ABORIGINAL LANGUAGE USE AND SOCIOECONOMIC WELL-BEING: A MULTILEVEL ANALYSIS

By

ERIN O'SULLIVAN, B.A., M.A.

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AUTHOR: Erin O'Sullivan, B.A., M.A. (The University of Western Ontario)

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Abstract

This dissertation uses multilevel models to test the veracity of two competing theories regarding the effect of Aboriginal language use on socioeconomic well-being. The cohesion hypothesis suggests that Aboriginal language use will contribute to a sense of ethnic identity and, in turn, to socioeconomic prosperity. The ghettoization hypothesis suggests that Aboriginal language use will reduce well-being by contributing to social and economic isolation.

Descriptive statistics from the 2001 Census of Canada support the ghettoization hypothesis. Compared to Aboriginal people who do not use an Aboriginal language, Aboriginal language users have lower levels of educational attainment, income, labour force participation and employment. Multilevel models however, demonstrate that neither hypothesis merits unqualified support. Aboriginal language users are predicted to have lower well-being than non-speakers under some circumstances – most notably in non-Aboriginal communities. Under other circumstances, however, the opposite is true. Tests of the mechanisms by which Aboriginal language use is supposed to affect well-being also have inconsistent implications. Additional research is proposed that might clarify the apparently complex relationship between Aboriginal language use and well-being.

Aboriginal language use in Canada is declining very rapidly. Of the dozens of Aboriginal languages used in Canada today, only a few are expected to survive into the next century. This dissertation may provide guidance to Aboriginal leaders tasked with allocating resources, as well as to politicians and policy-makers faced with increasingly urgent demands to support Aboriginal language maintenance.

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Contents

Illustrations

Tables

Figures

Figures

Figures

Chapter 1: Dissertation Overview and Literature Review

1.1 Dissertation Overview

The aim of this dissertation is to test two competing hypotheses related to Aboriginal language use in Canada: the cohesion hypothesis and the ghettoization hypothesis. The former suggests that Aboriginal language use has a positive impact on socioeconomic well-being. The latter suggests the opposite.

The remaining sections of this chapter describe the history and current state of Aboriginal languages in Canada. These sections also discuss the cohesion and ghettoization hypotheses in greater depth and highlight the various mechanisms by which Aboriginal language use is supposed to exert its effects. Chapter 2 describes the data and methods used to test the competing hypotheses and various suppositions implicit in them. Results are presented in chapter 3 and are discussed and synthesized in chapter 4.

While a clear relationship between Aboriginal language use and well-being exists, these results offer unqualified support for neither the ghettoization nor the cohesion hypothesis. Of the various interesting findings discussed in chapters 3 and 4, perhaps the most interesting is that Aboriginal language use is associated with lower levels of well-being in non-Aboriginal communities and to some extent in non-reserve Aboriginal communities. In legal reserves, however, Aboriginal language

users and non-speakers have similar levels of well-being. Policy makers are advised not to promote Aboriginal language use as a means of improving socioeconomic well-being. Where legal and ethical considerations motivate Aboriginal language use, language programs and policies should be tailored to individual language communities.

1.2 The Current State of Aboriginal Languages

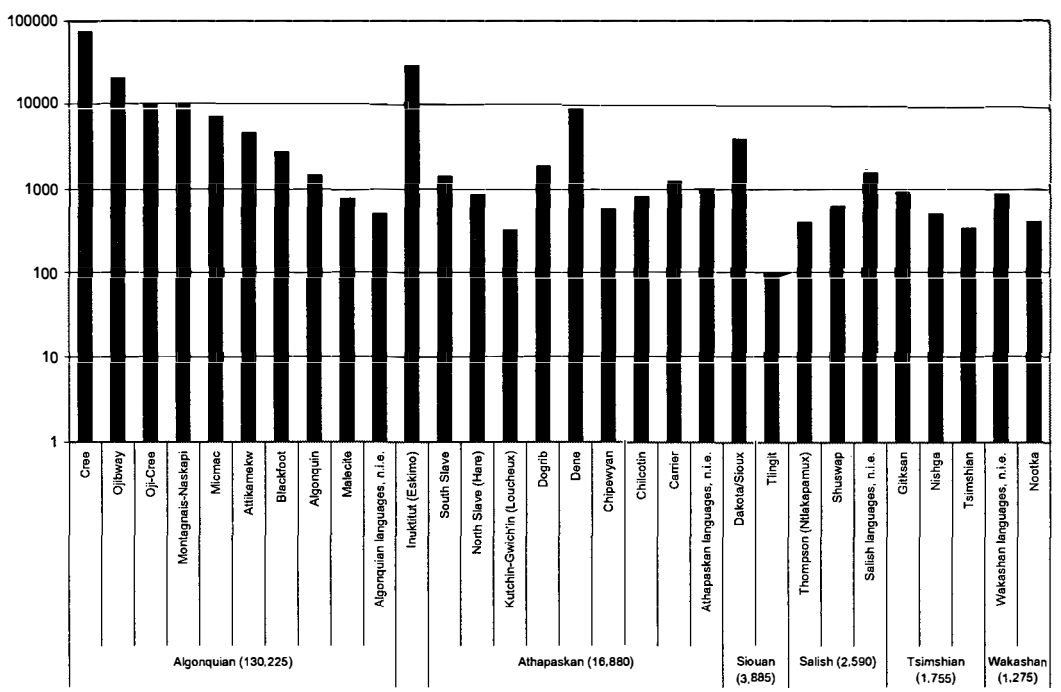
In the 2001 Census of Canada, approximately 976,000 individuals identified themselves as Aboriginal people. Of these, approximately 235,000 (~24%) claimed the ability to converse in an Aboriginal language, 203,300 (~21%) had an Aboriginal mother tongue[1], and 179,725 (~18%) spoke an Aboriginal language at home (Norris, 2007, p.198). The boundaries between languages can be fuzzy and fluid. What one linguist regards as two dialects of a single language may be regarded by another linguist as two distinct languages; what linguists regard as a single language may be given two or more names corresponding to political divisions (Dalby, 2003, p.31). It is difficult to identify precisely, therefore, the number of Aboriginal languages that are spoken in Canada. According to Norris (2003), for example, there are 11 Aboriginal language families composed of 50 individual languages. The Task Force on Aboriginal Languages confirms that there are 11 language families, but asserts that

[1] The Census of Canada defines "mother tongue" as the language learned first in childhood that the respondent still understands.

there are approximately 61 individual languages (2005, p.33).

The Census of Canada identifies 35 Aboriginal languages classified into 11 language families. Norris (2006, p.207) notes, however, that approximately 76% of those with an Aboriginal mother tongue use one of the five largest individual languages: Cree (39%), Inuktitut (15%), Ojibway (12%), Montagnais-Naskapi (5%) and Dene (5%) (Norris, 2006, p.207). Most Aboriginal languages have fewer than 10,000 speakers and many have only a few hundred. Figure 1.1 shows how individuals reporting an Aboriginal mother tongue on the 2001 Census break down into individual Aboriginal languages.

Figure 1.1: Mother Tongue (Single Response) in Various Aboriginal Languages, 2001



Source: 2001 Census of Canada, Statistics Canada, Cat. No. 97F0011XCB2001040 [data]

> Canada's Aboriginal population can be classified into four major groups: status Indians, who are registered under the Indian Act of Canada; non-status Indians, who have Aboriginal ancestry but lost or never had status under the Indian Act; Métis, who are of mixed Aboriginal and non-Aboriginal ancestry; and Inuit, who are indigenous to Canada's Arctic and sub-Arctic regions. (Norris, 1996, p.169)

Only about 5% of the approximately 292,300 Métis in Canada reported the ability to speak an Aboriginal language in 2001[1] (Statistics Canada 2003a). Aboriginal language use is most common among the Inuit. About 71% of Canada's approximately 31,890 Inuit reported the ability to speak an Aboriginal language (mainly Inuktitut) on the 2001 Census (ibid). About 30% (184,135) of the North American Indian (or First Nation) population (608,850) were able to speak an Aboriginal language (ibid). Aboriginal language use is much more common among Registered than non-Registered Indians. In the 1996 Census, 35.7% and 5.7% of Registered Indians and non-Registered Indians, respectively, reported an Aboriginal mother tongue (Norris & Jantzen, 2002, p.40).

Aboriginal language use is declining – and quickly. The 24% of the Aboriginal population who claimed the ability to speak an Aboriginal language in 2001

> represents a sharp drop from 29% in 1996, and appears to confirm most research which suggests that there has been substantial erosion in the use of Aboriginal languages in recent decades. Another definite indicator of the erosion is

[1]These population and language use counts represent "single response" populations. Those who claim to be both Metis and Inuit, for example, are excluded.

> the declining percentage of the Aboriginal population whose mother tongue is Aboriginal. In 2001, just 21% of Aboriginals in Canada had an Aboriginal mother tongue, down from 26% in 1996. (Norris, 2007, p.19)

Norris notes that the use of Aboriginal languages in the home has been declining since 1981 and that the mean age of speakers has increased. The first fact is a cause and the second a result of a reduction in the number of Aboriginal children who are learning ancestral languages: "The 2001 Census indicated that only 15% of Aboriginal children under the age of 5 had learned an indigenous mother tongue" (Norris, 2006, p.199).

As Aboriginal languages vary in terms of numbers of speakers, they also vary in terms of "viability," or the likelihood of enduring into the foreseeable future. Numerous typologies of language viability exist.

> Perhaps the best known scheme is the eight-stage Graded Intergenerational Disruption Scale (GIDS) proposed by Fishman (1991). Describing the demise of languages in Canada, Kincade (1991) presents five levels running from "viable" to "extinct." Another five-level classification is proposed by Wurm (1998, p.192), but the terms do not quite coincide. And, in discussing Australia's Indigenous languages, McConvell & Thieberger (2001, pp.55–56) set up a language endangerment index. This remains an evolving process in which new schemes continue to emerge and older schemes are refined. (Walsh, 2005, p.298)

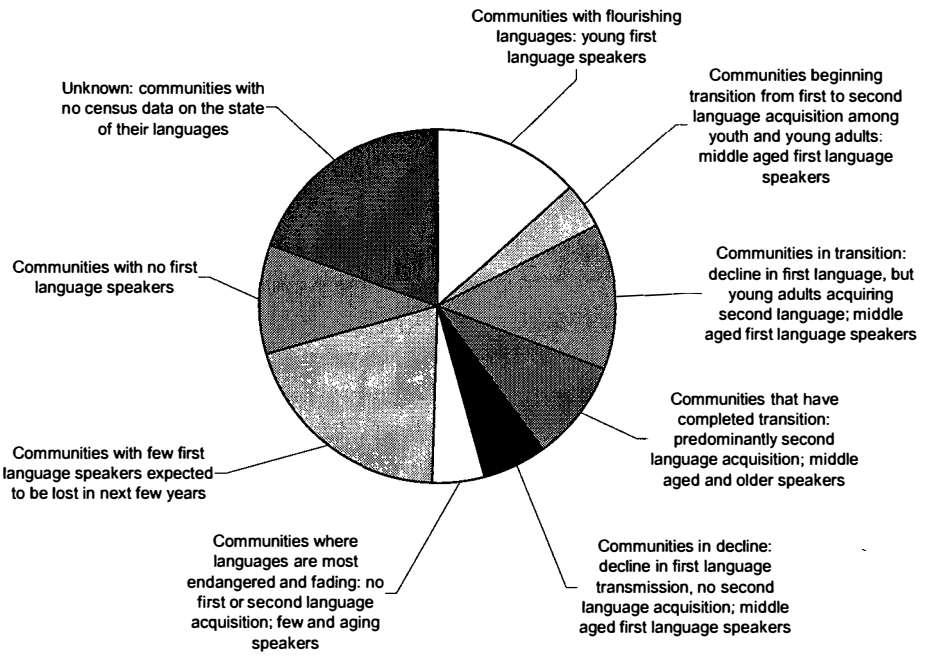
In an analysis of 1996 Census data, Norris (1998) used Kinkade's typology to classify Canada's Aboriginal languages. This typology classifies Aboriginal languages into five groups: already extinct, near

extinction, endangered, small[1] but viable and viable and large. Norris deemed viable only the three largest Aboriginal languages: Cree, Ojibway and Inuktitut. Fifteen were classified as viable but small, while 13 were classified as endangered (the remaining four languages or language groupings were classified as "uncertain").

The viability of individual Aboriginal languages varies from community to community. That is, among communities with the same ancestral language, the prevalence of Aboriginal language use varies widely. Norris (2006), for example, examined the vitality of Aboriginal languages across Canadian communities. She found that even Cree, Ojibway and Inuktitut, the most common Aboriginal languages, are near extinction in many communities. Figure 1.2 summarizes Norris' findings.

[1] I.e. spoken by a small number of people.

Figure 1.2: Viability of Aboriginal Languages in Canadian Communities, 2001 (Adapted from Norris, 2006)



In recent years, the decline of Aboriginal languages has been recognized. Moreover, demands that this decline be halted or reversed have proliferated. The Assembly of First Nations and the Royal Commission on Aboriginal people (RCAP) are two of the more prominent bodies that have insisted on the need to preserve Aboriginal languages[1]. The Government of Canada responded to these demands by officially recognizing the importance of Aboriginal languages and its culpability in their decline (see, for example, Prime Minister Harper's 2008 *Statement of*

[1] The Royal Commission on Aboriginal Peoples (RCAP) was established in 1991 and published its final report (available at http://www.ainc-inac.gc.ca/ap/rrc-eng.asp) in 1996. The Assembly of First Nations (AFN) is a major national First Nations advocacy organization.

