., /v/ to /b/), prevocalic voicing (e.g., /f/ to /v/), postvocalic devoicing (e.g., /dge/ to /ts/), and final consonant deletion (e.g., dropping the /g/ in fishing). Seven of these error patterns (gliding, vocalization of liquids, cluster reduction, fronting, weak syllable deletion, stopping, and final consonant deletion) are stressed in the literature as being patterns that occur in children with phonological disorders (Grunwell, 1987; Ingram, 1976; Stoel-Gammon & Dunn, 1985, as cited in Dodd et al., 2006). The remaining three error patterns, deaffrication (Hodsen & Paden, 1991), prevocalic voicing, and postvocalic devoicing (Haelsig & Madison, 1986; Stoel-Gammon & Dunn, 1985, as cited in Dodd et al., 2006) are also found in typically developing children.

Research Procedures

Data were collected in May and June 2014, at the end of the academic school year. A total of 13 individuals including research assistants, teachers, retired school teachers, and undergraduate university students conducted the assessments. All assessors received prior training on how to administer the Confident Learners battery, one of which included the DEAP's Diagnostic Screen. Assessments were conducted one-on-one with the assessor. For the most part, they were done in a quiet room where there would be little distraction. When the assessment was completed, all children received a sticker for their participation. All assessments were recorded with an audio recorder, Olympus, model DM-620.

To administer the DEAP Diagnostic Screen, the assessors showed a total of 10 animated pictures: a watch, a man fishing, a pair of gloves, a spider, a boy giving a girl some flowers, scissors, a helicopter, a bridge, an umbrella, and an elephant. For each picture, the assessor asked "what is this?" Children would answer by saying what they

saw on the picture. If they did not know the target word, the assessor would proceed to ask a question in order to prompt the correct word (e.g., "what do you wear on your arm that tells the time?"). If the children still did not elicit the target word, the assessor would give a choice between two items, one being the correct answer (e.g., "is this a watch or a sock?"). If children still did not produce the correct word, the assessor would produce the word and ask the children to repeat it (e.g., "can you say watch?").

Assessors would then go through the 10 pictures again to measure for Single-Word Inconsistency. The word produced on the first attempt was used for speech error analysis even if children were inconsistent on a word on the second try. Even if children scored non-age appropriate on the Single-Word Inconsistency task with more than 50% word inconsistencies, their assessment was still included in the study due to the nature of eliciting the target words. For example, if the assessor needed to elicit the target word for the children to produce the first time (i.e., imitation), the second time the participant may have only remembered certain sounds in the word, not the whole word produced, due to lack of knowledge and memory of the target word. This may have caused some inconsistent answers unrelated to their speech abilities. If by chance the child did not elicit the word on the first attempt but did on the second attempt, the second attempt was chosen for analysis. Thus, for this study the Single-Word Inconsistency task was utilized to gather words for analysis that were unable to be gotten in the first attempt; and not to measure for Single-Word Inconsistency, as the task required.

The primary researcher received training in assessing the DEAP and listened to all audio-recordings and reassessed them based on a self-made DEAP scoring chart (see Appendix A) for every child. If the child was in an age category where the specific

error was age-appropriate, it was not marked as an error (i.e., if the child was less than 5.5 years of age, gliding errors were considered age-appropriate). Only speech errors that were non-age appropriate were marked down for further inquiry.

The original purpose of scoring the DEAP was to provide feedback reports to each school on their children's speech production. During the time of the assessment, the L1 and L2 of the children were not collected. Therefore, the primary researcher visited all study schools located in Ontario, Saskatchewan, and New Brunswick in Spring, 2015 during another phase of the CL assessment and was able to retrieve the L1 and L2 of all children assessed in Spring, 2014. Each child was asked by the primary researcher or two additional assessors the language they spoke the most. A follow-up occurred with the primary researcher asking teachers or school staff members who knew the children well enough to confirm the primary languages. If a child's identified L1 did not match with that identified by teachers, then the teachers' responses were taken as the appropriate answer. For study schools not included during the 2015 research assessment, those schools were contacted by telephone and were emailed a list of the children who were assessed in Spring 2014. An individual (e.g., classroom teacher, principal) was asked to provide the L1 and L2 of each child on the list. Additionally, those schools were asked to identify their community language (see Appendix B).

Data Analysis

All data were entered using IBM SPSS v. 22 by the primary researcher and another research assistant. For the first research question, "What are the most prevalent errors in the sample of First Nations children?" a descriptive view of the most common speech errors made by the entire sample was obtained. Several criteria were used to

categorize the speech errors into patterns. First, any error produced more than once per school was highlighted as a common error. Second, those highlighted errors were then chosen for analysis if they appeared at least twice in more than one school across the entire sample.

In order to analyze phonological error patterns, Dodd, et al., (2002) classified all errors into 10 different patterns with an 11th pattern for other error potential patterns that may appear in children's speech. Due to the unique population for the current study, two patterns were eliminated. The first was deaffrication. This type of error is common in typical and atypical developing children (Bernhardt & Stemberger, 1998) and is quite similar to a stopping error where its procedure substitutes affricates with alveolar stops (e.g., /dge/ in *bridge* to /sh/). The majority of deaffication errors in the DEAP's Diagnostic Screen, and in the study's sample, are also categorized as stopping or postvocalic devoicing errors. The only error substitution that is a deaffrication error (e.g., *watch*: /tch/ to /ge/) was not found in the sample, thus providing justification for its elimination.

The second eliminated pattern suggested by the DEAP was prevocalic voicing. In this pattern, the only common error was for the word *scissors*, /ss/ was replaced by /d/, which is also a stopping error. Thus, as this possible error stood alone in this pattern, it was labelled as a stopping error and not a prevocalic voicing error.

Moreover, because some error patterns were quite common across the sample and did not belong in any of the patterns proposed by the DEAP, 4 additional patterns were created. For the first added pattern, a common error was to replace a vowel with another vowel in the middle of the word. For example, in the word *helicopter*, the

initial /e/ was often replaced with either an /o/ or an /a/. This pattern was labelled as vowel substitutions.

A second added pattern was named beginning vowel substitution. This pattern is characterized by words that begin with a vowel (e.g., *umbrella* and *elephant*) for which a substitution of the first vowel sound was replaced with another vowel sound (e.g., replacing /e/ for /m/ in *umbrella*). The third added pattern was labelled consonant deletion. Deleted consonants that are not the final sound in the word belong to the pattern consonant deletion. In this study, one deleted consonant was found: deleting /m/ in *umbrella*.

Lastly, a common phoneme substitution found in the sample was /m/ for /n/ in the word *umbrella*. This change is known as assimilation, an articulatory modification that ensues when one phoneme impacts an adjacent phoneme (e.g., /m/ and /n/ are closely related in sound structure; Dodd, et al., 2002, p.72). The substitution /n/ for /m/ in *umbrella* was the only assimilation error in the sample's speech error.

Analyzing a single speech error in a single pattern also occurs for postvocalic devoicing, which has only the substitution of the sound /dge/ to /ts/ in the word *bridge*. Because there was only one error for both assimilation and postvocalic devoicing errors, unlike the other patterns, which have at least two speech errors per pattern, these errors were analyzed at the word level. There were 12 speech patterns in total.

For the second research question to discern speech differences of the entire sample based on heritage language, I applied binary logistic regressions to look at the probability (marked as prevalence) of producing each speech error at the heritage language level, as listed in Table 3. This was performed by taking the logit of the heritage languages and converting it into probabilities. The probability ranges from 0

to 1. The dependent variable is dichotomous and categorical: the child either produced the speech error (coded as 1) or did not produce the speech error (coded as 0).

Correspondingly, I determined the relationship between speech error patterns (or frequency of speech errors of similar kind) and heritage language using multivariate Ordinary Least Squares (OLS) regression. Consonant deletion, postvocalic devoicing, and assimilation were excluded from this analysis and treated separately, with logistic regression, as they are error patterns with only one speech error. The slope and standard error (SE) presented in Table 3 were used to determine the association between speech patterns and the six heritage languages. The greater the slope, the greater the expected number of children within a heritage language background to produce speech errors within a speech pattern. A small SE indicates that the sample mean represents a more accurate image of the actual population mean, and is used to test that the slope is not zero.

The third question investigated the relationship between speech errors, age and gender. In regards to age, logistic regressions were performed. Only 306 participants were used for this analysis for two reasons. First, gliding errors were acceptable speech errors for children aged 5 years and 5 months and under. Thus, any child under 5;5 who made a gliding error was marked with a 0 to indicate that the error was not produced. Only children aged 5 years and 6 months and over were appropriate for the DEAP's Diagnostic Screen. Second, a number of children were well above the kindergarten age cohort, possibly due to repeating kindergarten or starting kindergarten late. A general rule in most Canadian provinces is that children born January 1st or later belong to a cohort between the ages of 4 years 8 months and 5 years and 7.99 months entering the school system in September. With the sample's children tested in 2014,

the oldest child to fit the September cohort would have to be born January 1st, 2008. Thus, all children who were born in 2007 were omitted from this question. The final sample size for the third question was 306 children; 148 boys and 158 girls.

Each participant's chronological age in years was considered and centered to 6 years. This age was chosen because it is at this average age that the children enter Grade 1. The odds ratios and prevalence (taking the logit of age and converting it into probabilities) for each speech error indicate speech error occurrence in children a year older-- at 7 years. Thus, the basic regression model predicts whether the probability of making any of the 43 speech errors would either increase or decrease entering the new school year in Grade 2. The probability of each speech error at age 7 is reported in Table 5 in the form of prevalence. The same analyses were performed separately for gender on the same 306 children.

OLS regression was used to examine the relationship between the number of speech errors occurring within the same pattern, both on age and gender. Table 6 reports the regression parameters and the standard errors. A larger slope for age indicated that older children, at age 7, would make a greater number of speech errors within a specific speech pattern. In regards to gender, a larger slope indicates that girls, compared to boys, produce more speech errors within a specific speech pattern. The intercept, indicate the expected number of speech error within a pattern at age six. As for gender, the intercept in their respective analyses indicate the expected number of speech error within a pattern for boys.

For the fourth question, only Cree and Innu language backgrounds had children who had their heritage language as L1. The remaining children had English as their L1 with the exception of the lone Dene and French children. First, all children who came

from Cree language backgrounds were placed in two groups: English as L1 or Cree as L1. Regarding children from Cree language backgrounds (N=123), there were 107 English as L1 speakers and 16 Cree as L1 speakers. For Innu children who either had Innu or English as L1 (N=45), there were 13 English L1 children and 32 Innu as L1 children. Speech errors in both groups were analyzed using logistic regression. Cree L1 children were coded 1 and English L1 children were coded 0. Results are presented and listed in Table 7 with respect to the children's L1 and whether the odds of speech error occurrence were more likely in Cree as L1 in comparison to their English as L1 counterparts. Also, the prevalence of both L1 groups on speech error occurrence was listed in Table 7. Regressions were repeated for children with Innu language background with Innu L1 children coded 1 and English L1 children coded 0.