Apology to Former Residents of Indian Residential Schools [Office of the Prime Minister, 2008]), and by pledging to aid in the reconstitution of Aboriginal languages. The Aboriginal Languages Initiative (ALI) was founded in 1998. Part of the Department of Canadian Heritage, the ALI has an annual budget of five million dollars and a mandate to "support community-based Aboriginal languages projects with a focus on enhancing and reinforcing early language learning" (Canadian Heritage, 2008, para. 5). In 2002, the Task Force on Aboriginal Languages and Cultures was formed to advise the federal government, which pledged $160 million over ten years to help preserve and revitalize Aboriginal languages[1].

No comprehensive list of the Aboriginal language programs in Canada exists. Nonetheless, it is clear that many Aboriginal groups and communities are putting a great deal of effort into maintaining or revitalizing their languages. Inuktitut has been declared an official language of Nunavut. As well, Nunavut is developing a strategy to produce bilingualism (in English and Inuktitut) in its schools (Government of Nunavut, n.d., online). The Six Nations reserve in southern Ontario offers immersion programs in the Mohawk and Cayuga languages[2]. Northern Manitoba's Opaskwayak Cree Nation has offered Cree

[1] These funds were cut in 2007, however, by Stephen Harper's Conservative government (Draaisma, 2008).
[2] See http://www.icmi.ca/immersion/immersion.html.

immersion programs for kindergarten students[1]. The Sagamok Anishnawbek community in northern Ontario offers Ojibway immersion to kindergarteners and Ojibway as a second language to older students[2]. In 1995, the Cree School Board in the Eastern James Bay region made Cree the language of instruction from kindergarten to grade three (Junker & Blacksmith, 2006, p.279). Perley (2006) describes the efforts of the Tobique Nation to reinvigorate Maliseet. Atlantic Canada's First Nation Help Desk, the Pirurvik Centre and the Cree Language Resource Project (CLRP), have produced elaborate online language programs for Mi'kmaq[3], Inuktitut[4], and Cree[5], respectively. The Métis Nation British Columbia and the BC United Métis Youth Circle collaboratively produced a similar online program for Michif[6].

1.3 Why are Aboriginal Languages Declining in Canada?

Languages decline for many reasons. Population loss is perhaps the most obvious. That is, when members of a language community die – gradually or otherwise – their language perishes as well. Newfoundland's Beothuk language, for example, is extinct. It died with the last of its tribespeople by 1829 (Waldram et al., 1995, p.52). Massive declines in Aboriginal populations occurred in the years following the arrival of

[1] See http://www.cbc.ca/canada/manitoba/story/2006/11/13/cree-immersion.html
[2] See http://communities.mysudbury.ca/Sites/Beedaban/default.aspx
[3] http://www.firstnationhelp.com/ali
[4] http://www.tusaalanga.ca/
[5] http://www.creedictionary.com
[6] http://www.learnmichif.com

Europeans in North America. Waldram et al. (1995), stress that estimates of Aboriginal population declines vary widely and should be interpreted with caution. Nonetheless,

> scholars now assume with a fair amount of confidence that the mortality rate of aboriginal people between first contacts and the late twentieth century was as high as 90 or 95 percent. (Miller, 1999, online)

Kinkade (1991) suggests that depopulation actually accounts for the bulk of Aboriginal language loss in Canada.

Though depopulation is perhaps the most direct means by which contact with dominant groups can erode minority languages, other avenues exist. In Canada, rather ironically, the decline in Aboriginal language use may be exaggerated by *increases* in the Aboriginal population. Bill C-31, passed in 1985, allowed for the reinstatement of individuals who had lost their status owing to provisions of the Indian Act. These individuals tended to be more urban and assimilated and, hence, less likely to speak an Aboriginal language. Their "reidentification" as Aboriginal would have reduced the rate of Aboriginal language use in the Aboriginal population. Guimond (2003) discusses the impact of this sort of "ethnic mobility."

Fishman (1991, p.58) emphasizes the importance of dispersal from ancestral homelands, citing it as a primary cause of ancestral language loss. When displaced from their homelands, people often find themselves in territories inhabited by several different minority linguistic groups. These

peoples will often adopt the dominant language as a common mode of communication, abandoning their own tongues. Patrick (2003) and Kinkade (1991) describe such occurrences among Canadian Aboriginal groups. The *Report of the Royal Commission on Aboriginal Peoples* describes several means by which indigenous North Americans were displaced from their residences and traditional territories:

> some nations were drawn into French/British, British/American and other conflicts of the 1600s and 1700s, and lost their traditional homelands as a direct or indirect result . . . They also saw their homelands restricted and often changed as a result of land purchase agreements, the treaty-making process, and the establishment of reserves. In more recent times, the displacement of Aboriginal people has often taken the form of deliberate initiatives by governments to move particular Aboriginal communities for administrative or development purposes. (RCAP, 1996b, online)

RCAP provides various examples of the latter type of relocation, including "the dramatic relocation of Inuit from Inukjuak, Quebec, and Pond Inlet on Baffin Island to the High Arctic in the 1950s" (1996b, online). Currently, Aboriginal mobility may have a similarly erosive effect on Aboriginal languages. Aboriginal people have high migration rates and reserves experience a lot of what Clatworthy and Norris (2007) term "churn": high levels of both in- and out-migration. Even if Aboriginal language users eventually return to their home communities, their facility with their Aboriginal language may decline during their residency off-reserve.

Canada's residential school system represents a very specific type of relocation that is frequently faulted for the decline of Aboriginal languages. About 130 of these schools existed between the late 19th century and the late 1970s. An estimated 150,000 Aboriginal children attended these schools, approximately 80,000 of whom are still alive (Indian and Northern Affairs, 2005, para. 1). Attendees of these schools were often forcibly removed from their communities, and were separated from them for months or even years at a time. While at school, Aboriginal students were forbidden to use their ancestral tongues, as the "entire residential school project was balanced on the proposition that the gate to assimilation was unlocked only by the progressive destruction of Aboriginal languages" (RCAP, 1996a, online). Noncompliance resulted in various penalties. Opinions vary with respect to the general level of severity of these penalties. Miller (1996) seems to regard extreme physical and psychological punishments as anomalies perpetrated by mentally unstable individuals. Kevin Arnett and the Truth Commission into Genocide in Canada (n.d.), however, insist that extreme forms of abuse, such as electric shocks and battery, were widespread and often fatal.

The "English-only" policies of residential schools would have eroded Aboriginal languages through disuse, but it has been argued that the psychological consequences of residential schools may have been an equally if not more significant factor in the shift from Aboriginal language

use. Specifically, the enforced exclusive use of English persuaded many Aboriginals that their languages and cultures were inferior and best abandoned. Numerous authors have commented on the psychologically damaging effects of Aboriginal residential schools (Kinkade, 1991; Crawford, 1998; Milloy, 1998; Fillmore, 1996; Brown et al. 2005; Task Force on Aboriginal Languages and Cultures, 2005), and the literature is rife with declarations by Aboriginal people that the fault for Aboriginal language loss lies with the residential school system (see, for example, RCAP, 1996a; Milloy, 1999; Annett, n.d.). Significantly, the Task Force on Aboriginal Languages and Cultures (2005) places particular emphasis on the role of residential schools in the decline of Canada's Aboriginal languages. It is worth noting that, in addition to the punishments delivered to students for speaking Aboriginal languages, conditions in residential schools were largely deplorable. The 1996 *Report of the Royal Commission on Aboriginal Peoples* includes claims of severely inadequate food, shelter, educational materials and qualified teachers, of rampant untreated disease, of students forced to labour on institutional farms to supplement inadequate funding, and of school administrators resorting to bribery and kidnapping to ensure maximal enrolment and concomitant maximal funding. It is important to keep these execrable conditions in mind when considering the possible impact of the residential school system on Aboriginal languages. That is, it was not simply the case of

Aboriginal children being encouraged a little too forcefully to speak English. Many of these children were treated as worthless, while systematic attempts at assimilation declared their ethnicity as the source of their worthlessness. Comments such as the following seem far more understandable in light of this reality: "My mother wouldn't teach me our language because the residential schools taught her it was evil. She was afraid that she would go back to residential school if she learned her language" (Brown et al., 2005, p.10).

Notably, residential schools may also have diminished Aboriginal languages by reducing Aboriginal populations. An earlier quote suggested that the deplorable conditions in the schools resulted in the death of many Aboriginal children. It is impossible to determine the extent to which those conditions were responsible for the fatal illnesses contracted by Aboriginal children[1]. Nonetheless, some statistics bear consideration. In the early 20th century, the Department of Indian Affairs' chief medical officer outlined

> the tragic impact of tuberculosis on the children . . . The percentage was indeed shocking. Bryce's death toll for the 1,537 children in his survey of 15 schools was 24 per cent, and this figure might have risen to 42 per cent if the children had been tracked for three years after they returned to their reserves . . . While a few officials and churchmen rejected Bryce's findings and attacked him as a "medical faddist," most had to agree with him, and no less an authority than

[1] For example, when Bryce, in 1909, examined 243 students in eight Alberta schools, he found that "in no instance was a child awaiting admission to school found free from tuberculosis; hence it was plain that infection was got in the home primarily" (Bryce, 1922, online).

> Scott[1] asserted that, system-wide, "fifty per cent of the children who passed through these schools did not live to benefit from the education which they had received therein." (RCAP, 1991a, online)

It is worth noting that the Canadian government, in cooperation with various churches, also operated day schools for Aboriginal children. In fact, a majority of Aboriginal students attended these types of schools (Titley, 1986, p.91). While some of the gross abuses that occurred in residential institutions were probably less common in day schools, the latter were no less devoted to "civilizing" Aboriginal children and eradicating Aboriginal culture. Day schools, therefore, could have had similar effects on Aboriginal language use as residential schools.

Minority languages also tend to decline owing to what Wurm calls "changes in the ecology of languages" (1991, p.2). Authors such as Coulmas (1992) and Edwards (1994) assert that minority languages tend to be abandoned where there is "an absence of an economic incentive to learn the traditional tongue combined with the economic necessity of learning the dominant language" (Coulmas, 1992, p.181). That material affluence among Canadian Aboriginal people depends on their being fluent in English or French seems likely. The majority of Aboriginal language groups are very small. In addition, more than 50% of Canada's Indian reserves, where Aboriginal language use is most common

[1] Scott was deputy superintendent of the Department of Indian Affairs from 1913 to 1932.

(Statistics Canada, 2003a), have populations of less than 100, 80% have less than 500 and only a handful have more than 3,000 (Statistics Canada, 2002). Alternative economies wherein an Aboriginal language is the medium of business, therefore, are probably rare. On the other hand, Aboriginal language use requires much effort while promising few direct benefits. Knowledge of an Aboriginal language is a prerequisite for few jobs, while maintaining an Aboriginal language requires time, energy and money. This last point is particularly salient given the changes to Aboriginal languages that must be made lest they be rendered irrelevant to "modern living." Authors such as Coulmas (1992, p.167) note that minority languages tend to decline if they fail to adapt to mainstream or emerging ideas, technologies, etc. Coulmas (1992), Drapeau (1995) and others, however, also note that modernizing traditional languages can be extremely difficult. Efforts to modernize Hawaiian are illustrative. A committee

> was formed to facilitate the modernization of the Hawaiian lexicon . . . the committee has a set of official guidelines for the coining of new words . . . The following is a translation of those guidelines . . . :
> 1. (Use) a word that is printed in the dictionary.
> 2. A word that is heard used by native speakers but is not contained in the dictionary.
> 3. Explicate the meaning by using Hawaiian words (circumlocution).
> 4. Broaden the meaning of a word that is in the dictionary.
> 5. A foreign word that is transliterated to reflect Hawaiian spelling.
> 6. A word that is formed by combining with morphemes of other words.

> 7. A word that is formed by the shortening of one or more Hawaiian words. (Wong, 1999, p.107)

Modernizing a language, unless speakers simply want to borrow foreign terms wholesale, is a difficult and time-consuming task, and one to which volunteers may not be equal.

A variety of contextual factors may affect changes in language ecologies. Isolation is one of the most widely recognized. That is, minority groups are more likely to lose their ancestral languages if they come into extended contact with dominant language groups (Drapeau, 1995; Fishman, 1989; Crystal, 2000). In fact, Drapeau claims that a minority language is unlikely to survive unless a significant portion of the language community remains monolingual and isolated from dominant cultures (1995, p.31). Similarly, Crystal (2000, pp.78-79) asserts that, once a language community shifts from monolingualism in a minority tongue to bilingualism, death of the minority language often follows within a few generations. Significantly, according to the 2001 Census, only about 15,000 monolingual users of Aboriginal languages remain in Canada (Statistics Canada, 2003a, online).

Increasingly, even geographically isolated language communities are finding themselves threatened. "Various scholars have estimated that up to 90% of the world's languages will disappear during the 21st century" (Bradley and Bradley, 2002, p.xi). Dalby (2003) attributes this global trend, in part, to the ubiquity of radio and television, broadcast for the most part

in majority languages. Skutnabb-Kangas, similarly, berates the "linguicidal" effects of the "consciousness industry" (formal education and the mass media) (2000, p.6). More recently, the Internet has come under particular scrutiny as a stimulus to language shift (Nolen, 2000). Respecting Canada's Aboriginal languages particularly, Drapeau (1995) affirms that Aboriginal "linguistic enclaves" are being eroded by the increasing saturation of Aboriginal communities with modern institutions and media.

Drapeau identifies circumstances under which contact with dominant languages has particularly deleterious effects on minority language use. Sustained bilingualism, she suggests, is unlikely where it is asymmetrical – where only individuals in the minority group learn a second language while members of the dominant group remain monolingual. Drapeau also suggests that bilingualism will probably fail where it is generalized, or had by all. Children are far less likely to learn their ancestral language if there are no monolingual community members with whom they must communicate. These arguments bode ill for Aboriginal languages in Canada. First, bilingualism among First Nations peoples is very generalized. Monolingualism among the most recent generations is very rare (Drapeau, 1995). This problem is compounded by the fact that, unlike most language communities, native settlements do not have a constant influx of monolingual migrants to necessitate the learning of the

minority tongue (Ricento, 1998). Aboriginal bilingualism is also extremely asymmetrical. In 2001, only 1.5% of those who claimed knowledge of an Aboriginal language did not identify themselves as Aboriginal people (Statistics Canada, 2003a, online).

Essentially, then, both overt coercion and changes in the ecologies of language in Canada seem likely to have furthered the decline of Aboriginal languages. It is worth noting that there is substantial debate between those who cite coercion as the major impetus behind minority language loss versus those who cite choice. Crawford (1998), for example, criticizes the use of the American Aboriginal school system (which was similar to Canada's) as a "scapegoat." Edwards is a particularly vocal proponent of the sort of "rational choice" approach to language shift that downplays the significance of coercion (May, 2005, p.328). Others, however, insist that minority languages loss is not a case of "language suicide," but a case of "language murder" (see Giles and Coupland, 1991; Edwards, 1994). Nettle and Romaine (2000), for example, insist that applying the "suicide" label is tantamount to blaming the victim.

The practical ramifications of the outcome of this debate are considerable: if dominant cultures are not found responsible for minority language loss, their members may not feel obliged to promote or finance minority language programs. According to some, however, the debate is

founded on false assumptions. Crawford argues that the murder/suicide dichotomy is "simplistic in the extreme" (1998, p.157). The boundary between coercion and choice is ambiguous. Though people tend to define the former in terms of immediate "punishments" such as physical or verbal abuse, the threat of undesirable longer-term consequences (such as poverty) can also be regarded as coercive. The nebulousness of coercion is especially significant given the power of dominant groups and governing bodies to control "language ecologies" (a point that, as I will discuss shortly, is not lost on Canada's Aboriginal language advocates). Consider Canada's Official Languages Act, which requires a large portion of federal employees to be fluent in both English and French (Office of the Commissioner of Official Languages, 1995, online). The Act provides relatively high paying and influential jobs to French speakers while denying such jobs to non-speakers. In addition, the policy has created opportunities for French instructors and producers of French curricula, while simultaneously (arguably) raising the "status" of the French language.

1.4 Why Should Aboriginal Languages be Saved?

What follows is a discussion of the various rationales favouring Aboriginal language maintenance, and their counterpoints.

1.4.1 Aboriginal language use is a right

The United Nations Declaration on the Rights of Indigenous Peoples was adopted by the United Nations General Assembly on September 13, 2007. Article 13 of the declaration reads as follows:

> 1. Indigenous peoples have the right to revitalize, use, develop and transmit to future generations their histories, languages, oral traditions, philosophies, writing systems and literatures, and to designate and retain their own names for communities, places and persons.
> 2. States shall take effective measures to ensure that this right is protected and also to ensure that indigenous peoples can understand and be understood in political, legal and administrative proceedings, where necessary through the provision of interpretation or by other appropriate means. (United Nations, 2008, p.7)

Canada (along with the United States, Australia and New Zealand) voted against the declaration, which is not legally binding in any case. Nonetheless, Article 13 reflects a very popular argument in favour of "saving" Aboriginal languages: for indigenous peoples, using an ancestral language is a "right."

How the abstract notion of language rights translates into public policy is uncertain. As Freeland and Patrick note, language rights discourses are "fraught with complications and contradictions, related particularly to the terms on which language rights are granted and the way that these can interact with sociolinguistic realities 'on the ground'" (2004, p.1). One gets an inkling of the potential magnitude of these complications when one considers Article 13, above. As indicated earlier, there are at

least 50 Aboriginal languages, many of which are predominantly if not exclusively oral, and many of which are spoken by only a few elderly individuals. Provision two effectively suggests that the Canadian government provide its services in all of these languages.

Provision one has perhaps even more far-reaching implications. It seems benign enough, requiring no action on the part of the Canadian government or non-Aboriginal population. A 2007 article in the New Brunswick Telegraph Journal, however, indicates otherwise. It is quoted below.

> By providing education only in English or French … [Canada] engages in a practice known as "subtractive language learning," whereby indigenous languages are effectively stigmatized and replaced with one or another dominant language. The mere fact that Canada mandates education in English or French, without the alternative of an education in the medium of First Nations languages, constitutes a violation of the linguistic human rights of our children. (Nicholas, 2007, p.A5)

The notion that respect for Aboriginal language rights requires not just a lack of active oppression, but active promotion by the Canadian government, is also held by the Task Force on Aboriginal Languages and Cultures. The Task Force (2005, p.75) asserts that in failing to promote and enable Aboriginal language use, Canada is "passively" promoting the assimilation of Aboriginal Canadians. Of particular significance is the Task Force's insistence that Aboriginal languages (and, by extension, Aboriginal people) will continue to be regarded as "second class" until they

are treated, in an official capacity, as equal to English and French. The amount of money necessary to fulfill Canada's promise of bilingualism outstrips, many times over, the $160 million pledged to Aboriginal language programs[1]. This fact that does not escape the Task Force, which highlights the profound inadequacy of that sum.

Clearly, then, in the current Canadian context, recognizing Aboriginal language rights has huge political and financial implications. It is perhaps little wonder that Canada voted against the United Nations declaration, citing concerns with its "wording" (CBC News, 2007, online).

1.4.2 Aboriginal language use is a key component of well-being

Aboriginal people have lower levels of well-being than do other Canadians. They have lower incomes and employment levels, greater dependency on government transfers, lower education levels and higher dropout rates, more health problems, and higher suicide rates (see White et al., 2007; Hallett et al., 2007; Burnaby & Philpott, 2007; Ciceri & Scott, 2006; Maxim & White, 2006; Kapsalis, 2006; Tobin Associates, 2004; White, et al., 2003).

Most recent incarnations of the Canadian federal government have committed to reducing this disparity and some suggest that promoting Aboriginal language use may further that agenda. Marie Battiste (2002)

[1] It is difficult to ascertain exactly how much government money is spent annually to support Canada's policy of official bilingualism. For example, however, Canada's *Action Plan for Official Languages*, launched in 2003, had an initial budget of $751 million over five years (Office of the Commissioner of Official Languages, 2008).

asserts that respect for and integration of Aboriginal languages and cultures into education enhances educational outcomes for Aboriginal people. White, Maxim, and Whitehead (2000) suggest that native languages may be an important element of the social capital that forms the bases of more cohesive, and thus more prosperous, communities. This perspective, which I call the "cohesion perspective" (O'Sullivan, 2003) is efficiently summarized in Crystal: "Local languages are seen to be valuable because they promote community cohesion and vitality, foster pride in culture, and give a community (and thus a workforce) self-confidence" (2000, p.31). Equivalently, Crawford asserts that "language loss can destroy a sense of self-worth, limiting human potential and complicating efforts to solve other problems such as poverty, family breakdown, school failure, and substance abuse" (1998, p.163). Cummins argues that the deleterious effects of language loss begin when children are educated using a dominant language that is different from their mother tongue:

> *To reject a child's language in the school is to reject the child*. When the message, implicit or explicit, communicated to children in the school is "Leave your language and culture at the schoolhouse door," children also leave a central part of who they are - their identities - at the schoolhouse door. When they feel this rejection, they are much less likely to participate actively and confidently in classroom instruction. (2001, p.20, italics original)

Tawney (1998) suggests that language loss reduces self-respect among community members, which in turn has a negative impact on the

socioeconomic status of the group. Lee (1992), similarly, suggests that loss of identity may disorganize a community and reduce members' motivation to strive for economic success. Likewise, Portes and Rumbaut (2001) found that minority language loss is associated with "acculturative dissonance." They argue that the ability of immigrant parents to guide their children on an upwardly mobile life course depends on their ability to "keep up" with their children's acculturation. When children do not speak their parent's language and become otherwise disconnected from their parents' culture, communication gaps emerge, parental authority erodes, and children become more vulnerable to downward assimilation (or assimilation into America's underclass).

There is little systematic empirical evidence for a connection between well-being and Aboriginal language use (Hallett et al., 2007). My earlier research (O'Sullivan, 2003) uncovered a negative relationship between Aboriginal language use and well-being at the community level. That research was far from conclusive, however. A recent study by Hallet et al., moreover, uncovered a very strong connection between Aboriginal language use and suicide in British Columbia:

> those bands in which a majority of members reported a conversational knowledge of an Aboriginal language also experienced low to absent youth suicide rates. By contrast, those bands in which less than half of the members reported conversational knowledge, suicide rates were six times greater. (2007, p.398)

Anecdotal evidence of the link between Aboriginal language use and measurable aspects of well-being is abundant. During consultations with the Task Force on Aboriginal Languages and Cultures,

> a number of Elders pointed to the moral teachings inherent in language and culture. They said that, without those moral teachings, many First Nation, Inuit and Métis people become involved in substance abuse and conduct themselves in ways that are harmful to their communities, families and themselves. (2005, p.62)

Conversely, a teacher of Inuvialuktun[1] in Inuvik, NWT, observed that learning Inuvialuktun seemed to ameliorate students' behavioural problems:

> "Once they do that, the behaviour and stuff like that just goes," she says. "Sometimes, when they come in here, they're lost . . . I've seen many, many children leave this classroom different. They're not so sad any more. I try to give them a little bit of their world. Their true world." (Weber, 2008, online)

While the idea that Aboriginal language use should enhance ethnic identity and, in turn, well-being is a simple and intuitive one, the mechanism via which Aboriginal language use is supposed to exert its effects is far more complex. Edwards' distinction between the communicative and symbolic functions of language, elaborated below, are informative.

[1] Inuvialuktun is a member of the Eskimo-Aleut family of languages.

1.4.2.1 Language-as-symbol

When considering the importance of language as a symbol of ethnic identity, two primary questions require resolution. First, is language a particularly important symbol, or is it just one of many that may be employed to define one's ethnic identity? Second, for language to be effective as a symbol, how fluent must group members be?

Some regard language as a particularly salient symbol of ethnic identity. According to Fishman, for example, language is "the supreme symbol system that quintessentially symbolizes its users and distinguishes between them and others"(1989, p.217). Others, however, contend that alternate symbols of ethnic identity may be used in lieu of language without any discernible loss of identity or group unity. According to May,

> a particular challenge for advocates of MLR [Minority Language Retention] . . . is the widespread consensus in social and political theory, and increasingly in sociolinguistics and critical applied linguistics, that language is at most only a contingent factor of one's identity. In other words, language does not define us, and may not be an important feature, or indeed even a necessary one, in the construction of our identities. (2005, pp.327-328).

The idea that symbols of ethnic identity are "interchangeable" finds support in contemporary theory. In *Ethnic Groups and Boundaries* (1969), for example, Barth denies the inherent importance of individual cultural elements to ethnic identity. He contends that ethnic identity relies on the definition of group boundaries rather than the actual composition or characteristics of the groups themselves. The notion that the contents of

ethnic identities are arbitrary is generally extended to include the notion that those contents are changeable. Thieberger, for example, asserts that

> identity is flexible and adapts to the needs of the moment. Speaking a particular language may be part of one's identity, but you do not lose your identity when that language is no longer spoken. You may refocus on other identity-forming issues. (2002, p.311)

According to May,

> the consequence of such a view is obvious: if language use is merely a surface feature of ethnic identity, adopting another language would only affect the language use aspect of our ethnic identity, not the identity itself. Thus, the loss of a particular language is not the 'end of the world' for a particular ethnic identity. (2005, p.328)

Examples of situations in which ethnic identity endured despite language loss are fairly abundant. Fishman regards "Jews who do not speak Hebrew . . . , Irishmen who do not speak Irish . . . , and Puerto Ricans who do not speak Spanish" as "powerful examples of the detachability of a traditionally and historically associated language with respect to the continuity of individual and collective ethnocultural identity" (1991, p.16). Most obviously, two thirds of those who identified themselves as Aboriginal people in the 2001 Census could not speak an Aboriginal language. One third of respondents to the 1991 Aboriginal Peoples Survey did not attach importance to learning or maintaining their ancestral tongue. It could be argued, moreover, that non-speaking respondents to whom Aboriginal language use *is* important actually undermine the notion that ancestral language use is integral to ethnic identity. After all, these people

do not speak their ancestral languages, but identify sufficiently strongly as Aboriginal people to want to speak them.