Similarly to what was done on the whole sample, I used OLS regression (see Table 8) to examine the frequency of speech error within a specific pattern, especially in regards to children's L1. The intercept revealed the number of speech errors within a given pattern for children who have English as their L1. The slope, with a one-unit increase, is the expected change in number of speech errors within a given pattern for children who have Cree as their L1. This analysis was repeated for the children with Innu language backgrounds who either spoke English as L1 or Innu as L1. Separate regressions were run for Cree and Innu language backgrounds; both are presented in Table 8.

Summary

This chapter presented the descriptive and quantitative measures that were undertaken to investigate the association of heritage language, age, gender, and English as L2 as possible predictors of speech errors and speech patterns occurrence among on-

reserve First Nations children across Canada. The next chapter provides the results of the analyses for each of the 4 research questions.

4.0 Results

This study used the DEAP's Diagnostic Screen for the purpose of determining whether First Nations children produce different speech errors than the DEAP's normative population and whether having a similar heritage language produces certain types of errors in order to explore whether these errors are due to a common dialect and not a speech error. Also, age, gender, and English as a second language (L2) were also considered as possible speech error predictors. Results from the data analyses are provided below.

Research Question 1

What are the most prevalent speech errors in the sample of First Nations children?

This question explored the most common speech errors in the entire sample of First Nations children (N=374). Tables 1 and 2 lists in bold the phoneme substitution and phoneme omission speech errors. Table 1 lists the similar speech errors and their respective speech patterns both from the DEAP's normative sample and the study's sample. Table 2 lists the speech errors and their respective speech patterns uniquely found in the study's sample. Under each speech error, the percentage of the entire sample making the error is noted. In all, 43 speech errors were made by at least 2 children from at least 2 different schools. The most common errors per pattern were gliding errors with 8 in total; followed by 6 cluster reduction speech errors; vocalization of liquids, stopping, and final consonant deletion, all with 5 speech errors; fronting, with 4 speech errors; syllable deletion, beginning vowel substitutions with 3 speech errors; medial vowel substitutions with 2 speech errors; and finally, postvocalic

devoicing, consonant deletion, and assimilation with 1 speech error in the phonological pattern. The speech error /dge/ to /d/ appeared as a stopping and fronting error, thus it was considered in both error patterns, but only once for analysis. Some error patterns such as gliding were frequent within the word (i.e., *umbrella*, *elephant*). As can be expected, the words with the larger number of phonemes produced the most speech errors. For example, *umbrella* produced 9 errors and *helicopter* produced 8 errors. By contrast, the shorter word *watch* only produced 2 errors.

All speech errors produced from the entire sample had great variability in their frequency of occurrence. The most prevalent speech errors came from the cluster reduction /nt/ to /n/ in *elephant* with 45.2% of children producing this error. The second most frequent speech error came in the stopping error /v/ to /b/ in *gloves,* which was found in 41.4% of all cases. The third most prevalent speech error was dropping the final /g/ in *fishing,* which was found in 17.6% of all cases. The majority of speech errors were found in less than 10% of all cases.

There were 8 speech errors found in the study's sample that were not found in the normative data from the Phonological Error Pattern Analysis (PEPA). First, omitting the final /g/ in *fishing* was found in 17.6% of all cases in the study's sample. The normative data suggested deleting the final consonant requires the omission of /ng/. However, deleting both /ng/ and /g/ were two prevalent speech errors in the sample. Second, the deletion of /s/ in *gloves* was found in 9.1% of cases. According to the PEPA, final consonant deletion requires the deletion of /ves/. This speech error was not found in the sample. Third, substituting /a/ with /i/ in *thank you* appeared in 2.4% of all cases. This error was placed in medial vowel substitutions error pattern that was not constructed in the PEPA. Another medial vowel substitution error was replacing /e/

with /o/ in *helicopter*. This was found in 15.5% of all cases. Fourth, both speech errors occurred in the beginning vowel substitutions: replacing /u/ with /e/ in *umbrella* (found in 7% of all cases) and replacing /e/ with /a/ in *elephant* (found in 4.8% of all cases) were not found in the PEPA. Lastly, the two remaining speech errors that were found in the study's sample but not in the PEPA were both in the word *umbrella*. First, deleting the consonant /m/ (found in 12.8% of all cases) and the assimilation error of substituting /m/ with /n/ was found in 11% of all cases.

Tables 1 and 2 lists the various speech errors and patterns tested for with the DEAP. When compared to the DEAP's normative data, several of these speech errors along with their corresponding pattern differ in the current sample. These 43 speech errors found in the current sample are used as variables of inquiry for questions 2 to 4.

Table 1.
Types of Speech Error Occurrence and Percentages of Total Sample Identified by the DEAP (N=374)

Error	Gliding	Vocalization of liquids	Cluster Reduction	Fronting	Syllable Deletion	Stopping	Postvocalic Devoicing	Final Consonant Deletion
watch				**tch – ts** (9.9%)				**ch – xx**[a] (2.4%)
fishing				**sh – s** (8.6%)		**f – p** (4.8%)		**ng – xx**[a] (5.6%) **g – xx**[a] (17.6%)
gloves	**l – w** (7.2%)					**v – b** (41.4%)		**s – xx**[a] (9.1%)
spider		**er – uh** (12.6%) **er – a** (1.9%)	**sp – p** (12%)					
thank you								
scissors		**or – uh** (7.2%)				**ss – d** (2.9%)		**final s – xx**[a] (11.2%)
helicopter	**l – w** (5.1%)	**er – uh** (9.6%) **er – a** (2.4%)	**pt – p** (7.5%) **pt – t** (5.3%)	**c – t** (3.5%)	**li –xx**[a] (5.3%)			
bridge	**r – w** (11.2%)		**br – b** (4.5%)	**dge – d** (1.3%)		**dge – d** (1.3%)	**dge – ts** (6.4%)	
umbrella	**r – w** (7.2%) **ll – w** (4.8%) **ll – y** (2.4%)		**br – b** (5.9%)		**um – xx**[a] (13.4%)			

elephant	**l – w** (4.3%) **l – y** (4.8%)	**nt – n** (45.2%)	**final e –xx**[a] (3.2%)	**ph – p** (2.7%)

[a]Sound omissions are marked with xx

Table 2.
Types of Speech Error Occurrence and Percentages of Total Sample Identified Uniquely by First Nations sample (N=374)

Error	Beginning Vowel Substitutions	Medial Vowel Substitutions	Consonant Deletion	Assimilation
watch				
fishing				
gloves				
spider				
thank you		**a – i** (2.4%)		
scissors				
helicopter		**e – o** (15.5%)		
bridge				
umbrella	**u – e** (7%) **u-a** (4.1%)		**m – xx**[a] (12.8%)	**m – n** (11%)
elephant	**initial e – a** (4.8%)			

[a]Sound omissions are marked with xx

Research Question 2

Do speech errors differ based on First Nations children's heritage language? If so, how?

An examination of the prevalence in percentages through logistic regressions was performed on all 43 speech errors and their speech patterns to investigate to what extent each speech error would occur based on heritage language background. Results revealed several statistically significant results as seen in Table 3. The speech errors are listed by their corresponding word, the targeted speech sound, and then the substitution or omission (marked as: xx). Each speech error's prevalence was bolded when the statistical significance was $p < .05$.

Ordinary Least Squares (OLS) regressions were performed to examine the relationship between speech error patterns and belonging to a heritage language background. The slope represents the expected increase or decrease of producing a speech error within a corresponding speech pattern when belonging to a specific heritage language background. Nine of the twelve speech patterns were used for this analysis. Postvocalic devoicing, consonant deletion, and assimilation were examined at the speech error level through logistic regressions since there is only one speech error in their corresponding speech pattern (see Table 3). The standard errors were also reported. Bolded numbers indicate statistically significant ($p < .05$) findings. Results are listed in Table 4.

Table 3.
Prevalence of Speech Errors by Heritage Languages

Heritage Languages		Cree (N=123)	Dene (N=17)	Ojibway (N=150)	Mi'kmaq (N=26)	Maliseet (N=12)	Innu (N=46)
Error Pattern Variables		Prevalence	Prevalence	Prevalence	Prevalence	Prevalence	Prevalence
Gliding	gloves (l-w)	**6.5%**	**5.9%**	**10.7%**	**3.8%**	**8.3%**	0%
	helicopter (l-w)	**0.8%**	0%	**8.0%**	0%	33.3%	**4.3%**
	bridge (r-w)	**13.0%**	0%	**10.7%**	**19.2%**	25.0%	**4.3%**
	umbrella (r-w)	**8.1%**	0%	**6.0%**	**15.4%**	25.0%	**2.2%**
	umbrella (ll-w)	**2.4%**	0%	**6.7%**	**3.8%**	25.0%	**2.2%**
	umbrella (ll-y)	**2.4%**	**5.9%**	**2.7%**	0%	0%	**2.2%**
	elephant (l-w)	**0.8%**	0%	**7.3%**	0%	25.0%	**2.2%**
	elephant (l-y)	**6.5%**	**11.8%**	**4.7%**	**3.8%**	0%	0%
Vocalization of liquids	spider (er-uh)	**10.6%**	**11.8%**	**16.7%**	**11.5%**	33.3%	0%
	spider (er-a)	**3.3%**	0%	**0.7%**	**7.7%**	0%	0%
	scissors (or-uh)	**3.3%**	**5.9%**	**9.3%**	**11.5%**	33.3%	**2.2%**
	helicopter (er-uh)	**8.1%**	**5.9%**	**12.0%**	**11.5%**	25.0%	**2.2%**
	helicopter	**2.4%**	**5.9%**	**2.0%**	**7.7%**	0%	0%

Cluster Reduction	(er-a) spider (sp-p)	**10.6%**	**5.9%**	**14%**	**3.8%**	**8.3%**	**17.4%**
	helicopter (pt-p)	**8.1%**	0%	**8.0%**	0%	25.0%	**6.5%**
	helicopter (pt-t)	**1.6%**	**5.9%**	**4.0%**	**3.8%**	**8.3%**	**19.6%**
	bridge (br-b)	**4.9%**	**5.9%**	**6.7%**	0%	0%	0%
	umbrella (br-b)	**7.3%**	**5.9%**	**5.3%**	**7.7%**	0%	**4.3%**
	elephant (nt-n)	**35.8%**	41.2%	**40.7%**	53.8%	**83.3%**	**71.7%**
Fronting	watch (tch-ts)	**15.4%**	**17.7%**	**8.0%**	0%	0%	**6.5%**
	fishing (sh-s)		**5.9%**	**5.3%**	**3.8%**	0%	**8.7%**
	helicopter (c-t)	**4.1%**	0%	**4.7%**	0%	**8.3%**	0%
	bridge (dge-d)	**0.8%**	0%	**2.0%**	0%	0%	**2.2%**
Syllable Deletion	helicopter (li-xx)	**3.3%**	0%	**6.0%**	**3.8%**	0%	**13.0%**
	umbrella (um-xx)	**11.4%**	**5.9%**	**18.0%**	**7.7%**	**8.3%**	**10.9%**
	elephant (final e-xx)	**2.4%**	0%	**2.0%**	**3.8%**	**8.7%**	**8.7%**
Stopping	fishing (f-p)	**5.7%**	**11.8%**	**6.0%**	0%	0%	0%

	gloves (v-b)	48.0%	**11.8%**	**39.3%**	**15.4%**	25.0%	61.0%
	scissors (ss-d)	**1.6%**	0%	**4.7%**	**3.8%**	**8.3%**	0%
	bridge (dge-d)	**0.8%**	0%	**2.0%**	0%	0%	**2.2%**
	elephant (ph-p)	**3.3%**	**5.9%**	**3.3%**	0%	0%	0%
Postvocalic Devoicing	bridge (dge-ts)	**8.9%**	0%	**5.3%**	0%	0%	**10.9%**
Final Consonant Deletion	watch (ch-xx)	**4.1%**	0%	**1.3%**	0%	0%	4.3%
	fishing (ng-xx)	**4.9%**	0%	**6.0%**	**3.8%**	0%	**10.9%**
	fishing (g-xx)	**20.3%**	**23.5%**	**12.0%**	**23.1%**	58.3%	**13.0%**
	gloves (s-xx)	**7.3%**	**5.9%**	**10.0%**	**11.5%**	**16.7%**	**8.7%**
	scissors (final s-xx)	**8.9%**	**17.7%**	**11.3%**	0%	0%	**23.9%**
Beginning Vowel Substitutions	umbrella (u-e)	**6.5%**	**11.8%**	**7.3%**	**3.8%**	0%	**8.7%**
	umbrella (u-a)	**4.1%**	0%	**0.7%**	**3.8%**	0%	**2.2%**
	elephant (initial e-a)	**4.1%**	0%	**4.0%**	**3.8%**	**8.3%**	10.9%

Medial Vowel Substitutions	thank you (a-i)	**1.6%**	**5.9%**	**0.7%**	0%	0%	**10.9%**
	helicopter (e-o)	**11.4%**	**5.9%**	**18.0%**	**15.4%**	0%	**26.1%**
Consonant Deletion	umbrella (m-xx)	**15.4%**	**11.8%**	**13.3%**	**15.4%**	**8.3%**	**4.3%**
Assimilation	umbrella (m-n)	13.8%	17.7%	12.0%	11.5%	0%	0%

Numbers are bolded when, p <.05

Table 4.
Number of Speech Errors in each Pattern by Heritage Language

	Cree (N=123)		Dene (N=17)		Ojibway (N=150)		Mi'kmaq (N=26)		Maliseet (N=12)		Innu (N=46)	
Error Pattern	Slope	SE	Slope	SE	Slope	SE	Slope	SE	Slope	SE	Slope	SE
Gliding (N=8)	**0.42**	**.088**	0.24	0.24	**0.57**	**0.08**	**0.46**	**0.19**	**1.50**	**0.28**	0.17	0.14
Vocalization of liquids (N=5)	**0.30**	**.073**	0.29	0.20	**0.41**	**0.07**	**0.58**	**0.16**	**0.92**	**0.23**	0.04	0.12
Cluster Reduction (N=6)	**0.68**	**.076**	**0.65**	**0.20**	**0.79**	**0.07**	**0.70**	**0.16**	**1.25**	**0.24**	**1.20**	**0.12**
Fronting (N=4)	**0.35**	**.050**	0.24	0.14	**0.20**	**0.05**	0.04	0.11	0.08	0.16	**0.17**	**0.08**
Syllable Deletion (N=3)	**0.17**	**.044**	0.06	0.12	**0.26**	**0.04**	0.15	0.10	0.17	0.14	**0.33**	**0.07**
Stopping (N=5)	**0.59**	**.061**	0.29	0.16	**0.55**	**0.06**	0.19	0.13	0.33	0.20	**0.63**	**0.10**
Final Consonant Deletion (N=5)	**0.46**	**.058**	**0.47**	**0.16**	**0.41**	**0.05**	**0.39**	**0.13**	**0.75**	**0.19**	**0.61**	**0.10**
Beginning Vowel Substitutions (N=3)	**0.15**	**.033**	0.12	0.09	**0.12**	**0.03**	0.12	0.07	0.08	0.11	**0.22**	**0.06**
Medial Vowel Substitutions (N=2)	**0.13**	**.035**	0.12	0.10	**0.19**	**0.03**	**0.15**	**0.08**	0.00	0.11	**0.37**	**0.06**

Numbers are bolded when, $p < .05$

Results from Table 3 reveal several findings regarding differences in the prevalence of speech error occurrence in Cree, Dene, Ojibway, Mi'kmaq, Maliseet, and Innu children. The majority of findings across heritage languages were significant ($p <$ .05). However, most had a low prevalence; therefore, the likelihood of speech error occurrence in children belonging to a specific heritage language background was less likely to occur.

All but two speech errors were significant in the 123 Cree children: the stopping error /v/ to /b/ in *gloves* and the assimilation error /m/ to /n/ in *umbrella*. A majority of significant prevalence for speech error occurrence in Cree children were close to 0. This indicates a low prevalence of speech error occurrence. Similar results were found in the 150 Ojibway children. As for Dene, twenty-four speech errors were significant, a majority with low prevalence, which was similar for Cree and Ojibway, but with a much smaller sample from the two with only 17 children.

However, a few speech errors were more likely to occur if one belongs to a specific heritage language background such as the cluster reduction in *elephant* (/nt/ to /n/). This was found significant and with a high prevalence in two heritage languages. First, Maliseet children had 83.3% of prevalence of speech error occurrence in reducing the cluster ($p <$ .05). Secondly, Innu children had 71.7% of prevalence of speech error occurrence ($p = <$ .05). Moreover, being from a Mi'kmaq language background yielded results suggesting those children had 53.8% prevalence of speech error occurrence for this speech error. However, it was not found significant ($p = 0.70$).

Another speech error with high prevalence was in Innu children regarding the stopping error /v/ to /b/ in *gloves*. Being from an Innu language background resulted in

61% prevalence of speech error occurrence. However, this error was not found significant ($p = 0.16$). Moreover, results revealed that being from a Cree language background yielded 48% prevalence of the stopping speech error occurrence despite it not being significant ($p = 0.65$).

Furthermore, the final consonant deletion error in *fishing* (omitting /g/) resulted in 58.3% prevalence in Maliseet children. However, this speech error was not significant ($p = 0.57$).

Innu children, in comparison to the other 5 heritage language backgrounds, only made vocalization of liquids errors in 2 instances (once for each of 2 children): once in *scissors* (/or/ – /uh/) and the other in *helicopter* (/er/ - /uh/). This suggests that Innu children were successful in producing vocalization of liquids sounds.

In Table 4, OLS regressions show the frequency of speech pattern occurrence for all 6 heritage languages. For Cree as a heritage language, all 9 speech patterns were found to be significant and positive. Thus, with a one-unit increase in heritage language (being from a Cree heritage language background as opposed to not being Cree) there was an expected increase in the number of speech errors produced in their corresponding pattern. All these numbers increased by less than one speech error per speech pattern. Similar results were reported for Ojibway.

Findings for Dene indicated 2 significant speech error patterns: cluster reduction and final consonant deletion. With a one-unit increase, that is belonging to a Dene language background, the expected change to produce a cluster reduction speech error increased by 0.65 speech errors due to ($p < .05$). For consonant deletion, the expected

increase of deleting the final consonant speech error increased by 0.47 speech errors with one-unit increase in Dene language background ($p < .05$).

Being of Mi'kmaq language background resulted in five significant and speech patterns: gliding, vocalization of liquids, cluster reduction, final consonant deletion, and medial vowel substitutions. All slopes were positive but less than 1, indicating that there was an expected increase in the number of speech errors within the five speech patterns with a one-unit increase in heritage language background; that is, when belonging to a Mi'kmaq language background ($p < .05$).

Maliseet language background resulted in 4 significant speech patterns: gliding, vocalization of liquids, cluster reduction, and final consonant deletion. First, there were eight opportunities to produce an error that belonged to the gliding speech pattern. The expected number of speech errors increased by 1.50 gliding speech errors, for children belonging to a Maliseet language background ($p < .05$). Second, there were five opportunities to produce an error that belonged to the vocalization of liquids speech pattern. The expected number of speech errors increased by 0.92 vocalization of liquids speech errors, for children belonging to a Maliseet heritage language background ($p < .05$). Third, there were six opportunities to produce an error that belonged to the cluster reduction speech pattern. The expected number of speech errors increased by 1.25 cluster reduction speech errors with six chances to do so, when belonging to a Maliseet as a heritage language background ($p < .05$). Lastly, with five opportunities to produce a final consonant deletion error, there was an expected increase of 0.75 final consonant deletion speech errors for children belonging to a Maliseet as a heritage language ($p < .05$).

Innu as a heritage language background found seven statistically significant speech patterns. Six speech patterns had a positive slope under one, the other, cluster reduction, had a slope greater than one. Therefore, with six opportunities to produce the speech pattern, there was an expected increase of 1.20 cluster reduction speech errors for children belonging to an Innu as a heritage language background ($p < .05$). The slopes of the other six significant speech patterns (fronting, syllable deletion, stopping, final consonant deletion, beginning vowel substitutions, and medial vowel substitutions) were found to be less than one. Thus, with a one-unit increase in heritage language (being from an Innu heritage language background as opposed to not belonging to it) there was an expected increase in the number of speech errors producing in their corresponding pattern. All these numbers increased by less than one speech error per speech pattern ($p < .05$).

Research Question 3

What is the relationship between speech errors, age and gender in First Nations children?