Even if the characteristics of ethnic groups have no intrinsic importance vis a vis ethnic identity, however, numerous authors decry the tendency to assume that those characteristics are therefore dispensable. May asserts that

> to say that language is not an inevitable feature of identity is thus not the same as saying it is unimportant. Yet many constructivist commentators, including many MLR [minority language retention] critics, in (rightly) assuming the former position have also (wrongly) assumed the latter. In other words, they assume that because language is merely a contingent factor of identity it cannot therefore (ever) be a significant or constitutive factor of identity. (2005, p.330)

Drapeau (1995, p.16) emphasizes that even if symbols of ethnic identity have no intrinsic value, they behave as though they do since group members must imbue them with significance. Group members, in other words, must "believe" that particular symbols have value. While the notion that that "in the process of self-definition, the group myths and cultural values, including language . . . may be substantially revised, altered, and reinterpreted so as to fit with changing conditions" (Eastman,1981, p.46) may be true, therefore, it does not follow that groups can alter their traditions deliberately or consciously. Consequently, the arbitrary nature of culture, while theoretically interesting, seems less practically important than many claim it to be. As Canagarajah observes, the fluidity of ethnic identity "doesn't change the fact that ethnicity and

mother tongue have always been potent forces in community relations" (2005, p. 439). Woodbury, accordingly, cautions against allowing such misinterpretations to become a "salve to the colonial conscience" (in Thieberger, 2002, p.312).

The arguments above undermine the notion that minority groups can simply replace their languages with symbols of ethnic identity that are perhaps less overt or cumbersome. Others, however, contend that it is precisely those characteristics that make languages such important symbols. As Fishman notes, claims that one cannot have an ethnic identity if one does not speak one's ancestral language are uniformly "countered by a 'yes, you can' counterclaim" (1999, p.118). It seems perfectly clear that, at least in the case of Canada's Aboriginal people, Aboriginal identity is not dependent on speaking an Aboriginal language. After all, most people who identify as Aboriginal do not speak an Aboriginal language. The question, then, is less about how Aboriginal language use impacts the presence or absence of Aboriginal identity, than about how Aboriginal language use affects the quality of Aboriginal identity. Giles and Coupland indicate that "the knowledge of our category memberships, *together with the values (positive or negative) attached to them*, is defined as our social identity" (1991, p.105, italics added). This remark suggests that "not every sense of identity is created equal." Consider Cummins's assertion, quoted above, that when children's mother

tongues are absent from their schoolrooms "children also leave a central part of who they are – their identities – at the schoolhouse door." I think it is more accurate to assert that they leave *pride* in those identities at the schoolhouse door. In light of this consideration, the notion that the flavour of one's ethnic identity is independent of the prominence of the cultural symbols that found it seems in error. In describing the use of minority languages in the educational system, Fishman captures the importance of the distinction between private and public symbols:

> The use of the disadvantaged language in the school is a symbolic statement in and of itself. It says we're here, we exist, we're faithful to ourselves. It is a statement of public legitimacy on behalf of populations that possess few other modes of symbolic entree into the public realm.(1989, p.471)

Again, Fishman is arguing that the visibility and arguable inconvenience of minority language use is what gives it its power as a source of a positive, pride-bolstering ethnic identity. The argument recalls to my mind a story: a First Nations man was out one night in Winnipeg with a group of "white" friends. The man wore a very elaborate outfit, emblazoned with feathers, tassels, beading, and all manner of other "traditional" Aboriginal ornamentation. When one of his friends commented on the flamboyance of the outfit, the First Nations man replied, "Hey, when you're an Indian hanging out with a bunch of cowboys, you've got to own it."

The arguments above assert that Aboriginal language maintenance is importance to Aboriginal identity so long as Aboriginal people believe that it is. Consequently, evidence that Aboriginal people do value their ancestral languages should be presented. It certainly does appear that language is important to a majority of Canada's Aboriginal people. Most of Canada's major Aboriginal organizations are quite emphatic on the point. The Assembly of First Nations (AFN) declares that

> language is our unique relationship to the Creator, our attitudes, beliefs, values and the fundamental notion of what is truth. Our languages are the cornerstone of who we are as a People. Without our languages, our cultures cannot survive. (Assembly of First Nations, 1990, online)

The Inuit Tapiriit Kanatami (ITK), in *Building Inuit Nunaat: The Inuit Action Plan* (2007), identified language preservation and promotion as a key priority. The Métis National Council (2008) singles out the Michif language as a defining feature of what is probably the most nebulous of Canada's Aboriginal groups.

The positions of these representative organizations do seem to reflect the sentiments of a sizeable proportion of Canada's Aboriginal people; there exists abundant anecdotal evidence of a perceived link between language and ethnic identity among the general Aboriginal population. The Task Force on Aboriginal Languages and Cultures observed that

> all across Canada, First Nation, Inuit and Métis participants spoke of the vital connection they experienced between

> themselves, the land and the Creator and of the need they felt to give voice to, and to honour, that connection in their own way, using their own languages. (2005, p.60)

Comments from other Aboriginal people are similar: "My language is my soul . . . when I speak my language, I feel at peace" (Graham, 2005, p.330); "Our Dogrib language is very important to us because it identifies us as a people in a unique culture within the land we occupy. Our language holds our culture, our perspective, our history, and our inheritance" (Task Force on Aboriginal Language and Cultures, 2005, p.21).

It is also worth noting that some quantitative evidence exists of the link between language and identity. Kalbach and Kalbach (in Pigott and Kalbach, 2005) found that ethnic connectedness declines as the use of the ethnic language decreases. "In addition, researchers such as Laroche, Kim, and Hui (1998) argue that there is a strong link between linguistic acculturation and declining ethnic identification" (Pigott and Kalbach, 2005, p.4). Portes and Rumbaut's (2001) work on immigrant acculturation has similar implications. A quick analysis of 2001 Census data reveals that individuals with Aboriginal ancestry are more likely to self-identify as Aboriginal if they speak an Aboriginal language. Table 1.1 is a cross-tabulation of ancestry and Aboriginal Identity, broken down by capacity to speak an Aboriginal language and mixed versus homogeneous ancestry.

Table 1.1: Aboriginal Identity Contingent on the Ability to Speak an Aboriginal Language and Ancestry, 2001[1]

	Speaks an Aboriginal Language	Aboriginal Identity		
		No	Yes	Total
Mixed Aboriginal and Non-Aboriginal Ancestry	No	56%	44%	100%
	Yes	4%	96%	100%
Only Aboriginal Ancestry	No	14%	86%	100%
	Yes	1%	99%	100%

Even assuming that language is an integral element of Aboriginal identity, what exactly "language" means in this context is uncertain. Specifically, what level of fluency in one's ancestral language is required for it to function as a symbol of ethnic identity? Like the question of the interchangeability of symbols, the relationship between fluency and linguistic identity is widely debated. In his research on language use in Canada and Wales, for example, Pool (1979) found a positive relationship linguistic ability and ethnic identification. Others insist that the relationship is less straightforward. A common claim is that fluency is unnecessary; a small repertoire of significant speech elements is a sufficient foundation for ethnic identity. Bradley and Bradley assert that "group identity and self esteem are of paramount importance. Language is a crucial element of this identity, even when speakers do not feel the need to attain fluency in

[1] I derived this table from the 20% sample of the 2001 Census of Canada.

the language" (2002, p.xii). Eastman claims that "language is not only an entire repertoire but also a set of speech elements which reflect culturally specific items" (1981, p.51) and that "language may also be an important factor in ethnic identity when a person does not know the language at all well and, for all practical purposes, never speaks it" (1981, p.46). Patrick's investigation of language use among indigenous Alaskans lends credence to these assertions.

> Alaska provides some examples in which Native languages have fallen into disuse, but a strong ethnic identity is maintained through the use of particular forms of English . . . in many Yup'ik and Inupiaq communities, there continues to be a vibrant Native cultural life and ways of expressions cultural beliefs, values, and practices by using distinctive varieties of English and sometimes by using certain "Native" terms and phrases. (Patrick, 2004, p.172)

Darnell's reflections on Aboriginal language programming in southern Ontario are similarly suggestive. Darnell notes that

> a new generation of well-educated fluent speakers of English privileges traditional language maintenance as an idealized expression of contemporary political aspirations. Language forms a critical pillar of reconstituted cultural authenticity and pride, although few of those who habitually employ this rhetoric are themselves fluent speakers of a traditional language. They tend to drop out of language classes and settle for symbolic use of the languages. (2004, p.98)

Thieberger, likewise, asserts that, where ancestral languages have declined, members of an ethnic group may "decide to use whatever parts of the language are still available to [them] for identity purposes" (2002, p.311). Indeed, Thieberger cautions against the narrow "structuralist" view

of language that defines language maintenance as the perpetuation of fluent speakers of a complete form of communication. If a positive sense of ethnic identity and the benefits supposed to follow are the goal, he claims, "attempts at language maintenance that insist on dealing with a structuralist model of language may fail to appreciate the rich possibilities for recreation of nonstandard forms" (2002, p.314). Similarly, Bradley and Bradley (2002) note that the mere attempt to save a minority language, by implying that it and the culture with which it is associated are worth saving, can enhance ethnic pride. For example, a project intended to save a critically endangered indigenous Australian language failed. Nonetheless, a tribesman declared that the "it was [successful] in reviving . . . that sense of worth in being Adnyamathanha" (in Crawford, 1998, p.164).

1.4.2.2 Language-as-communication

The previous discussion of "language-as-symbol" undermines the notion that endangered languages must be retained as living languages. Other symbols may be equally useful sources of ethnic pride, and, even where a language is regarded as an irreplaceable symbol, fluency may not be necessary. Some, however, insist that communication in an ancestral language plays an essential role in ethnic identity construction and maintenance. Portes and Rumbaut (2001) found "limited bilingualism" (i.e. lack of fluency in the language used by one's parents) among the children of immigrants to be associated with poorer educational outcomes. As

indicated previously, the authors argue that lack of a fluently shared language undermines parental authority, interfering with children's identity formation and rendering them more vulnerable to "dissonant acculturation."

Others emphasize the importance of minority languages to the transmission of cultural knowledge. Most obviously, cultural knowledge cannot be transmitted if members of different generations do not share a common mode of communication. The comments of one young Inuit woman are illustrative: "If we didn't speak Inuktitut how would we speak to my aunts and uncles? How would we learn to make traditional clothing or learn anything about fishing or hunting? Like there's knowledge that my grandparents have but if they can't pass it on to me, what use is it?" (in Crago et al., 1998, p.86). This issue is particularly relevant to Canada's Aboriginal people. Aboriginal language loss has occurred so rapidly that there has not been sufficient time to translate all legends, cultural knowledge, etc., into a dominant language.

Importantly, however, some deny that translation is even possible. While scholars such as Stephen Pinker (see, for example, *The Language Instinct*, 1995) eschew the notion that certain concepts can only be expressed in certain languages, others emphasize that

> at any given point in time, every language indexes its associated culture more fully than others do. The distinctive artifacts, conventions, concerns, values and beliefs of any

> culture are more fully, easily, and naturally expressed by its associated language than by others (Fishman, 1989, p.470).

Fishman's comment echoes the popular notion that languages reflect and perpetuate the "worldviews" of their respective cultures. The notion that different languages impose unique structures and systems of meaning upon reality, thus reflecting and perpetuating different "ways of seeing the world" among those who speak them (Eastman, 1981, p.49) is most closely associated with the works of Edward Sapir and Benjamin Whorf. A statement by the former summarizes what has come to be known as the Sapir-Whorf hypothesis:

> Human beings do not live in the objective world alone . . . but are very much at the mercy of the particular language which has become the medium of expression for their society . . . No two languages are ever sufficiently similar to be considered as representing the same social reality. The worlds in which different societies live are distinct worlds, not merely the same world with different labels attached . . . We see and hear and otherwise experience very largely as we do because the language habits of our community predispose certain choices of interpretation (Sapir, 1962, pp.68-69). (Schmid and De Bot, 2004, p.237)

The intricate entwinement of language elements and, by implication, the difficulty of exact translation from one language to another, has also been famously explored by linguist Ferdinand de Saussure (see, e.g., Harris and Taylor, 1997). He regarded languages as systems in which each element is connected to every other element. From this principle follows the notion that the definition of a single word can never end and, consequently, that no word can ever be translated precisely.

Evidence abounds that concepts born of Aboriginal cultures are difficult to translate into English. The notion that tribal relationships cannot be expressed in English is a common one. Elder Eli Taylor, for example, stated that

> our language embodies a value system about how we ought to live and relate to each other . . . it gives a name to relations among kin, to roles and responsibilities among family members, to ties with the broader clan group. There are no English words for these relationships because our social and family life is different from theirs. (in Graham, 2005, p.330)

Possibly because I am monolingual, it is difficult for me to appreciate this sort of claim. Not having a real grasp of the different structures languages can have, I tend to think of the issue in simplistic terms. For example, if a certain tribe has a word for one's mother's brother's second born daughter and English does not, "one's mother's brother's second born daughter" is nevertheless logically equivalent (if less elegant). In reality, however, translation often involves much more than the "mere" denotations of individual words. The examples below illustrate how difficult translation can be, and why the theoretical possibility of exact translation may, therefore, be of little practical importance.