Results from the logistic regressions are found in Table 5. Both age and gender were analyzed with separate regressions. Table 5 sets out the prevalence in percentages, standard error, and the odds ratios for each speech error centered at 6 years of age. Odds ratios reveal how greater the odds are of a child making the speech error with one-unit change; that is, 7 years as compared to the odds of a child at 6 years. Also, the prevalence calculated by probabilities of speech error occurrence in a 7-year-old in comparison to a 6-year-old is listed in Table 4.

Table 5 also shows the prevalence, standard error, and odds ratios for each speech error based on gender. This shows how greater the odds are for a girl to produce

the speech error compared to a boy. All 43 speech errors are listed by their corresponding speech pattern. Bolded odds ratios are significant at the $p < .05$ level.

Table 6 sets out the OLS regression analyses on age centered at six years and gender in regards to the nine speech patterns. The intercept, slope, and respective standard errors were reported, while significant numbers are bolded when at the $p < .05$ level. Regarding age, the intercept signifies the expected number of speech errors (within their respective speech pattern) at age 6. The slope represents the expected change in the number of speech errors within each speech pattern when age changes from 6 years to 7 years. As for gender, the intercept is the expected number of speech errors (within their respective speech pattern) for boys. The slope represents the expected change in the number of speech errors within each speech pattern for girls in comparison to boys.

Table 5.
Prevalence of Speech Errors at Age 6 years and for Gender

		Age at 6 years (N=306)[a]		Gender (N=306)[a]	
Error Pattern	Variables	Prevalence (SE)[b]	Odds Ratios[b]	Prevalence (SE)[b]	Odds Ratios[b]
Gliding	gloves (l-w)	43.2% (0.86)	0.76	**25.1% (0.46)**	**0.34**
	helicopter (l-w)	78.1% (1.02)	3.57	36.6% (0.50)	0.58
	bridge (r-w)	31.1% (0.73)	0.45	37.5% (0.36)	0.60
	umbrella (r-w)	74.4% (0.94)	2.90	30.7% (0.48)	0.44
	umbrella (ll-w)	59.2% (1.162)	1.45	36.4% (0.58)	0.57
	umbrella (ll-y)	11.1% (1.50)	0.12	**10.0% (1.07)**	**0.11**
	elephant (l-w)	67.9% (1.21)	2.11	31.3% (0.62)	0.46
	elephant (l-y)	31.3% (1.03)	0.46	33.0% (0.52)	0.49
Vocalization of Liquids	spider (er-uh)	58.2% (0.70)	1.39	34.1% (0.35)	0.52
	spider (er-a)	**99.9% (3.44)**	**894.64**	74.0% (1.16)	2.85
	scissors (or-uh)	41.7% (0.89)	0.72	37.5% (0.43)	0.60
	helicopter (er-uh)	44.1% (0.79)	0.79	37.2% (0.39)	0.59
	helicopter (er-a)	87.9% (1.79)	7.29	65.5% (0.87)	1.90
Cluster Reduction	spider (sp-p)	42.3% (0.80)	0.74	31.5% (0.41)	0.46
	helicopter (pt-p)	74.4% (0.94)	2.90	40.6% (0.46)	0.69
	helicopter (pt-t)	35.0% (1.09)	0.54	37.9% (0.54)	0.61
	bridge (br-b)	42.6% (1.08)	0.97	37.9% (0.54)	0.61
	umbrella (br-b)	50.8% (0.97)	1.03	68.0% (0.51)	2.12
	elephant (nt-n)	46.7% (0.47)	0.88	**37.3% (0.23)**	**0.60**

Fronting	watch (tch-ts)	47.0% (0.83)	0.89	62.5% (0.42)	1.66
	fishing (sh-s)	63.6% (0.93)	1.74	55.9% (0.46)	1.27
	helicopter (c-t)	74.3% (1.28)	2.89	34.3% (0.64)	0.52
	bridge (dge-d)	56.3% (2.06)	1.29	48.4% (1.01)	0.94
Syllable Deletion	helicopter (li-xx)	34.4% (1.00)	0.53	**14.6% (0.64)**	**0.17**
	umbrella (um-xx)	31.3% (0.71)	0.46	40.9% (0.35)	0.70
	elephant (final e-xx)	15.2% (1.46)	0.18	31.4% (0.72)	0.46
Stopping	fishing (f-p)	83.6% (1.25)	5.11	65.7% (0.62)	1.92
	gloves (v-b)	45.3% (0.48)	0.83	46.0%(0.24)	0.85
	scissors (ss-d)	56.4% (1.34)	1.23	77.2% (0.81)	3.38
	bridge (dge-d)	56.3% (2.06)	1.29	48.4% (1.01)	0.94
	elephant (ph-p)	70.6% (1.58)	2.40	85.3% (1.09)	5.80
Postvocalic Devoicing	bridge (dge-ts)	78.5% (1.08)	3.65	41.7% (0.52)	0.72
Final Consonant Deletion	watch (ch-xx)	87.9% (1.79)	7.28	31.6% (0.87)	0.46
	fishing (ng-xx)	22.4% (1.02)	0.29	54.2% (0.49)	1.18
	fishing (g-xx)	71.4% (0.63)	2.50	49.2% (0.30)	0.97
	gloves (s-xx)	40.8% (0.84)	0.69	39.9% (0.42)	0.66
	scissors (final s-xx)	65.3% (0.78)	1.88	50.0% (0.38)	1.00
Beginning Vowel Substitutions	umbrella (u-e)	75.7% (0.94)	3.12	61.1% (0.47)	1.57
	umbrella (u-a)	56.4% (1.69)	1.29	82.8% (1.10)	4.80
	elephant (initial e-a)	17.6% (1.13)	0.21	65.9% (0.56)	1.93

Medial Vowel Substitutions	thank you (a-i)	30.5% (1.49)	0.44	61.2% (0.74)	1.58
	helicopter (e-o)	51.1% (0.62)	1.05	41.1% (0.31)	0.70
Consonant Deletion	umbrella (m-xx)	47.0% (0.74)	0.89	40.2% (0.36)	0.67
Assimilation	umbrella (m-n)	70.6% (0.74)	2.40	65.9% (0.38)	1.93

[a]Regressions were run separately for age and gender.
[b]Numbers are bolded when, $p < .05$

Table 6.
Number of Speech Errors in each Speech Pattern by Kindergarten Age Cohort and Gender

	Age at 6 years (N=306)[a]		Gender (N=306)[a]	
Error Pattern	Intercept (SE)	Slope (SE)	Intercept (SE)[b]	Slope (SE)[b]
Gliding (N=8)	0.50 (0.06)	-0.87 (0.24)	**0.51 (0.06)**	**-0.35 (0.12)**
Vocalization of liquids (N=5)	0.37 (0.02)	0.13 (0.20)	0.36 (0.05)	-0.14 (0.10)
Cluster Reduction (N=6)	0.76 (0.05)	-0.20 (0.19)	**0.76 (0.05)**	**-0.22 (0.09)**
Fronting (N=4)	0.21 (0.03)	0.15 (0.17)	0.21 (0.03)	0.03 (0.06)
Syllable Deletion (N=3)	0.20 (0.03)	-0.18 (0.16)	**0.22 (0.03)**	**-0.15 (0.06)**
Stopping (N=5)	0.50 (0.04)	0.05 (0.15)	0.49 (0.04)	0.05 (0.07)
Final Consonant Deletion (N=5)	0.45 (0.04)	0.13 (0.15)	0.44 (0.04)	-0.04 (0.07)
Beginning Vowel Substitutions (N=2)	0.14 (0.02)	0.01 (0.09)	0.14 (0.02)	0.08 (0.04)
Medial Vowel Substitutions (N=2)	0.20 (0.26)	-0.02 (0.10)	0.20 (0.02)	-0.04 (0.05)

[a]Regressions were run separately for age and gender
[b]Numbers are bolded when, $p < .05$

Results reported in Table 5 demonstrate the findings for both age and gender. Regarding age, one speech error was significant among the 306 children when a seven year old is compared to a six year old. The significant speech error was the vocalization of liquids error /er/ to /a/ in *spider* with an odds ratio of 894.64 and a probability of 99.9% occurrence in a 7 year old, compared to a 6 year old ($p < .05$).

Concerning gender, four speech errors were found to be significant, all suggesting that boys have higher odds of producing the speech errors. First, there were 2 significant gliding errors: substituting /l/ with /w/ in *gloves* being around 66% more likely in boys and with 25.1% prevalence in girls in comparison to boys (odds ratio = 0.34, $p < .05$). The second gliding error, substituting /ll/ for /y/ also in *umbrella* was 89% more likely to occur with boys given an odds ratio of 0.11, and 10% prevalence when the child is a girl ($p < .05$).

The cluster reduction error /nt/ to /n/ in *elephant* was found more likely to occur in boys than girls with an odds ratio of 0.60, $p < .05$. The prevalence for girls was 37.3%. All cluster reduction errors with the exception of reducing /br/ to /b/ in *umbrella* were found to have odds that favoured boys over girls.

Lastly, the syllable deletion speech error /li/ in *helicopter* was found more likely to occur in boys than girls with an odds ratio of 0.17 and a $p < .05$. Furthermore, the prelevance of producing this speech error was 14.6% in girls.

The speech error patterns reported in Table 6 through OLS regressions were not significant when examined by age centered at 6 years. This suggests that with a one-unit increase in age (from 6 to 7 years old), the expected change in the number of speech error patterns (within each speech pattern) provided no significant difference.

Regarding gender, results revealed four significant findings when investigating speech patterns. The first speech pattern was gliding with eight opportunities to produce speech errors in the pattern. The expected number of gliding speech errors for boys was 0.51. With a one-unit change of gender, that is, girls in comparison to boys, the expected change in the number of gliding speech errors decreased by 0.35 ($p < .05$). A second significant speech pattern was found in cluster reduction speech errors. This pattern had six speech errors. The expected number of cluster reduction speech errors for boys was 0.76 s. Girls, on the other hand, were less likely to make cluster reduction errors due to an expected decrease of 0.22 cluster reduction speech errors ($p < .05$). Lastly, syllable deletion was statistically significant with three speech errors in its pattern. The expected number of syllable deletion speech errors for boys was 0.22 speech errors. With a one-unit change in gender, that is girls compared to boys, there was an expected decrease of 0.15 syllable deletion speech errors ($p < .05$).

Research Question 4

To what extent do speech errors relate to English first language First Nations children compared with First Nations children who have a heritage language as their first language?