The Task Force on Aboriginal Languages and Cultures describes how, unlike English, the structure of Anishnabe:

> tends away from isolating the speaker from other people or from the events or phenomena of the world about which he or she is speaking . . . In most contexts an Anishnabe speaker will normally refer first to the person (gin) or object

> (ihweh) that is the object of the statement and place the reference to himself or herself later in the phrase. While an English speaker would say, "I am speaking to you," an Anishnabe speaker would normally say the equivalent of "you are being spoken to by me" . . . Unlike English, which focuses on awareness of oneself and on what one has to say, Anishnabe allows a speaker to focus on awareness of others as a precondition to verbal expression. Language in this context is more than simple communication of information, it is a social event whose goal is to establish and maintain the web of identities and relationships within which the speaker finds himself or herself. (2005, p.22)

Disputes over the modernization of Hawaiian also provide insight into how intricately and subtly cultural elements may be encoded in language. In an effort to modernize Hawaiian, a committee was formed to "create" Hawaiian versions of English words. Some argued, however, that "translating" these words into Hawaiian on a 1:1 basis fundamentally undermined the Hawaiian worldview as embodied in the "original" Hawaiian language. Hawaiian, apparently, contains much ambiguity. Wong comments on this ambiguity:

> It is my impression that this is perhaps a reflection of the Hawaiian worldview in terms of the norms of language use. That is, Hawaiians traditionally found the need to disambiguate speech to be a rather low priority if it was at all important. Furthermore, Hawaiians probably took full advantage of this capability to insure that their words were not overly direct and definitive. My hypothesis is that indirectness was preferred and that lack of clarity in interpersonal interactions was a sign of solidarity between interlocutors. That is, by allowing the listener to make multiple interpretations of an utterance, the two (or more) people involved in the interaction must engage each other more actively by making interpretations and appropriate responses guided by those interpretations. (1999, p.107).

According to Wong, there is concern that "a move to reduce ambiguity would affect the ways in which speakers use the language to relate to one another" (1999, p.108) altering, in effect, indigenous Hawaiian culture.

That the notion of languages embodying worldviews is taken seriously by Aboriginal people is evident in many of the previous quotes relating to the importance of ancestral languages. Marie Battiste, Micmac, Professor and Director of the University of Saskatchewan's Aboriginal Education Research Centre, argues the case emphatically: "Aboriginal languages are the basic media for the transmission and survival of Aboriginal consciousness, cultures, literatures, histories, religions, political institutions, and values. They provide distinctive perspectives on and understandings of the world" (Battise, 2000, p.199);

> Where indigenous knowledge survives, it is transmitted through Aboriginal languages . . . The fundamental prerequisite for educating Aboriginal peoples is comprehension of the inherent structure of the language as a model for understanding both how Aboriginal consciousness and rationality function and how they are manifested and renewed in Aboriginal knowledges, heritages, and relationships. (Battiste, 2002, pp.17-18)

Even where one takes for granted that language embodies culture, controversy exists. Aboriginal languages have changed a great deal since "contact" and will, either spontaneously or as a result of interventions, continue to change. In addition, many Aboriginal languages have various dialects. Based on these considerations, some purport that "Aboriginal worldviews" have already been lost, or that they soon will be as languages

are standardized and modernized to reflect non-Aboriginal concepts and values.

Attempts to stanch the loss of indigenous languages often involve institutionalizing those languages, particularly in education and government service industries. Such institutionalization presupposes a written form of Aboriginal languages, and a written form presupposes a standard form. Decisions must be made, therefore, respecting which form of a language represents an appropriate standard. If certain forms are excluded, what of the "worldviews" of users of those forms? As Henze and Davis remark,

> who decides what language and cultural forms are to be taught to children in school? What happens to those forms of cultural expression that are not selected for transmission, and how do such choices impact children's understandings of culture and their own or other people's origins? (1999, p.15)

It is worth noting that the differences between dialects can be, or can be perceived to be, significant. Patrick, for example, describes the "tension that inevitably arises between the 'standard' language forms taught and promoted by the school and those used in everyday interactions" (2005, p.371). Burnaby and Philpott (2007) describe such tensions among the Innu of Labrador. Stebbins describes how the standardized version of Sm'algyyax is denigrated by some as inauthentic "town Sm'algyyax" (2002, p.72), and that "considerable antagonism exists between speakers of different dialects (which vary from village to village).

This has typically revolved around debates about who speaks the language 'properly'" (2002, p.71).

Modernization involves finding ways to express "modern" and/or "foreign" concepts by way of traditional languages. Whose version of a given language, and by extension, whose culture will serve as a template for new vocabulary remains an issue. Additionally, however, there is the issue of whether a given language should be modernized at all. As Bradley and Bradley note, attitudes towards "linguistic boundary maintenance" range "along a continuum from purism to acceptance. Maximal purism involves conservative attitudes to the minority language and rejection of an effect of language contact or other change; maximal acceptance naturally also leads to rapid internal change" (2002, p.2). Ahlers suggests that, to "purists," to "modernize" a language is to strip it of the traditional worldview it embodies and the cultural practices to which it refers. She remarks:

> in the changed world in which native language activists find themselves, one can barely find anything to speak about that does not touch on modern culture . . . Can use of the heritage language succeed in reflecting the traditional worldview in any way, or does it become a hollow shell, inside of which can be found nothing but the dominant culture? (1999, p.56)

and that new vocabularies

> can be so overwhelming that native-speaking elders may have difficulty understanding the speech of children in classroom immersion programs. As one Maori educator said, the elders complain, "Sure, we have a new generation of

> speakers - but all they talk about is English concepts!" (1999, p.57)

Those who favour some degree of acceptance, however, seem to reflect Will Kymlicka's perspective:

> Advocates of [language] rights are rarely seeking to preserve their 'authentic' culture if that means returning to cultural practices long past . . . Rather, they are concerned 'to maintain one's membership in a distinct culture, and to continue developing that culture in the same (impure) way that the members of majority cultures are able to develop theirs' (1995: 105) . . . The key issue for minority language speakers thus becomes one of cultural and linguistic autonomy rather than one of retrenchment, isolationism, or stasis. (May, 2005, p.332)

Notably, Canada's Task Force on Aboriginal Languages and Cultures promotes an attitude of "acceptance":

> We believe First Nation, Inuit and Métis languages embody the past and the future. To enter into a relationship with our ancestors we must speak our languages and by doing so we honour their spirits. However, we also adapt our languages to new environments, new situations and new technologies. (2005, p.3)

Arguments regarding the effect on Aboriginal identity and culture of changes in or inauthentic aspects of ancestral languages are suggestive. Consider Wong's comments:

> Although the concept of tradition is nebulous and provides an unstable foundation upon which to build a case for the authenticity of language forms, it is nonetheless an important factor in the minds of those participating in revitalization efforts . . . It is perhaps enough that the community believes that linguistic and cultural practices are traditional. No one has a problem accepting these traditions until some researcher comes along and presents evidence debunking them as myth . . . Authenticity can thus be thought of as a

> construction of society, its very existence depending on whether or not it is a psychological reality for the community. (1999, pp.103-104)

Recall previous arguments about whether language is a particularly important symbol of ethnic identity, and the assertion that, in effect, it is if the individual or community thinks it is. We see a similar argument being put forth here respecting the structure of ancestral languages.

It is worthwhile at this point to recapitulate some of the proposed processes through which language is supposed to affect identity, and, in turn Aboriginal well-being. First, there is the notion that "language" is purely symbol. Its visibility makes it an obvious point of identification for the members of an ethnic group. With this point of identification available, a sense of identity is formed, enhancing one's well-being. It does not matter what the language actually is, in terms of vocabulary or structure, and how much of it people actually have to use is debatable. Second, there is the often implied (by, for instance, the Task Force on Aboriginal Languages and Cultures' discussion on ways to enhance the status of Aboriginal languages), but less frequently declared notion that an ethnic identity will have a positive effect on well-being only insofar as the holder of that identity takes pride in it. Third, there is the assertion that, proud or not, members of a minority group cannot achieve a real sense of cultural identity unless they have access to the unadulterated culture, which is available only by way of the ancestral language. Finally, in the notion that

an ancestral language need only be regarded as authentic by those who speak it, we find an amalgamation of the "language-as-symbol" and "language-as-communication" arguments. Apparently, using an ancestral language as a form of communication is important, but only insofar as doing so has symbolic importance for minority groups. Fishman's remarks summarize the complexity of the language-identity link:

> 'the whole truth' about the relationship between language and culture may be too complex and too subtle, as well as too subjective and self-fulfilling to be fully told. In all realms of cultural behavior, those factors that are believed to be true have very definite consequences, whether or not they were initially or demonstrably true above and beyond the beliefs about them. (1991, p.15)

1.4.3 Aboriginal Languages Contain Invaluable Knowledge...

1.4.3.1 ...About the World

The "Ecological Argument" in favour of preserving Aboriginal languages claims that "the survival of minority languages is crucial for the survival of the planet, for with every language that disappears a uniquely functional local set of meanings about the environment is lost" (Blommaert, 2004, p.58). I introduced this notion earlier, when discussing how language shift can introduce barriers to intergenerational transmission of cultural knowledge. However, the focus of the ecological argument is not the identity and well-being of indigenous people specifically, but rather the preservation of indigenous knowledge for the benefit of all:

> Athabascan languages best express 6000 years of valuable world-views, and extensive regional and local knowledge. In a time of increasing concern over pollution, and resource shortages, this language and cultural knowledge of balance and harmony with the land may have broader significance. For this information to be continually available we need to encourage and maintain fluent speakers. (Dementi-Leonard and Gilmore, 1999, p.48)

The group of academics comprising the organization "Terralingua" is particularly emphatic. They assert that "biological, cultural, and linguistic diversity are co-evolved, interdependent, and mutually reinforcing" (Terralingua, 2008, online).

The idea that indigenous peoples possess a wealth of environmental knowledge has been largely institutionalized. Canada is a signatory to the International Convention on Biological Diversity, which recognizes "the contribution that traditional knowledge can make to both the conservation and the sustainable use of biological diversity" (Convention on Biological Diversity, 1993, online). UNESCO's report on *Language Vitality and Endangerment* (2003) expresses similar views. The notion is not, however, without its detractors. In *Disrobing the Aboriginal Industry* (2008), Widdowson and Howard declaim as useless much of what is called traditional knowledge. Walsh, similarly, suggests that the value of the Indigenous knowledge captured by indigenous languages might be overestimated:

> One hundred years ago the dominant cultures in the developed world would have had a rich lexicon and discourse on horses and horse-driven transport. This

> richness has either been lost entirely or has shrunken to highly specialized contexts . . . Some would argue that this stuff is irrelevant to the present times and would regard this as useless knowledge. So why are some of us getting so worked up over the loss of specialized vocabulary in Indigenous languages? (2005, pp.306-307)

1.4.3.2 …About Ourselves

Studying languages can provide various types of information about humankind's past and present. For example, by examining similarities among languages and dialects, linguists have been able to trace migration and settlement patterns in the "prehistoric" world. For example:

> A U.S. researcher studying an ancient language now spoken by only a few hundred people in a remote corner of Siberia has found the first linguistic link between the Old World and any First Nation in Canada…[he] found that the few remaining speakers of the relic Ket language in Russia's Yenisei River region, and the tens of thousands of Athapaskan-speaking aboriginal people in Canada and the U.S . . . use almost identical words for canoe and such component parts as prow and cross-piece. (Boswell, 2008, online; see Vajda, 2008)

The study of minority languages in their infinite variety can also help us understand language itself. To understand this most human of phenomena, some contend, is to better understand the human mind. Dixon, for example, insists that "only by studying the various possibilities across all languages can we gain a general picture of the nature of the human brain as it relates to language activity." Such research, Dixon argues, could "evolve some new mode of thinking that could help to deal with problems in the modern world" (1997, p.116). Junker and Blacksmith,

who examined the relationship between language structure and the way in which subjects experience emotions, echo Dixon:

> Testing Wierzbicka's hypotheses about emotional universals on an aboriginal language like East Cree can provide us with interesting results. First, a greater degree of variation in any conceptualization domain can be expected with such a non-European language than that between English and French. Note also that such languages are fast disappearing and changing, with their culture and traditional way of life under assault. So our results about cross-linguistic variation may be quite different twenty years from now. (2006, p.279)

1.4.4 Aboriginal Languages are a Link to the Land

Dementi-Leonard and Gilmore (1999) discuss how research on mobility and settlement among Athabaskan language groups was used as evidence for Aboriginal land claims. Similarly, Patrick notes that "for some groups, language rights have become intertwined with struggles over land rights" (2004, p.173). As indicated earlier, discussions of Aboriginal languages in Canada and elsewhere emphasize their "local" quality. This quality is manifested in names for landmarks, local flora and fauna, etc. Implicitly, then, different Aboriginal languages may be said to be associated with different territories. Some Aboriginal groups view their languages, consequently, as "proof" of their claims to land. In *Towards a New Beginning: A Foundational Report for a Strategy to Revitalize First Nation, Inuit and Métis Languages and Cultures*, the Task Force on Aboriginal Languages and Cultures endorses this viewpoint. The document states that

> We came from the land – this land, our land. We belong to it, are part of it and find our identities in it. Our languages return us again and again to this truth. This must be grasped to understand why the retention, strengthening and expansion of our First Nation, Inuit and Métis languages and cultures is of such importance to us; (2005. p.24)

that Aboriginal languages

> are the original languages of Canada, spoken here millennia before French and English. They ground First Nation, Inuit and Métis nationhood, are recognized in treaties and are entrenched in section 35 of the Constitution Act, 1982. There is an intimate connection between those who speak them and this land, and the Task Force recommends that the physical connection between First Nation, Inuit and Métis peoples and the land be restored and strengthened through government-to-government agreements on co-management or similar regimes; (2005, p.iii)

and that

> First Nation, Inuit and Métis people never doubted either their inherent nationhood or the sacred connection between that nationhood and the land and never intended to relinquish either. (2005, p.26)

It seems apparent that Aboriginal people in Canada, insofar as they are represented by the Task Force, regard Aboriginal language use as key to maintaining and furthering the special status of Aboriginal people and of bolstering their claims to ancestral territories.