Logistic regressions were performed to explore the odds of children making certain types of speech errors from a similar heritage language background, and their first language (L1). This indicates differences between children with English as L1 or a heritage language as L1. Table 7 presents the findings from all children of Cree language backgrounds (N=123) and children of Innu language backgrounds (N=45). Listed are the prevalence in percentages of both English L1 and Cree L1 children, and

odds ratios (the likelihood of speech error occurrence in a Cree L1 child in comparison to an English L1 child). In a separate analysis (also in Table 7), results are listed for children with Innu language backgrounds. Significant odds ratios are bolded when $p <$ .05. A dash indicates that the speech error was not made for either English as L1 or the heritage language background as L1 within the same heritage language, and therefore could not be analyzed. Blank spaces in the odds ratios column indicate that one of the two L1 analyzed did not make the speech error, thus, odds ratios could not be calculated.

OLS regressions were also performed to see how speech patterns were associated with the children's L1 in both Cree and Innu language backgrounds. The intercept, slope, and respective standard errors were reported, with significant numbers bolded when at the $p < .05$ level. The intercepts represent the expected number of speech errors (within their respective speech pattern) for English as L1 speakers. The slope represents the expected change in the number of speech errors (within their respective speech pattern) for English as L2 speakers. Results from the OLS regressions are listed in Table 8.

Table 7.
Prevalence of Speech Error Occurrence in Children with their Heritage Language as L1 compared to their English L1counterparts

		Cree (N=123)[a]			Innu (N=45)[a]		
Error Pattern	Variables	Prevalence English L1	Prevalence Cree L1	Odds Ratios[b]	Prevalence English L1	Prevalence Innu L1	Odds Ratios[b]
Gliding	gloves (l-w)	7.5%	0%		--	--	--
	helicopter (l-w)	0.9%	0%		7.7%	0%	
	bridge (r-w)	14.0%	6.3%	0.41	0%	0%	> 100
	umbrella (r-w)	9.3%	0%		0%	0%	> 100
	umbrella (ll-w)	2.8%	0%		7.7%	0%	
	umbrella (ll-y)	2.8%	0%		0%	0%	> 100
	elephant (l-w)	0.9%	0%		7.7%	0%	
	elephant (l-y)	7.5%	0%		--	--	--
Vocalization of liquids	spider (er-uh)	12.2%	0%		--	--	--
	spider (er-a)	2.8%	6.3%	2.31	--	--	--
	scissors (or-uh)	3.7%	0%		--	--	--
	helicopter (er-uh)	9.3%	0%		7.7%	0%	
	helicopter (er-a)	2.8%	0%		--	--	--
Cluster Reduction	spider (sp-p)	7.5%	6.3%	0.53	7.7%	13.3%	1.83
	helicopter (pt-p)	1.9%	12.5%	1.77	7.7%	6.9%	0.89
	helicopter (pt-t)	11.2%	0%		7.7%	14.3%	2.00
	bridge (br-b)	5.6%	0%		--	--	--
	umbrella (br-b)	8.4%	0%		15.4%	0%	
	elephant (nt-n)	32.7%	56.3%	2.65	76.9%	73.%	0.81
Fronting	watch (tch-ts)	13.1%	31.2%	3.02	0%	0%	> 100
	fishing (sh-s)	12.2%	31.3%	3.23	7.7%	8.5%	1.11
	helicopter (c-t)	4.7%	0%		--	--	--
	bridge (dge-d)	0%	6.3%	> 100	7.7%	0%	
	helicopter (li-xx)	3.7%	0%		7.7%	11.0%	1.49

Syllable Deletion	umbrella (um-xx)	13.1%	0%		15.4%	12.1%	0.75
	elephant (final e-xx)	2.8%	0%		7.7%	8.5%	1.11
Stopping	fishing (f-p)	6.5%	0%		--		--
	gloves (v-b)	44.9%	68.8%	2.70	30.8%	51.6%	**2.40**
	scissors (ss-d)	0.9%	6.3%	7.07	--	--	--
	bridge (dge-d)	0%	6.3%	> 100	7.7%	0%	
	elephant (ph-p)	2.8%	6.3%	2.31	--	--	--
Postvocalic Devoicing	bridge (dge-ts)	5.6%	31.3%	**7.65**	7.7%	9.8%	1.31
Final Consonant Deletion	watch (ch-xx)	3.7%	6.3%	1.72	0%	0%	> 100
	fishing (ng-xx)	5.6%	0%		15.4%	12.1%	0.75
	fishing (g-xx)	20.6%	18.8%	0.89	7.7%	11.0%	1.49
	gloves (s-xx)	8.4%	0%		0%	0%	> 100
	scissors (final s-xx)	9.3%	6.3%	0.65	30.8%	26.1%	0.79
Beginning Vowel Substitutions	umbrella (u-e)	6.5%	6.3%	0.95	7.7%	8.5%	1.11
	umbrella (u-a)	4.7%	0%		0%	0%	> 100
	elephant (initial e-a)	4.7%	0%		7.7%	9.8%	1.31
Medial Vowel Substitutions	thank you (a-i)	1.9%	0%		15.4%	12.1%	0.75
	helicopter (e-o)	12.2%	6.3%	0.48	15.4%	29.5%	0.67
Consonant Deletion	umbrella (m-xx)	17.8%	0%		0%	0%	> 100
Assimilation	umbrella (m-n)	13.1%	18.8%	1.53	--	--	--

[a]Regressions were run separately for Cree and Innu
[b]Numbers are bolded when, $p < .05$

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Table 8.

Number of Speech Errors in each Speech Pattern by Children with their Heritage Language as L1 compared to their English L1 counterparts

	Cree (N=123)[a]		Innu (N=45)[a]	
Error Pattern	Intercept (SE)[b]	Slope (SE)[b]	Intercept (SE)[b]	Slope (SE)[b]
Gliding (N=8)	0.48 (0.10)	-0.41 (0.24)	0.23 (0.14)	-0.05 (0.09)
Vocalization of liquids (N=5)	0.34 (0.07)	-0.27 (0.19)	0.08 (0.04)	-0.04 (0.02)
Cluster Reduction (N=6)	0.67 (0.08)	0.08 (0.21)	1.15 (0.25)	0.03 (0.15)
Fronting (N=4)	**0.30 (0.06)**	**0.04 (0.17)**	0.15 (0.14)	0.02 (0.08)
Syllable Deletion (N=3)	0.20 (0.05)	-0.20 (0.11)	0.31 (0.17)	0.02 (0.10)
Stopping (N=5)	0.55(0.07)	0.32 (0.18)	**0.39 (0.13)**	**0.17 (0.08)**
Final Consonant Deletion (N=5)	0.48 (0.06)	-0.16 (0.17)	0.55 (0.18)	0.06 (0.11)
Beginning Vowel Substitutions (N=2)	0.16 (0.04)	-0.10 (0.11)	0.15 (0.12)	0.05 (0.07)
Medial Vowel Substitutions (N=2)	0.14 (0.03)	-0.08 (0.09)	0.54 (0.16)	-0.11 (0.09)

[a]Regressions were run separately for Cree and Innu

[b]Numbers are bolded when, $p < .05$

Results in Table 7 indicate 1 significant speech error difference in Cree as a language background; between children with English as their first language (L1) and Cree as L1 ($p < .05$). Cree L1 children are 7.65 times more likely than English L1 children to make the postvocalic devoicing error by replacing /dge/ with /ts/ in *bridge*. The prevalence of a Cree L1 child making the speech error was 31.3% while that of an English L1 child was 5.6%.

In the case of children with Innu as a language background, the stopping error made by replacing /v/ with a /b/ in *gloves* was the only significant speech error between children with English as L1 and Innu as L1. Innu children having Innu as L1 were 2.4 times more likely to substitute /v/ with a /b/ in *gloves* in comparison to their English as L1 counterparts (odds ratio = 2.40). The prevalence of Innu L1 children making the speech error was 30.8% while English L1 children's prevalence was 51.6%.

Additionally, Innu children did not make 4 out the 5 vocalization of liquids speech errors; only 1 child with an Innu language background made 1 speech error in the pattern: replacing /er/ with /uh/ in *helicopter*.

As reported in Table 8, OLS regressions revealed the expected number and the expected change in the number of speech errors within their respective speech patterns for children from both Cree and Innu language backgrounds, based on their first language. Only fronting errors were found significant in children with Cree as a language background. With four chances to produce the speech pattern, Cree children with English as L1 had an expected number of 0.30 fronting speech errors. With one-unit change of first language, that is, Cree as L1, children had an increase of 0.04 fronting speech errors ($p < .05$).

With regards to children with Innu as a heritage language background, only the stopping errors speech pattern (with five chances to produce the speech pattern) was found to be statistically significant at the $p < .05$ level. Innu children with English as L1 had an expected 0.39 stopping speech errors in the stopping error pattern. With one-unit increase in first language, that is, children with Innu as L1, had an expected increase of 0.17 stopping errors.

Summary

The results outlined in this chapter establish several speech production differences in on-reserve First Nations kindergarten children based on the Diagnostic Evaluation for Articulation and Phonology's Diagnostic Screen. Several speech errors were found in the study's sample were not indicated in the Screener's Phonological Error Pattern Analysis. Second, there was a high prevalence of speech error occurring across the entire sample and in all six heritage languages in the cluster reduction speech error /nt/ to /n/ in *elephant*. The effect of age at 6 years old was non-significant with the exception of the vocalization of liquids error /er/ to /a/ in spider, which favoured 7-year-olds in its occurrence.

Meanwhile, gender was found to be significant in four speech errors, all showing that boys produced the speech errors more often than girls. Further, three significant speech patterns (gliding, cluster reduction, and syllable deletion) occurred more often in boys than in girls. English as a second language was linked to one significant speech error in both children with Cree and Innu language backgrounds: /dge/ to /ts/ in *bridge* in Cree, and replacing /v/ with /b/ in *gloves* in Innu. Implications of these findings are further explored in the next chapter.

5.0 Discussion

This study investigated speech errors among First Nations children residing on reservations across Canada. This was done by examining the speech error prevalence across 31 communities, and by their respective heritage language background, age, gender, and English as a second language (L2) influences. This served to highlight potential dialectal features in First Nations' speech production. This final chapter interprets the study's findings in relation to the research literature and provides information on whether to treat various speech errors as errors or as a dialect. Findings may shed light on the validity of current standardized speech assessments and practices with First Nations populations.

Discussion of Results

Research Question 1

What are the most prevalent speech errors in the sample of First Nations children?

Results described the heterogeneity of the 43 speech errors across 12 speech patterns. The purpose of looking at speech errors across all 6 heritage languages was to describe how on-reserve First Nations kindergarten children produce phonemes and words on the DEAP's Diagnostic Screen. This perspective is unique and urgently needed in the literature on First Nations speech production (Ball & Bernhardt, 2008). The DEAP's Diagnostic Screen requires children to produce the majority of the most popular phonemes in Standard English in just 10 words. This quick assessment conveys a comprehensive look at not only individual speech errors, but also the phonological pattern they belong to. Table 2 also shows common speech errors and speech patterns in the DEAP's normative sample that were not found in the study's sample (see the manual

for the DEAP's normative speech error scoring chart: *Phonological Error Pattern Analysis*).

Two speech errors appeared in over 40% of all cases: the cluster reduction error /nt/ to /n/ in *elephant* (45.2%) and the stopping error /v/ to /b in *gloves* (41.4%). This cluster reduction in *elephant* (/nt/ to /n/), is a typical speech variation in speech development (Dodd et al., 2006). As seen with the cluster reduction in *elephant,* certain English variations such as African American English and Standard American English may reduce the end of the word to a single consonant (Seymour & Seymour, 1981). Given the prevalence of cluster reductions at the end of words in various dialects and that 45.2% of all children in this study reduced the cluster, it could be that this is a dialectal component that corresponds to Aboriginal English dialects.

The sample's heritage languages do not have the fricative /v/, often due to a smaller phonological inventory than English (Wolfart, 1996). Thus, replacing /v/ with /b/ is a natural substitution, as found in the research literature (Ball & Bernhardt, 2008) and in the current study. However, if not resolved by the appropriate age (4 years and 6 months according to the DEAP) it is considered to be a speech error.

In regards to speech patterns, there were additional patterns created (i.e., beginning vowel substitutions, medial vowel substitution, consonant deletion, and assimilation) to fit the most common speech errors from the study's sample. This demonstrates that the study's sample provides unique features in the most common phonological patterns that are worth noting for anyone involved in First Nations' speech development. Speech differences from mainstream populations and the importance of paying special attention to them have been highlighted by several authors who conduct

research on First Nations speech and linguistic variations in comparison to mainstream society (Ball & Bernhardt, 2008; Peltier, 2010; Peltier, 2011; Pesco & Crago, 2010). These speech differences between First Nations children and mainstream children are what Chamberlin (2003) described as small differences that emphasize culture and community and provides speakers with an understanding of their identity.

Research Question 2

Do speech errors differ based on First Nations children's heritage language? If so, how?

Results from Table 3 and Table 4 highlight the significant speech errors and speech patterns made in children by clustering them by their heritage language background (i.e., Cree, Dene, Ojibway, Mi'kmaq, Maliseet, and Innu). The majority of speech errors for all six heritage languages were found significant; however, they also had low prevalence of occurrence, which suggest the speech errors were not frequent enough to consider them as a product of an Aboriginal English dialect at the heritage language level. The statistically significant speech error that was found highly prevalent and more likely to occur was seen in Maliseet and Innu with the cluster reduction from /nt/ to /n/ in *elephant* (83.3% and 71.7% respectively). However, due to the small sample of twelve children from one Maliseet community this conclusion cannot be generalized to all Maliseet speakers. Furthermore, the remaining heritage languages provided high prevalence of speech error occurrence.

Cluster reduction as a speech pattern was not only found significant in Maliseet, Innu, and Mi'kmaq, but the remaining heritage languages had the cluster reduction error pattern as a positive and significant speech error pattern. This was mostly due to the

reduction of /nt/ to /n/ in *elephant*. As set out in Table 1, the speech error occurred over 45% of the entire sample, making it prominent across the entire sample. Maliseet and Innu had positive slopes indicating that with a one-unit increase in heritage language background, or belonging to the heritage language background, the expected number of cluster reduction speech errors increases by 1.25 and 1.20 speech errors respectively. Thus, the cluster reduction of /nt/ to /n/ in *elephant* should be considered as a possible dialectical feature across First Nations communities across Canada. Since several Aboriginal English dialects are known to delete the final consonant in words ending in more than two consonants (Ball, Bernhardt, & Deby 2005), a further look into the deletion of the final consonant in words ending in two consonants should be considered. The same deletion was also found in the word *fishing*.

In regards to dropping the final consonant in *fishing*, despite it not being significant, this was 58.3% more likely to occur if the child was from a Maliseet heritage language background. When it came to speech errors on words ending with /ing/, they have been found to be common in several English regions due to dialect (Labov, 1990); a typical phenomenon also found in the Canadian Maritimes, where the Maliseet community resides. Thus, it cannot be concluded that this cluster reduction is due to an Aboriginal English dialect, or a regional dialect that is spoken in surrounding mainstream areas. However, omitting the final /g/ in words ending with /ing/ should be considered as a potential dialect for communities residing near mainstream towns where it is a common dialectal feature.

Fishing and *elephant* both end with a VCC (vowel, consonant, consonant) pattern, and for both words the final consonant was dropped because of deletion or

reduction of the cluster (/g/ and /t/ respectively). The high prevalence suggests that Maliseet children produced these mainly because of their heritage language background. It may be that Maliseet children also tend to drop the final consonant in other words that end in a VCC pattern. *Scissors* also ends with a VCC, but its final consonant /s/ gives the word its pluralization, making it not as valid as the other "true" VCC words when looking at VCC speech patterns. This error was not statistically significant in Maliseet, possibly due to their knowledge of pluralizing *scissors*. However, one must keep in mind that the sample size for Maliseet was low and came from a single community. Thus, results cannot be generalized to all Maliseet children and results may only represent the analyzed community.

Several speech errors have prevalences nearing 0, which indicate that they were not large enough to provide evidence that those errors were due to an Aboriginal English dialect through a common heritage language. However, in the case with the lone Dene community, results could indicate that low prevalence for speech error occurrence could be due to Dene's more comprehensive language system in comparison to English (Ball & Bernhardt, 2008). Only two significant speech error patterns (cluster reduction and final consonant deletion) had smaller expected number of speech error increases in comparison to the majority of heritage language backgrounds. Also, Dene contains a larger phonological system in their heritage language. This could be a contributor to the Dene children's results on the DEAP due to having more exposure to various sounds from their heritage language background. We can conclude that Dene children, despite being from only one community and school, made few speech errors on the DEAP's Diagnostic Screen. It could be that the study's results on Dene may indicate that low

speech error prevalence is also due to the community itself and their exposure to Standard English in the school and in the community, and the overall quality of English language teaching. Since only one Dene community participated in this study, it could be that another Dene community may yield different results.

Pertaining to the Innu heritage language background, a 61% prevalence of speech error occurrence, the stopping error /v/ to /b/ in *gloves*, suggests that is was more likely to occur despite not being found significant. Like the other heritage languages in the sample, Innu does not contain the fricative /v/, thus for the word *gloves*, replacing it with /b/ coincides with the literature on common Aboriginal English language features (Ball & Bernhardt, 2008). This speech error substitution was expected for children with Innu language backgrounds due to their small phonological inventory of around 11 sounds; neither of which includes the fricative /v/ (Clarke et al., 2007). However, this error for Innu children may be largely associated with having Innu as their first language (L1) and English as a second language (L2). For further discussion on this point, see discussion on question 4.

In regards to the Cree language background for the fricative /v/ to /b/, with a non-significant prevalence of 48% in speech error occurrence, there was little change in whether being from a Cree language background affected the results in producing the speech error in *gloves*. Research suggests that, in Plains Cree, this substitution was accepted as being derived from a community dialect (Ball & Bernhardt, 2008; Wolfart, 1996). Despite not being statistically significant, it is still worth noting as this feature may be community-specific, or found in communities with the Plains Cree (Ball & Bernhardt, 2008), and not specific to Cree as a heritage language.

A unique finding that pertained to Innu children was the lack of vocalization of liquids errors. As previously mentioned, only two out of the forty-six children made one vocalization of liquids error each (one child having French as L1) with five chances to do so. Evidently, the speech error pattern set out in Table 4 was not found significant and had a small slope of 0.04 vocalization speech errors with Innu as a heritage language background. Where the majority of Innu children had English as L2 (32 Innu L1 to 13 English L1 respectively), results suggest that Innu children had no trouble producing vocalization of liquids sounds. The Innu phonological system does not contain the sounds /er/ and /or/ which would make the production of the words *spider*, *scissors*, and *helicopter* easier to produce if it did. To date, there has been no documented research on Innu children and vocalization of liquids. Thus, future research could look at why Innu people are succeeding at producing the said vocalization of liquids errors when it is not part of their phonological system. This would help SLPs and educators who work with Innu children to be more confident if a child does make a vocalization of liquids error, then they could work with him or her to correct this type of error since it is most likely not a dialectical feature.

Regarding speech error patterns, as set out in Table 4, Cree and Ojibway resulted in statistically significant positive slopes on all error patterns indicating an increase in speech error frequency in the respective speech patterns when belonging to either heritage language background. These slopes were all found to have similar results in comparison to the other heritage language backgrounds with the exception of the stopping error pattern (which is largely due to the fricative /v/ to a /b/, which posed similar results to Innu).

In terms of gliding speech errors, being from a Maliseet language background produced a positive slope with an expected increase of 1.50 gliding speech errors. Separately, only substituting /l/ with /w/ in *gloves*, had a significant expected increase of gliding speech error frequency. This speech error pattern had the largest slope among all heritage language backgrounds. The Maliseet phonological system does contain both /l/ and /w/ sounds making even the strongest Maliseet speakers able to produce both sounds. Thus, this speech error is most likely not due to a heritage language background and is thus considered a speech error. In addition, all other prevalences of gliding speech errors reported in Table 3 were relatively high in comparison to the other heritage languages. Thus, special attention to gliding speech errors should be taken into account in the lone Maliseet community.

When compared to the other heritage language backgrounds, relatively large slopes were found in vocalization of liquids errors, cluster reduction (largely due to /nt/ to /n/), and final consonant deletion errors. This demonstrates that special attention to these patterns in speech instruction should occur. With little research on speech variations in Maliseet children, findings from this study add to the sparse body of literature regarding speech production in English. However, since only one Maliseet community participated in this study generalizations cannot be made as results may vary in other Maliseet communities and schools.

Lastly, Innu had seven out of the nine speech error patterns result in significant findings indicating that being from an Innu language background increases the expectancy of speech error production in the seven patterns. The stopping pattern, with a positive slope of 0.62 was mostly due to the speech error /v/ to /b/ in *gloves* which, was

found to be about 61% likely to occur when children are from an Innu language background and with English as L2 (see discussion on question 4).