1.5 Arguments Against Saving Aboriginal Languages

1.5.1 Aboriginal Language Promotion Can be Divisive and Demoralizing

1.5.1.1 Not All Aboriginal People Desire or are Capable of Aboriginal Language Use

The notion that Aboriginal people regard their languages as integral to their ethnic identities is a recurring theme in the discussions above. It is important to remember, however, that the desire for Aboriginal language maintenance is not universal among Canadian Aboriginal people. Henze and Davis note that

> even some indigenous people feel that progress in the modern sense requires giving up some old ways, including language, and that efforts to save a dying language are not the best use of time when there are so many issues at stake that seem more pressing, not the least of which are physical and economic survival (1999, p.3).

Conflict over the desirability of Aboriginal language use also manifests itself statistically. In the 2001 Aboriginal Peoples Survey, only about 60% of respondents regarded Aboriginal language use as important (Statistics Canada, 2003e). If those who desire Aboriginal language use, however, do so because they wish to legitimate Aboriginal culture, it follows that those who do not desire Aboriginal language use may be "too far gone" to recognize the value of their culture. Consequently, they might be deemed ill-equipped to decide which language they, their families and communities ought to use. This point seems especially relevant given the traumatic means (e.g. the residential school system) by which many lost

their ancestral tongues. An earlier quote referred to a woman who is now "afraid" to use her language. Crawford, similarly, refers to aversion to language planning "among not a few Indian parents, who vividly remember the pain they suffered in school and hope to shield their children from the same experience"(1998, p.158).

At the risk of oversimplifying the issue, one cannot help but draw parallels between efforts by past governments to "solve the Indian problem" by forcibly divesting Aboriginal people of their ancestral languages, and the contemporary notion that the enduring problem can be solved by forcibly restoring them. As Henze and Davis remark, "Many [linguists] are shedding the objectivist positions of the past and taking on more politically active roles in language renewal. But others argue that this, too, is colonial thinking: 'We should not assume that we know what is best for them' (Ladefoged 1992:810)" (1999, p.8).

In addition to re-traumatizing victims of cultural oppression, promoting Aboriginal language use has the potential to alienate non-speakers. This is particularly problematic given that some Aboriginal languages are either extinct or so deteriorated that they are unavailable for use. An article written by an Aboriginal author illustrates the corrosive potential of conflict over the necessity of language retention. Wagamese (2000) discusses a lecture in which a prominent Aboriginal man proclaimed that one who does not know his ancestral language cannot

claim to be an Aboriginal. The author disputes the notion that his inability to learn his ancestral language (which is extinct) is grounds for denying his claim to an Aboriginal identity[1].

1.5.1.2 Discord Exists Over the Means and Ends of Aboriginal Language Programming

Numerous authors point out that, even given consensus over the importance of an ancestral language, significant disagreement may exist respecting the means and ends of language programming (see, e.g. Fishman, 1990; Giles and Coupland, 1991; Henze & Davis, 1999). We have already seen that different people may have different goals with respect to fluency. Since greater fluency will almost invariably require more money, arguments over bands' priorities are likely to be common. Earlier discussions regarding standardization and modernization also suggest that the potential for Aboriginal language programming to incite discord is great. Efforts to modernize Hawaiian are illustrative of this potential. First, there was conflict regarding the authority of the committee that undertook the task of modernizing the language. Wong (1999)

[1] It is worthwhile noting that, in the ongoing debate over what criteria should define First Nationhood in Canada, the capacity to use an Aboriginal language has been proposed. Lawrence (2004, p.68) and Cornet (2007, p.153) state that some Canadian band membership codes consider proficiency in the ancestral language. This emphasis on cultural rather than biological (e.g. blood quantum) bases of "Indian-ness" may be, in part, a consequence of Bill C-31. The bill permitted the reinstatement of individuals who had lost their Indian status as a result of certain provisions of the *Indian Act*. Most of these individuals are women who married non-Indian men and the offspring of those unions. According to Lawrence (2004) and Cannon (2005), the return to reserves of reinstated individuals is perceived by some as a threat to bands' financial and cultural integrity. Since reinstated individuals tend to be more assimilated into the dominant culture, some bands may have attempted to deny them membership by making linguistic and cultural knowledge prerequisites.

criticised its biased composition, devoid as it was of native speakers and women. Second, the "rules" (listed previously) the committee established respecting how new words should be incorporated suggest infinite opportunities for dispute. And, indeed, dispute occurred. Wong describes "the conflict between book language and the language of the kapuna ('elders')" (1999, p.100).

I should point out that the issue of modernization may be particularly salient to Aboriginal people in Canada. Earlier, I described how some Aboriginal groups are attempting to use ancestral languages as evidence in land claims disputes. The notion that modernization and other changes to Aboriginal languages might eradicate the *je ne sais quoi* that makes Aboriginal languages "Aboriginal" represents a threat to such efforts. It is not only certain Aboriginal people who ascribe ethnic "authenticity" only to those aspects of Aboriginal culture that existed "pre-contact" or, at least, "long ago." As an INAC employee, I am frequently regaled with lectures asserting that "Indians have no right to ask for special treatment when they have cars and TVs" and that "if Indians want special hunting rights they should only be able to use bows and arrows and other things they had before Europeans came." These assertions may seem silly and inconsequential to some. They seem weightier when one considers how Aboriginal rights are treated in Canadian law, however. Analyses of Supreme Court decisions, for example, demonstrate that

Aboriginal rights tend to be based on "pre-contact" Aboriginal cultures. Patrick, for example discusses R. v. Van der Peet. The defendant in this Supreme Court case was charged with contravening the Fisheries Act by selling ten salmon.

> Her defense rested on the fact that the Charter of Rights and Freedoms in the Constitution Act of Canada (1982) 'recognizes and affirms' the 'existing [A]boriginal and treaty rights of the [A]boriginal peoples of Canada', leaving the Court to decide whether the selling of fish counted as an 'Aboriginal right'. What the Court decided was that an Aboriginal person had such a right to engage in an activity only if the activity was 'an element of a practice, custom or tradition integral to the distinctive culture of the [A]boriginal group claiming the right' (1996, para. 46, cited in Vallance 2003: 7). Moreover, a practice counted as 'integral' to an Aboriginal culture only if it was practiced 'prior to contact between [A]boriginal and European societies' (1996, para. 60, cited in Vallance 2003: 7). (Patrick, 2005, p.374)

Patrick concludes that, in Canadian law, Aboriginal culture is "linked to, and even 'frozen' in, a distant past" (2005, p.373); "that 'culture,' intrinsic to the granting of rights, has been understood as 'fixed' in some pre-contact past, its social practices, 'traditions,' and structure remaining distinctive only by remaining unchanged. In other words, to the extent that these practices do change – in particular, by becoming influenced by Euro-Canadian or 'Western' practices – they are no longer considered 'distinctive'" (2005, pp.374-375). Essentially, disputes over whether and how to modernize Aboriginal languages might be particularly animated given the potential legal and financial repercussions associated with altering "Aboriginal culture."

That the practices required to institutionalize indigenous languages can stimulate such discord is disconcerting in itself. After all, Aboriginal language use is supposed to influence well-being by increasing community cohesion. It seems less likely to do so if language programming initiates new schisms. As importantly, however, Aboriginal language use is supposed to empower the disenfranchised. It seems less likely to do so – and may even have the opposite effect – if the "version" of the language slated for salvation is a different version from one's own. One would have effectively had one's language devalued and targeted for destruction once again – only perhaps by one's "own people" this time. Patrick, for example, remarks upon the "paradox" that arises when those who seek to institutionalize Indigenous languages promote a standardized form; simultaneously, they marginalize and exclude speakers who use non-standard varieties[1].

1.5.2 Aboriginal Language Use Ghettoizes Aboriginal People

Earlier, I described claims that using ancestral languages can enhance the socioeconomic well-being of Aboriginal people. Many, however, claim that the opposite is true. Indigenous language use is purported to erode well-being by making minority groups insular with

[1] Patrick's remark, in its original French, follows :

> Ce point de vue contextuel permet de souligner un paradoxe inhérent à la reconnaissance des langues autochtones, à savoir que les locuteurs qui se rallient autour d'une variété dialectale homogène et « standardisée » dans le but d'obtenir davantage d'espace institutionnel et de reconnaissance linguistique risquent par le fait même d'exclure et de marginaliser ceux et celles qui parlent une variété non standard de cette même langue. (2007, p.126)

mindsets incompatible with mainstream economics and by reducing proficiency in dominant languages.

1.5.2.1 Indigenous Language Use Makes Indigenous Peoples "Backwards"

Until fairly recently, Canadian policies regarding Aboriginal people reflected the notion that indigenous groups are "primitive" and that assimilation will bring them economic prosperity. That notion was the impetus behind residential schools, for example, which sought to "kill the Indian in the child" (Office of the Prime Minister, 2008, online) in order to end the cycle of poverty in Aboriginal communities. Respect for cultural diversity has increased over the last few decades. The notion that the prevalence of poverty in the Aboriginal population is in some way related to "Aboriginal culture," however, endures. Earlier, I described how Aboriginal languages are assumed to perpetuate that culture by facilitating intergenerational communication and preserving Aboriginal "worldviews." Essentially, some still presume that Aboriginal language use limits socioeconomic potential by tethering Aboriginal people to obsolete traditions and mindsets. Armstrong, for example, remarks that:

> Many native cultures maintain elements of traditional culture that are incompatible with conventional economic development. Traditional cultures have been characterized as being past/present oriented, stressing socio-cultural needs and valuing generalized work skills that are suited to reciprocal economic activity. Mainstream economic activity generally requires a future orientation, stressing economic goals and specialized work skills. (1989, p.8)

Widdowson and Howard express similar notions in *Disrobing the Aboriginal Industry*. Margaret Wente of the *Globe and Mail* summarizes the authors' argument as follows: "Ms. Widdowson argues that the most important explanation for aboriginal problems today is not Western colonialism but the vast gulf between a relatively simple neolithic kinship-based culture and a vastly complex late-industrial capitalist culture" (2008, p.A21). Similar sentiments permeate Tom Flanagan's *First Nations? Second Thoughts* (2000).

This idea is also reflected in the assertion that Aboriginal people should not be judged by non-Aboriginal criteria[1]. Nichols, for example, claims that

> checking the justness of indigenous movements for linguistic security against the test of social mobility within the dominant society is inappropriate, since the colonial context in which indigenous peoples find themselves means that many of these movements . . . are specifically aimed at creating a space away from the dominant society itself . . . Consider . . . Benhabib's . . . concern for the development of 'future citizens'. The question is: citizens of what community? . . . indigenous movements to linguistic security don't always facilitate such development. In fact, at times, they are specifically designed to disrupt such development. This is not to say that they, by necessity, restrict the development of good citizens, but often they are orientated towards the development of good Cree, or Maya, or Navajo citizens, and rightly so. (2006, p.43)

For others, nothing about traditional Aboriginal cultures is necessarily at odds with mainstream economic pursuits. They do hold,

[1] Though it denies, at the same time, the legitimacy of the claim that assimilation is good if it improves "socioeconomic well-being."

however, that a cycle of poverty exists within some Aboriginal groups and that cohesion within these groups – which Aboriginal language use is supposed to further – can perpetuate that cycle. It is worthwhile to note that some who hold this position might even acknowledge that the current low levels of well-being among Canada's Aboriginal people were initiated by the marginalization and infantilization of Aboriginal peoples by colonial powers. Nevertheless, the notion that assimilation is the best means of solving the current "Indian Problem" is still advanced. Consider recent work by White et al., who discuss various types of social capital and how they affect educational outcomes among Aboriginal people. "Bonding social capital" (2006, p.70) consists of the norms and sentiments that 'hold groups together.' These authors assert that

> Increasing levels of social capital are not necessarily related to increasing educational attainment. This can be understood by examining what we call norm effects. Simply put, where parents and family have low educational attainment and high levels of binding social capital, the child's educational attainment tends to be low. This is why we see a high correlation between mother's and children's educational attainment . . . Where we have low educational norms embedded in a child's family, it is counter productive to build bonding social capital. (White et al., 2006, p.72)

Extending this notion from families to communities, if one identifies with and is immersed in an under-achieving group, one is likely to be underachieving oneself[1]. I should note that White et al. in no way

[1] This idea is strongly supported by the work of Portes and colleagues (e.g. Portez and Rumbaut, 2001) on adaptive techniques of second-generation Americans.

advocate the assimilation of Aboriginal people; quite the opposite. Their ideas about social capital and social cohesion, however, are reflected in the notion that breaking the cycle of Aboriginal poverty requires the dissimilation of "defective" Aboriginal groups, and, by default, assimilation of their constituents into the mainstream. Of course, assimilation into less dysfunctional Aboriginal groups is a frequently professed alternative solution. For example, as an investigator of well-being at Indian and Northern Affairs Canada, I am often asked to identify examples of "successful" Aboriginal groups so that less successful groups might emulate them.