Despite few significant differences at the heritage language background level, this study's findings support current research which claims that Aboriginal English dialects are often tied at the regional level even if there are shared linguistic features within the same heritage language (Heit & Blair, 1993; Leap, 1993; Peltier, 2010).

Research Question 3

What is the relationship between speech errors, and age and gender in First Nations children?

Logistic regression analyses were performed to see the effect of age and gender on the 43 speech errors. When all ages were centered at 6 years old, only one significant speech error was found: the vocalization of liquids error of substituting /er/ with /a/ in *spider*. The odds ratio of making the speech error with a one-unit increase in age, that is, a 7-year-old was more likely than a 6 year old by almost 900 times (odds ratio = 894.64, $p < .05$). Findings also suggest that there is 99.9% prevalence of occurrence for a 7-year-old compared to a 6-year-old. The odds ratio and prevalence showed large age effects; however, there are a few factors that may explain this finding. First, the vocalization of liquids error has a large standard error of 3.44 suggesting that there is a wide confidence interval in this finding. This could be due to only 4 children producing this speech error and they were all on the older end of the age cohort: born January, February, March, and May 2008. Thus, results revealed that only older children made this error, skewing results, making it seem like this error was largely dependent on age. Furthermore, the significance level was 0.048 indicating that this finding was very close in suggesting

that the null hypothesis of no association between age and substituting /er/ with /a/ in *spider* was most likely true.

The effects of gender on speech error occurrence resulted in 4 significant findings; all favouring boys producing the errors with higher odds and prevalence than girls. Similar results were found in OLS regressions, where a negative slope determined that gliding, cluster reduction, and syllable deletion were all more common in boys. These results coincide with research and Hyde and Linn's 1998 meta-analysis revealing that there is a gender effect in speech production differences where girls outperform boys. These findings also align with research on expressive language disorders suggesting that boys are more likely to be diagnosed with speech difficulties (Weindrich et al., 1998) and girls having a more rapid growth in their phonological acquisition (Smit et al., 1990). If girls as young as 6 years old take on a language variant that is above their level of consciousness and boys taking on a language variant that is a lower level of consciousness as Romaine (1978) suggests, this may explain why boys produced more speech errors on the DEAP than girls. Furthermore, the study supports Dodd (2013) who showed that girls are less likely to produce cluster reductions (see Table 6). Lastly, centering the children's ages at 6 years supports the Smit and colleagues (1990) study that at age 6 there were significant effects where girls acquired speech sounds at an earlier age than boys.

However, research on common dialects such as African American English (Chambers, 1995; Washington & Craig, 1998; Wolfram, 1969) and Scottish English (Romaine, 1978) suggest that these cross-cultural gender differences in speech could be derived from girls either being more exposed to Standard English, or succumb to

differences in language socialization (Moore, 1967, as cited in Dodd, et al., 2003). Another language socialization theory suggests that there may be a more favourable view of masculinity from boys that comes with speaking a dialect (Washington & Craig, 1998).

Thus, one must not assume speech error differences by gender are necessarily or entirely because boys performed lower on the speech assessment, have more speech difficulties, or have a slower speech growth rate in comparison to girls for the reason that differences in language socialization may have an effect on young First Nations children living on reservations.

Research Question 4

To what extent do speech errors relate to English first language First Nations children compared with First Nations children who have a heritage language as their first language?

Two heritage languages (Cree and Innu) were studied for speech error occurrence in English as second language learners (L2) in comparison to their English native (L1) speaker counterparts. In regards to Cree children, from the 43 speech errors, only the postvocalic devoicing error of replacing /dge/ with /ts/ in *bridge* was significant being 7.7 times more likely to occur in English as L2 speakers than English L1 speakers. A reason for this may be that the Cree language contains a sound represented as t͡s (IPA, 1989) that is very similar to the error substitution of /ts/. If Cree L1 speakers are not greatly exposed to English, they may seldom encounter the /dge/ sound and therefore replace it with a sound that is familiar to them in their heritage language. Moreover, the /ts/ sound in the English language is not one of the most common phonemes used in

spoken language. A non-peer reviewed analysis was conducted by the author associating both the Carnegie Mellon University Pronouncing Dictionary with Adam Kilgarriff's unlemmatized frequency list to establish the Relative Frequencies of English Phonemes and found that /dge/ was only used in 0.59% of English phonemes (Relative Frequencies of English Phonemes, 2012). Thus, Cree children may have little exposure to its sound based on its lack of frequency spoken in classrooms and community. Ball and Bernhardt (2008) indicate that with Plains Cree, a typical substitution for /ge/ is /s/. Thus, this study's findings expand on existing work by looking into whether substituting /dge/ for /ts/ may also be accepted in in Plains Cree.

The fronting speech pattern in Table 8 presented a significant slope that suggests that Cree L1 children had a small expected increase of 0.04 fronting speech errors compared to their English L1 counterparts who had an expected number of 0.30 fronting errors. This speech error pattern included replacing sounds that were replaced with /ts/ (/tch/ in *watch*), and reducing /sh/ to /s/ in *fishing*, both patterns of which were more prevalent in Cree L1 children compared with their English L1 counterparts despite being non-significant. Children with a Cree language background were 15.4% susceptible to replace /tch/ with /ts/ in *watch* and 14.6% in substituting /sh/ to /s/ in *fishing* (see Table 3) due to their heritage language background. Despite the low numbers at the heritage language level, these substitutions could be considered as dialects within a heritage language. For example, reducing /sh/ to /s/ is already a typical substitution noted in Plains Cree (Ball & Bernhardt, 2008). Thus, the fronting substitution errors /tch/ to /ts/ could be a dialectical feature in some Cree communities but not all. A deeper look needs to be made regarding who among the Cree children is likely to make these fronting

errors, as these errors may be a community-specific dialectical feature and not heritage language specific.

However, from the 123 Cree children measured for analyses; only 16 of them had Cree as a L1. Thus, careful interpretations must be made on the findings of speech errors in Cree L1 children and its generalization to all Cree L1s. For future research, I suggest researchers test a larger number of Cree children who speak Cree as L1 from a variety of Cree communities to establish common speech production derived from a heritage language. This would serve well SLPs and educators who work with English L2 Cree children as they focus on certain sounds in their English instruction.

Regarding children with Innu as a heritage language background who either spoke English or Innu as L1, different results were revealed in comparison to Cree children. With 13 English L1 speakers and 32 Innu L1 speakers, the Innu as L1 speakers were 2.40 times more likely to replace the /v/ with a stopping sound /b/ in *gloves* in comparison to their English L1 pupils. This suggests that Innu children who speak English as L2 are more prone to elicit this speech error. Research on Innu phonological systems suggests that it does not contain the fricative /v/ and its replacement for /b/ is a substitution that is common for languages lacking the /v/ sound (Ball & Bernhardt, 2008). Thus, for Innu children who are learning English as L2, this speech sound may be more difficult for them to pronounce as they may have never encountered the sound outside of English language instruction. This speech error was also found prevalent in question 1, occurring in 41.4% of all cases in the study. As this error is prevalent in English as second language learners, it also had a prevalence of 61% for the entire Innu

sample (see question 2). These large numbers suggest that the replacement of the /v/ to a /b/ in *gloves* could be derived from their heritage language as a dialectical feature.

This could also account for the significant differences between English L1 and L2s in the stopping error pattern in Table 8, where a greater likelihood of stopping error occurrence is seen when the Innu child has Innu has L1. Since the /v/ to /b/ substitution in *gloves* was the only stopping error that was made by both Innu L1 and English L1, the expected increase of 0.17 stopping speech errors for Innu as L1, when the expected number of the speech error for English L1 children was 0.39 stopping speech errors reveals the importance of the /v/ to /b/ substitution.

Research shows that children learning a second language as the language of instruction may not come to school with the same amount of academic preparedness due to lack of exposure to the language of instruction. These children have the task of learning the language on top of learning the content being instructed to them. This can lead to them not entirely profiting in their learning (Brice, Miller, & Brice, 2006; Dodd, So, & Lam, 2008). Thus, tackling speech differences that English as L2 children produce in comparison with children who speak the language of instruction as L1, will allow educators and SLPs to focus on the /dge/ sound with their Cree L1 children and /v/ sound with Innu L1 children if they do not believe they are a common dialectical feature.

Implications for Practice

The purpose of this study was to explore speech variations in on-reserve kindergarten First Nations children living in 31 on-reserve communities across Canada. The 43 most common speech errors varied when compared to the DEAP's normative

data, suggesting that on-reserve First Nations children have unique speech errors compared with children learning Standard English in public schools. This exploratory research study on speech variations adds further knowledge about dialects, and may contribute to overall speech and language development if these variations are taken into consideration in practice. Those who focus their work on First Nations children's speech and language (e.g., SLPs, educators, policy makers) can use findings from this study as a foundation for considering speech errors as dialectical derived from a community. The study reveals that a primary step is answering the urgent need to develop valid and culturally-relevant speech assessments for children because these are greatly lacking (Ball & Bernhardt, 2008; Ball et al., 2005).

Further, as results revealed, a specific heritage language has few large effects regarding speech error differences from one heritage language to another. Future research should consider looking for speech variations predicted by a common dialect at the community-level. However, in regards to Maliseet and Innu, reducing the cluster of /nt/ to /n/ in *elephant* was significant and could suggest that it is a dialectal component. Lastly, a study to quantify Maliseet children dropping the final /g/ in *fishing* should be considered with a larger population. These speech errors should be brought to the attention of the respective communities to establish whether they should be considered a speech error that should be remediated or documented as a dialectal component that is typical in their community. Future research describing dialectical features in Maliseet communities should take important notice of this feature.

The success of vocalization of liquids sounds from Innu children sheds light on their Aboriginal English dialect that has yet to be documented. SLPs and educators who

work with Innu children should pay close attention to this type of error as results from the study indicate that the children had no trouble with their vocalization of liquids sounds despite the small phonological inventory of the Innu language.

As for gender, the 4 speech errors that were found significant all indicated that boys are more likely to make these speech errors. However, it is unclear due to sparse research on First Nations children, particularly on reservations, whether these gender differences are due to boys having more speech difficulties, boys having a slower rate of speech development than girls, or boys being socialized differently which makes them more susceptible to produce words with a dialect as compared to girls. To date, no research has explored the relationship between the variety and form of language socialization in on-reserve First Nations boys and girls and its effect on speech production. However, this area of inquiry could shed light as this unique and under-described population could bring new meaning to language socialization processes in First Nations boys and girls.

The study also recognizes the importance of children learning English as a second language, as they come into the school system with different speech and language abilities. By contrasting Standard English, a dialect, with English as L2, corresponding to what was found in the /dge/ sound in Cree and in the /v/ sound in Innu, SLPs and practitioners will be able to identify where to place their emphasis to "correct" certain speech sounds if Standard English is the preferred method in the classroom or use their time on different tasks because they are acceptable within the community. This could eventually aid in modifying current Standard English speech assessments since

they are primarily used in speech diagnoses, regardless of the L1 of the child (Skahan, Watson, & Lof, 2007) or whether the child possesses an Aboriginal English dialect.

Having certain speech sounds documented, allows researchers and practitioners to meet the needs in a community-specific and community-sensitive manner, which gains support from community members as it helps promote language revitalization as their community dialect is documented, recognized, and practiced (Ball & Bernhardt, 2008). It will drive research in recognizing the importance of dialect as a full language system. As this study was a preliminary look at speech variations, researchers can use this as a guide to ask deeper questions on current speech variation in First Nations; such as engaging community members with the study's results in determining what constitutes a dialectal variation and what constitutes a speech error. This will ensure First Nations communities have ownership of their spoken language and what it means to them as a community (Battiste, 2013).

This study suggests taking potential dialects into account to distinguish between First Nations children needing remedial language therapy and those who do not so that resources are not misused and children are not missing important classroom instruction by being pulled away for remedial work (Ball et al., 2005). Furthermore, it will help the children who do need speech and language interventions so that they receive the correct treatment meeting their needs (Ball et al., 2005). Further research examining speech variations and linking them to other educational skills such as additional literacy skills would be worth inquiring to support a comprehensive speech and language development in First Nations children.

Limitations and Recommendations for Future Research

As with every study, this study has a number of limitations. An important limitation that is prevalent in research with humans is the impossibility to take into account all factors that may play an important role in children's speech development (e.g., hours of English literacy taught per week; parental influence on literacy and speech beyond mother tongue; school absenteeism; the presence and quality of Aboriginal educators). These factors impact speech and language acquisition and may contribute to the children's current speech proficiency in English (Hoff & Tian, 2005). As there were 31 communities involved in the study, considerable variability in English language instruction is to be expected. Future research on this topic, particularly with First Nations children, should be aware of these factors and take into account that speech variations and speech development are the result of many factors.

A second limitation of this study is related to the cross-sectional design method that was used. As the assessment was conducted at one point in time, results could have varied had the assessment been administered on a different day. For example, if the children were feeling tired or sick that day, their voice features may have been affected. Thus, the researcher may have had difficulty hearing what the children were truly saying. In terms of research design, a longitudinal analysis would be a preferable method. For example, by assessing the DEAP's Diagnostic Screen for speech variations a week later on the same set of children, one could predict how constant the variations are; thus, concluding with greater confidence whether these speech errors are due to dialect or speech errors. However, a cross sectional design fits the purpose of the

DEAP's Diagnostic Screen to seek a general screening of speech sounds for possible speech disorders; making the assessment reliable for its purpose.

A third limitation pertains to the DEAP's Diagnostic Screen for possible speech error occurrence. Despite the DEAP's Diagnostic Screen attempt to assess the most popular English phonemes, a larger word inventory is suggested for future research on general speech variations. This would ensure a more accurate representation of how kindergarten First Nations children are speaking. For several speech errors (e.g., /v/ to /b/; /f/ to /p/; /m/ to /n/) there was only one attempt for that specific error. Thus, the child's speech error may have been at the word level and not at the phonological level. For example, a child may be used to saying "*unbrella*" instead of *umbrella* believing that this is the correct pronunciation and not an assimilation speech error. A larger word inventory would give the child other opportunities to produce the same assimilation error. Hence, future research could also examine the consistency of speech errors using a larger word inventory. Even if the DEAP's Diagnostic Screen elicits the most popular English phonemes, allowing the possibility for additional phoneme substitution and omissions to be explored would provide evidence that these speech errors could potentially be due to dialect. This would allow Speech-Language Pathologists (SLPs) and educators to take a deeper look at on-reserve children's speech variations and aid them in their overall speech development. However, the DEAP' Diagnostic Screen is a recognized and valid instrument to measure for general speech production that gives reliable results. These findings are a foundational step to establishing a difference between speech variations or differences (e.g., dialect, English as L2) and speech

impairments or disorders, in order to create culturally-relevant programs and assessments for First Nations children across the six heritage languages in Canada.

A fourth limitation pertains to the 2nd question on the association between speech errors and heritage language backgrounds. A heritage language may feature several dialects. This may contribute to speech differences within the 6 heritage languages in the 10 elicited words. For example, Ojibway has several dialects such as Saulteaux, Chippewa, Oji-Cree among others; as well as several variations of Cree as listed in the literature review. Despite being somewhat mutually intelligible (Rhodes & Todd, 1981), all contain unique linguistic variations that are deeply rooted in colonialism and language revitalization (Battiste, 2013) that result in differences in speech production. Thus, the study's findings cannot be generalized as results may vary depending on this study's communities. Researchers on this topic may want to focus their analysis on communities who share the same dialect within the heritage language as a greater indication of whether speech errors vary based on community dialect could ensue. Another limitation is that several of the communities had very few children, a common occurrence in First Nations communities that may have only a few hundred people living on the reservation. Thus, having a low sample size on several heritage languages is a reflection on the number of First Nations children in each community.

Regarding children who did not possess English as a first language, it is unclear as to what extent those children had prior exposure to English. Some children may have had very little whereas others may speak their heritage language as a first language and be fluent in English making them bilingual and proficient speakers in both languages. It is possible that the variety quality of prior English language exposure may have affected

the type and frequency of speech errors. A recommendation for future research would be to separate the children who are fully bilingual in their heritage language and English, but have their heritage language as L1, from the children who are learning English as L2 for the first time with classroom instruction. This may yield different results because of their different levels of exposure to English.

Finally, since there were only one Maliseet and one Dene community in the study, the results represent the overall performance of the school's children on their speech production. Thus, a careful interpretation on what is considered dialect and other intervening factors (e.g., the quality of the school's literacy teaching and the presence of aboriginal educators and their dialect) cannot be underestimated. Researchers should strive to include more schools and communities who possess the same dialect to verify what constitutes a dialectical feature or a speech error. Moreover, researchers could ask community educators, community members, and elders, what they believe constitutes a dialect feature. This would allow First Nations communities to have ownership and be represented in establishing these features. This could help understand the community's needs for community-specific implementations, needs, knowledge, and teachings (Battiste, 2013) that strengthen the community's culture and language needs (Canadian Heritage, 2005).

Conclusion

This study examined how speech production varies in comparison to a normative population as a function of a common heritage language, age, gender, and English as L2 across 31 on-reserve First Nations communities across Canada. The current study adds to the sparse literature pertaining to speech production for First Nations children

residing on Canadian reservations. This study also demonstrates the importance of providing common speech patterns to SLPs, researchers, educators, and community members so that linguistic documentation and appropriate speech assessments can be made available to First Nations children across Canada to ensure they receive educational assessments and instruction that reflect their speech variations.

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Appendix A

Diagnostic Evaluation for Articulation and Phonology Scoring Chart

DEAP Scoring Chart

Child's Code: _____ Child's Age: _____ Original File Name: _____

Folder Info: _____ Time on Recording: _____

	1. Single-Word Production	2. Single-Word Inconsistency		Articulation	Phonological Errors
Item	Response	Same / Different		Age Appropriate / Not Appropriate	Age Appropriate / Not Appropriate
1. watch	w ɑ t͡ʃ	S	D		
2. fishing	f ɪ ʃ ɪ ŋ	S	D		
3. gloves	g l ʌ v z	S	D		
4. spider	s p a ɪ d ɚ	S	D		
5. thank you	θ æ ŋ k j u	S	D		
6. scissors	s ɪ z ɚ z	S	D		
7. helicopter	h ɛ l ə k ɑ p t ɚ	S	D		
8. bridge	b r ɪ d͡ʒ	S	D		
9. umbrella	ʌ m b r ɛ l ə	S	D		
10. elephant	ɛ l ə f ə n t	S	D		
Number of Items Produced Differently (**D**) =					Single-Word Inconsistency Score _____%
Number of Items Repeated (**S** + **D**) =					☐ Age Appropriate
Single-Word Inconsistency Score [**D** ÷ (**S** + **D**)] x 100 =					☐ Not Age Appropriate

Appendix B

Date:

School:

Subject: Student's first language

First language: A first or primary language refers to the first language a person learns in childhood and would be the language the child speaks best.

Child Name	First Language	Second Language (if applicable)	Third Language (if applicable)

Community Language:
Name of respondent:
Comments:

Thank you,

Anne Laurie
M.A. Student, University of New Brunswick

Glossary

Aboriginal - The term Aboriginal is coined as any person who is a descendant of the primary inhabitants of the land). In Canada, whether they are First Nations, Métis or Inuit. The term often proclaims ambiguity in defining who constitutes as Aboriginal, especially when Aboriginal research derives from several countries. I acknowledge that the term Indigenous is the current accepted term when researching this population, however, Indigenous being an umbrella term for all people who are tied to the land feels overly broad when discussing the population. Whereas, placing focus on Aboriginal people, from countries such as Canada, United States, and Australia among others signifies groups of people who have faced similar experiences due to European colonialism. I categorize the terminology as Marie Battiste suggests in *Decolonizing Education* (2013). Therefore, for the literature review I will solely use Aboriginal and in the methodology section and beyond I will refer to First Nations as it is the population of inquiry.

Dialect - A dialect is known as any comprehensible variant of a particular language as they vary in the pronunciations of words and in the words of spoken sentences (Kay-Raining Bird, 2011). A dialect is commonly accepted within its speakers as a fully function language system.

Standard English - Variant of English. This dialect presumes as the dominant language variation and used through formal discourse, which then becomes standardized that s heard on national media (Ball & Berhnardt, 2012) and taught in the majority of school systems and commonly used in English standardized assessments.

Speech error - A speech error is any deviation from the correct pronunciation according to the standard assessment of the DEAP. When studying a population who speak with an dialect as the First Nations are commonly known to (Ball & Bernhardt, 2008), a speech error may not always be considered an error but a dialect or phonological substitution that is commonly accepted within the First Nations community. For the current study, the term error will be used but sensitivity as acknowledged by the researcher.

Heritage language - Refers to the home language of an individual (Cummings, 1983). Several other terms have been used such as mother tongue, ancestral language, ethnic language, (Cummings, 1983) and native language. Heritage language is often used for Aboriginal populations as Fishman (2001) describes this term in three main groups: Indigenous, colonial, and immigrant groups.

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