1.5.2.2 Minority Language Use Reduces Dominant Language Proficiency

Above, I described the notion that Aboriginal language use might reduce well-being by enhancing individuals' immersion in a dysfunctional culture. The notion that minority language use can reduce well-being by reducing proficiency in a dominant language is also common. That fluency in a dominant language will be related to socioeconomic well-being, particularly among Canadian Aboriginal people whose own language groups are generally small, seems indisputable. That minority language use reduces dominant language fluency, however, is contested. The debate is particularly heated in the area of education. For example, in 1998, the government of Australia's Northern Territory "passed legislation to axe [bilingual programs for indigenous students]. The authorities' stated

reason for the closure of these programmes was that of the putative 'poor standards in English literacy' in bilingual schools, in comparison with English-only Aboriginal schools" (Nicholls, 2005, p.160).

Nicholls, however, insists that "no evidence has ever been proffered to support such a claim" (2005, p.160). Portes and Schauffler (1994), Krashen (1999) and Skutnabb-Kangas (2000), also deride the notion that bilingualism reduces dominant-language proficiency. The latter calls the idea that the amount of time one is exposed to a language determines one's fluency in that language the "maximum exposure" fallacy. She cites studies in which no relationship was found between school children's "time-on-task" and dominant language mastery, and even some that discovered a negative relationship.

1.5.3 Language Shift is Progressive

Some opponents of minority language retention argue that language shift is a positive, evolutionary process which should be allowed to proceed unencumbered. Crawford (1998) calls proponents of this view "linguistic Darwinists." Some profess the opinion, described earlier, that Aboriginal cultures and, by extension, Aboriginal languages are incompatible with the modern mainstream. Others simply seem to advocate a more general "survival of the fittest" attitude whereby, if indigenous languages are dying, "nature" must have deemed them unworthy of survival. Yet others praise the loss of minority languages,

apparently hoping that having a single language will unite disparate segments of humanity. Demont-Heinrich's comments are illustrative. He asserts that, to some,

> English has become a "floating signifier," a de-politicized, de-nationalized, de-culturalized linguistic repository for the entire world, a sort of linguistic grab bag for worldly, postmodern symbolic interactionists around the globe . . . At this end of the discursive continuum, the global rise of English, then, is most frequently cast as an "inevitable" outcome of a linguistic teleology which will deliver universal "progress" and rescue humanity from the horrors of the Tower of Babel. (2004, pp.13-14)

1.5.4 Language Shift Is Inevitable

Many researchers believe that dead languages cannot be revived. Dixon (1997) asserts that no extinct language has ever been revived. Rigsby (in Drapeau, 1995, p.20) makes the same claim with specific reference to North America and Australia. Other authors claim that even linguistic decline cannot be stopped indefinitely.

In an earlier section, I described the factors believed to contribute to minority language loss, and how these factors appear to be aligned against Aboriginal languages in Canada in particular. Moreover, strategies to retard language loss are often criticized as ineffectual. For example, in Canada and elsewhere, the notion that official recognition of a language will prevent its decline is common. As the Task Force on Aboriginal Languages and Cultures argues, this sort of "status planning" is intended to improve people's opinions of a language, encouraging them to use it (see, e.g. Wurm, 2002). Language planners seem to agree, however, that such efforts have little effect unless they are accompanied by financial

support and more direct efforts to promote language use. In 1984, for example, seven Aboriginal languages were designated as official in the Northwest Territories. Ostensibly, the purpose of the Official Languages Act was the "preservation, development, and enhancement" (Fettes, 1998, p.127) of Aboriginal languages. The act focused on the provision of government services, however, making no provisions for maintaining the tongues as living languages. Consequently, many criticized it as irrelevant to language maintenance efforts (See Fettes, 1998, p.127; the Task Force on Aboriginal Languages and Cultures, 2005, p.v).

The most common, or at least the best documented, direct means of promoting Aboriginal language use is formal instruction. Such instruction can be part of mandatory or elective school curriculum, or can be offered to the general public by any number of organizations. Whatever its source, formal language instruction has limitations. Most significantly, the feasibility of teaching a language in a formal setting is limited by how much "corpus planning" the language requires. Corpus planning involves the reconstruction, standardization, modernization and documentation of a language. Previous sections have described how involved corpus planning can be. Very deteriorated or sparsely documented languages would require much remedial work before being the subject of formal language instruction – at least if the goal of that instruction is fluency. Formal language instruction can also be plagued by a scarcity of qualified teachers (Dementi-Leonard & Gilmore, 1999). Graham points out that Cree and Ojibway programs were impeded by "the scarcity of qualified instructors and the lack of curricular materials" (2005, p.325). Graham's

comment is particularly discouraging given that Cree and Ojibway are two of Canada's three largest Aboriginal languages.

The difficulties associated with formal instruction in Aboriginal languages aside, the capacity of formal instruction to "save" Aboriginal languages is questionable. Some argue that this type of instruction does not lend itself to an increase in intergenerational transmission and that it can actually transfer "responsibility for mother tongue transmission from its natural and necessary domain – the home and family" (McCarty, 1998, p.28). Moreover, the effects of formal language education among Canadian tribes have been, according to some, rather disappointing. Drapeau, for example, claims that "despite an increase in formal schooling in the Aboriginal language and the growing number of language experts . . . the rate of actual spontaneous use of Aboriginal literacy skills in everyday life is quite low" (1995, p.11).

One final problem exacerbates these purported shortcomings of efforts to save Aboriginal languages. As Drapeau notes,

> all efforts, means and measures geared towards Aboriginal language conservation/revitalization will have to be permanent. They cannot be thought of as a transitory stage. Language endangerment is a permanent predicament and will thus require permanent efforts. Speaking of reversing the tide is mistaken in that the negative undertow is there to stay. (1995, p.30)

Because language programs are extremely vulnerable to funding cuts, uninterrupted programming is unlikely. It may therefore be the case that the death of Aboriginal languages is certain and that to resist their demise is simply to postpone the inevitable.

These criticisms – that "official recognition" does not "work," that formal instruction is difficult and expensive and also, ultimately, does not "work", demand attention. Richard Littlebear's poem is particularly damning. It

> describes the litany of remedies that native groups have tried in their efforts to restore their languages: from creating dictionaries, to training indigenous people as linguists, to applying for federal bilingual education grants, to creating culturally relevant materials, and so forth, all ending with the refrain, 'and still our native American languages kept on dying' (1996:xiii). (Henze and Davis, 1999, p.8)

There are convincing counterpoints, however. First, Norris found that "in 2001, more people could speak an Aboriginal language than had an Aboriginal mother tongue (239,600 versus 203,300). This suggests that some speakers must have learned their Aboriginal language as a second language. It appears that this is especially the case for young people" (Norris 2007, p.19). It follows, therefore, that at least some formal language classes are producing graduates capable of conversing in their ancestral tongues. Moreover, while critics disparage official recognition as ineffectual where it is not accompanied by funding, Fettes nonetheless argues that the effectiveness of formal instruction "depends on the use of the language in the home and community, and on deliberate efforts to restore its importance and prestige" (1998, p. 122). Ultimately, then, it seems that "status planning" and formal education might be ineffectual where applied piecemeal, but effective as components of comprehensive program directed towards intergenerational transmission in the home and

community (Henze and Davis, 1999). McCarty's comments regarding the Rough Rock Navajos are illustrative:

> While schools cannot "save" threatened languages, recent developments have positioned schools at the centre of the arena in which the politics of language are negotiated. Rough Rock illustrates more widespread processes in which schools have come to form a key social structural and organizational nexus for promoting Aboriginal languages and cultures. (1998 p.27)

It is also worthwhile to note that certain notions respecting corrosive influences on minority languages are contestable. For instance, the notion that exposure to dominant languages and cultures erodes minority languages is widely accepted. Some empirical evidence suggests that Canada's Aboriginal languages may be quite resilient to exposure to mainstream culture, however. Allen et al., for example, examined the effects of exposure to English on proficiency in Inuktitut. "Results are inconclusive" they declared. "Some suggest that higher exposure to English leads to stagnation in Inuktitut, while others do not" (2006, p.578). Moreover, while many assert that media intrusion erodes minority languages, others argue that technologies such as the Internet can actually retard minority language loss (Walsh, 2005). The online Aboriginal language programs listed earlier lend credence to this notion.

Also contestable is the notion that there is no economic incentive for Aboriginal people to learn their ancestral tongues. In an earlier section, efforts to link Aboriginal language and land claims were described. If these efforts are fruitful, Aboriginal leaders, at the very least, will have much to gain by promoting Aboriginal language use among their band members.

Further, the "cohesion hypothesis," which perhaps is better known in academia than elsewhere, may gain adherents among Aboriginal people. While Dixon, for example, insists that "there has to be a utilitarian reason for learning [a minority language], something more (to judge from recent experience) than ethnic pride," and that "appeals for revival or restoration will not be successful if they are based essentially on cultural grounds" (p.111), his notion of "utilitarianism" lends itself to a variety of interpretations. Fishman, for example, refutes the notion that language maintenance efforts are "irrational" by indicating that the groups engaged in these efforts are attempting, very rationally, to reap the benefits of a revived group identity (1990, p.9). His suggestion is that ethnic pride can have a very important instrumental role in a group's economic health, and that the distinction between "emotional" and "rational," and between the economic and the non-economic, is ambiguous. Some Aboriginal people and communities, appreciating this fact, may come to regard ancestral languages as economic assets.

It is also important to emphasize that there are many Aboriginal languages. Some are certainly more viable than others, and some will most certainly become extinct. We must take care, however, not to "throw the baby out with the bathwater," ignoring the potential of languages like Cree, Ojibway and Inuktitut to thrive simply because the outlook is less favourable for many other Aboriginal languages. Moreover, some languages may be more viable than they appear. According to Darnell, "reports of the last living speaker of various languages have . . . been highly exaggerated, beginning almost with contact," (2004, p.89) and that "linguists have too often assumed that

languages . . . are moribund and found instead that new performers step forward when their skills are called upon by their communities" (2004, p.97). Stebbins's (2002) research on British Columbia's Tsimshian people supports this claim. He indicates that, while there appear to be few speakers of Sm'algyax under 50, there are actually many. Younger speakers simply do not identify themselves as such because they do not think it appropriate to declare themselves authorities on Sm'algyax. The Tsimshian, Stebbins claims, feel that it is wrong for a non-elder to act as a source of information.

Finally, it is important to note that critiques of strategies to save Aboriginal languages are based on the aforementioned "structuralist" view of language which defines language maintenance as the perpetuation of fluent speakers of a complete form of communication. As also indicated earlier, the linguistic aspirations of Aboriginal people and communities vary greatly. Some may desire modernization, some may not. Some may desire fluency. For others, the mere knowledge that their language was thought sufficiently valuable to be taught in a classroom might be enough. As Patrick notes,

> A more traditional goal might be that of producing fluent speakers with very extensive lexical knowledge and mastery of the language's grammatical structures . . . Another goal, however, might be to develop language abilities for more restricted purposes; for example, to participate in traditional cultural rituals that remain central to community life . . . what counts as a 'living' language might differ substantially from one speaker or community to another . . . only Indigenous language speakers themselves can judge whether their language has or has not 'survived' and what implications this has for their community. (2005, p.382)

Dementi-Leonard and Gilmore express similar sentiments. Attempts to judge language planning efforts using uniform or "academic" standards, they contend,

can be counterproductive. Rather, language should be regarded as "part of a complex web of culture and identity [that] must be viewed only through those delicately interwoven and intricate relationships and the local meanings it holds for community members" (1999, p.38).

1.6 Conclusion

The time is ripe for research on indigenous languages and on Canadian Aboriginal languages in particular. The importance of indigenous cultures has been recognized recently by the international community: the United Nations *Declaration of the Rights of Indigenous People* was adopted in 2007 and UNESCO has declared 2008 the International Year of Languages. In Canada, however, as Aboriginal languages rapidly decline, their value remains contested.

Canada's Liberal government was dedicated to the notion that Aboriginal living conditions can be improved by empowering Aboriginal peoples and promoting Aboriginal cultures. In 2002, the federal Liberals earmarked an unprecedented amount of money for Aboriginal language preservation programs. With the arrival of the Harper Conservatives in 2006, sentiments in Ottawa changed and the promise of increased funding for Aboriginal languages was withdrawn. The instability of government policy with respect to Aboriginal languages may, at least in part, be a consequence of apparently irredeemably conflicting theoretical perspectives and anecdotal evidence, plus a dearth of scientific empirical research on the effects of Aboriginal language use on users.

I hope that this dissertation will provide some of the evidence policy makers need to make informed and stable decisions with respect to Aboriginal languages. I do not mean to suggest that empirical research of the type

described herein can fully explain the mechanisms by which language influences well-being. Such research can, however, demonstrate whether Aboriginal language use impacts well-being at all. With such information in hand, policy makers might make decisions regarding language programming more quickly and confidently, and those on both sides of the language/well-being debate might find cause to reevaluate their positions.

Chapter 2: Research Questions, Data and Methods

2.1 Introduction

The purpose of this research is to assess the merit of two competing hypotheses respecting the effect of Aboriginal language use on socioeconomic well-being. Both of these hypotheses were introduced in chapter 1. The "cohesion hypothesis" suggests that Aboriginal language users will have higher levels of well-being. As Crystal remarks, "local languages are seen to be valuable because they promote community cohesion and vitality, foster pride in culture, and give a community (and thus a workforce) self confidence" (2000, p.31). The "ghettoization hypothesis" suggests the opposite. As Pool remarks, "a planner who insists on preserving cultural-linguistic pluralism had better be ready to sacrifice economic progress" (in Nettle and Romaine, 2000, p.155). This research will address the basic question of whether Aboriginal language users have higher or lower levels of well-being, but it will also test some of the nuances embedded in the two hypotheses. These additional research questions are discussed below.

2) Does the impact of Aboriginal language use differ across age groups?

There is cause to suspect that that Aboriginal language use impacts younger generations differently than older ones. It was not so long ago that some Aboriginal groups existed in almost complete isolation. It seems reasonable, therefore, to suppose that Aboriginal language use

may have promoted insularity in older generations more so than in younger generations whose interaction with mainstream culture has been greater. Younger generations, that is, may be forging hybrid identities of which their Aboriginality is a part, but which are also engaged with contemporary society. If that is the case, Aboriginal language users among older generations might have lower levels of well-being than their English and French-speaking counterparts, while a different relationship between language and well-being might exist for younger persons. Further, Aboriginal language users among older generations likely learned a dominant language, on average, later than younger users. In 2001, for example, 7.2% of the Aboriginal Identity population aged 15-24 with an Aboriginal mother tongue learned English, French or both concurrently. Among Aboriginal people 65 and older with an Aboriginal mother tongue, only 2.7% also claimed to have an English and/or French mother tongue (Statistics Canada 2003b, online). The recent penetration of English language media into previously isolated Aboriginal communities also suggests that older generations would have learned a dominant language later and, arguably, less well. Finally, while older generations experienced intense discrimination on account of their ethnic origins, younger generations have been spared much of that trauma. Many, in fact, have grown up in an era of ethnic revival, wherein Aboriginal people and cultures are being afforded new respect. Consider Guimond's work on

"ethnic drifters," for example. He found that "from 1971 to 1996, Aboriginal populations defined on the basis of ancestry more than tripled in size (+252%) increasing from 312,800 to 1,102,000 persons. By comparison, the total increase of the Canadian population as a whole was 30% for the same period" (2003, p.91). Guimond argues that this population increase, for which fertility alone cannot account, was likely at least partially a consequence of improved attitudes towards Aboriginal people. This improvement encouraged Aboriginal people to acknowledge their heritage.
3) Does the impact of Aboriginal language use depend on whether one has only Aboriginal ancestry (i.e. homogeneous ancestry) or mixed Aboriginal and non-Aboriginal ancestry (i.e. heterogeneous ancestry)?

Chapter 1 suggested that Aboriginal language use may be more "important" to those for whom Aboriginal identity is more salient. It seems plausible that Aboriginal identity is more salient for those with exclusively Aboriginal origins. Accordingly, Aboriginal language use might impact their lives more positively. Chapter 1 also suggested that the alleged tendency of Aboriginal language use to breed insularity – to the detriment of socioeconomic well-being – might be counteracted by increased participation in the dominant culture. Consequently, individuals with mixed origins might find that Aboriginal language use produces for them a more engaged, hybridized Aboriginal identity. That Aboriginal language use might be a greater boon to these individuals, therefore, is also plausible.

4) Do different "types" of Aboriginal language use impact well-being differently?

Aboriginal language use in Canada differs along two main dimensions, which I call "predominance" and "primacy." Predominance refers to the proportion of one's linguistic communications that are made using an Aboriginal language. In this study, predominance is operationalized as whether or not an Aboriginal language is used in the home. For those who use an Aboriginal language in the home, that language is assumed to have a more pervasive influence. Primacy refers to whether one has an Aboriginal mother tongue or whether one learned one's Aboriginal language as a second language. One can derive from the literature various reasons why different classes of Aboriginal language use might impact well-being differently. For example, chapter 1 describes how Aboriginal language revival movements are often spearheaded by economically well-off non-speakers. We also saw that these leaders tend to view language revival as a way of rejecting, symbolically, colonial oppression. Such individuals would be classified as having an Aboriginal second language, but a non-Aboriginal mother tongue, and, most likely, a non-Aboriginal home language. Contrast this group with another theoretically plausible one: Aboriginal people who live more traditional lives and who use an Aboriginal language as a matter of course. Regna Darnell points out that the

> ideology of linguistic revitalization as a recovery from colonial oppression is not found in isolated communities like the ones in which Lisa Valentine and I did our initial field research. As long as traditional language and cultural identity can be taken for granted, people do not need to talk about them. (2004, p.97)

It seems possible that Aboriginal language use serves to enhance the isolation and economic marginalization of such traditional groups, without serving as a source of pride and motivation. Simply, it is conceivable that both the ghettoization and cohesion perspectives may have merit, depending on how one characterizes "Aboriginal language use."

5) Is the effect of Aboriginal language use on well-being dependent on whether one resides in an Aboriginal community?

Some suggest that Aboriginal language use is a cohesive force. As chapter 1 illustrates, the exact mechanism by which and context in which Aboriginal language use can have this effect have never been specified satisfactorily. Nevertheless, the image of Aboriginal communities using Aboriginal languages to forge economically advantageous bonds of ethnic solidarity is a common one in the literature. Implicitly, then, Aboriginal language use should have a more positive effect on well-being when used among the Aboriginal people with whom one is supposed to bond. Alternately, if the ghettoization hypothesis is true and Aboriginal language use has a negative impact on well-being, its use may be more disadvantageous in highly concentrated Aboriginal populations. The

bonding effect of Aboriginal language use might make a community turn inwards, increasing members' isolation from the mainstream economy.

6) Is the effect of Aboriginal language use on well-being dependent on the level of Aboriginal language use in one's community?

Again, the notion that Aboriginal language use is a cohesive force implies that it is an inherently collective phenomenon. Consequently, if Aboriginal language use enhances well-being, it should be a more strongly positive force when one's neighbours use it as well. Conversely, if Aboriginal language use ghettoizes, it should be a more powerfully negative force when employed among other users. Notably, the claim that Aboriginal language use is cohesive does not necessarily mean that it can only bond into communities individuals who are proximate geographically. The image of individual Aboriginal language users experiencing enhanced self-esteem, motivation, and success by virtue of their identification with "imagined"[1] or virtual Aboriginal communities seems plausible. Nonetheless, physical communities of Aboriginal people remain common, particularly given the Canadian reserve system. Consequently, understanding how Aboriginal language use at the community and individual levels interact is worthwhile.

[1] Benedict Anderson describes "imagined communities" in his 1999 book of the same name. Imagined communities are not characterized, as "real" communities are, by face-to-face interaction among members. Rather, they exist as conceptualizations in members' minds. Imagined Aboriginal communities may exist where individuals who are not members of physical Aboriginal communities nonetheless feel a kinship with what they perceive to be "Aboriginal culture" or "Aboriginal people."

7) Do changes in Aboriginal language use at the community level affect individuals' well-being, and do these effects differ across language use categories?

Chapter 1 describes claims that the components of ethnic identity are arbitrary and adaptable. Aboriginal people might feel demoralized about the loss of their language if they regard it as an important part of their ethnic identities, but they would eventually find other symbols to "fill the void."[1] On the other hand, communities in which Aboriginal language use is increasing might be experiencing the benefits of ethnic pride. Having both the motivation to increase Aboriginal language use and the experience of seeing their efforts succeed might provide the "positive sense of identity" that Aboriginal language use is purported to produce. Accordingly, declines in Aboriginal language use, regardless of absolute levels of Aboriginal language use, might be associated with lower levels of well being, while increases in Aboriginal language use – again, regardless of absolute levels of use – might be associated with higher levels of well-being. These effects might manifest at either the community level, if the pride or discouragement affects the entire population, or in the form of a cross-level interaction. Users of an Aboriginal language, for example, may be adversely affected by declining Aboriginal language use in their

[1] Notably, in the 2001 Aboriginal Peoples Survey (APS), while 93% of respondents with an Aboriginal mother tongue attached importance to their ancestral language, only 39% of those who had never spoken an Aboriginal language did. I derived these statistics from the 2001 APS Public Use Microdata File (PUMF) (Statistics Canada, 2006a).

communities while those who do not use an Aboriginal language are not. Conversely, users of Aboriginal languages may benefit from increases in Aboriginal language use while those who do not use Aboriginal languages, lacking this key means of identifying with their communities, are adversely affected.

7) Does the effect of Aboriginal language use on one's well-being depend on the isolation of the community in which one resides?

Darnell's previous quote suggests that Aboriginal language use has more symbolic significance for Aboriginal people who are immersed in mainstream society. Potentially, then, Aboriginal language use may not be a pride-bolstering, motivational influence among more isolated users. Consequently, Aboriginal language use might have a less positive effect on well-being for more geographically isolated people.

2.2 The Data

The analyses reported in this dissertation were performed on data from the 2001 Census of Canada. The specific data set used was composed of the individual records of the 20% sample of the Canadian population who completed the 2B, or "long form" of the Census[1]. These "microdata" (Statistics Canada, 2007a) were accessed through McMaster University's Research Data Centre (RDC).

[1] Available at http://www.statcan.gc.ca/imdb-bmdi/instrument/3901_Q2_V2-eng.pdf

The full 20% microdata file consists of approximately six million cases. The analyses described herein, however, were based on only the adult "Aboriginal Identity population." The approximately 275,000 cases within this subset of the 20% microdata file were 18 years or older at the time of the Census, and responded affirmatively to Census question 18, "Is this person an Aboriginal person, that is, North American Indian, Métis or Inuit?" These cases are nested in approximately 4,000 communities. Communities are defined in terms of census subdivisions (CSDs).

> Census subdivision (CSD) is the general term for municipalities (as determined by provincial legislation) or areas treated as municipal equivalents for statistical purposes (for example, Indian reserves, Indian settlements and unorganized territories). (Statistics Canada, 2002, electronic)

Note that different subsets of this smaller data set were used to analyse different response variables. These subsets and the justifications for using them will be presented shortly.

Readers may consider the following information about the 2001 Census of Canada useful when considering the results of these analyses.

- The 2001 Census population gross population undercoverage rate was 3.95%. This rate was offset by an overcoverage rate of 0.96%. The net undercoverage rate was, therefore, 2.99% (equivalent to 924,429 persons) (Statistics Canada, 2004).

  > The rate of population gross undercoverage was highest for the Northwest Territories (9.10%). Provincially, the rate was highest for British Columbia (5.30%). Gross undercoverage

> was less than the national rate (3.95%) for all provinces east of Ontario whereas the rate for Ontario (4.56%) was slightly higher. There was greater variation in undercoverage between the gender and age groups. Gross undercoverage was higher for men (4.90%) than for women (3.02%), with the highest rates being for young adults. The rates were strikingly high for young persons aged 20 to 24 (9.85%), with 11.68% being the rate for males and 7.91%, the rate for females in this age group. (Statistics Canada, 2004, p.62).

- 30 Indian Reserves refused to participate in the 2001 Census. Data are not available for these "incompletely enumerated" reserves. The estimated population for these reserves in 2001 was 34,541 (Statistics Canada, 2004); approximately 4% of the Aboriginal Identity population (976,305) and approximately 12% of the on-reserve Aboriginal Identity population (286,080).
- Approximately 2% of households were enumerated in the 2001 Census using the canvasser enumeration method. Questionnaires were completed by Census representatives who selected and/or formulated responses based on interviews with household members. This method is normally used in remote and northern areas of the country, and on Indian reserves. The canvasser enumeration method is also used in certain urban areas where respondents are regarded as unlikely to return a questionnaire. Given that Aboriginal people are disproportionately represented in the far North, on Indian Reserves (obviously), and also probably in socioeconomically depressed urban

areas[1], it is reasonable to assert that the method used to collect 2001 census information from Aboriginal people was, generally, different from the method used to collect data from non-Aboriginal people. Whether or not the difference in collection method may have affected the accuracy of the information collected is impossible to know. A great deal of research, however, addresses potentially different sources of error that might arise from different methods of data collection. An overview of this research can be found in Groves, et al. (2004).

- Data from the 2001 Census of Canada underwent extensive editing. For example, write-in responses (such as Mother Tongue) were translated into numeric codes automatically, for the most part. Where automatic coding was not possible, subject matter experts assigned codes manually. Perhaps most importantly, missing and inconsistent data were imputed.

> These missing or inconsistent responses were corrected most of the time by changing the values of as few variables as possible through imputation. Imputation invoked "deterministic" and/or "minimum-change hot-deck" methods. For deterministic imputation, errors were corrected by inferring the appropriate response value from responses to other questions. For minimum-change hot-deck imputation, a record with a number of characteristics in common with the record in error was selected. Data from this "donor" record were borrowed and used to change the minimum number of

[1] In 2001, the average income of the Aboriginal identity population in urban areas was $15,199, while the average income of other urban Canadians was $23,137. Further, the incidence of low income (among members of economic families) was 35.6% among the urban Aboriginal identity population but only 15.4% among other urban Canadians (Statistics Canada, 2003b)

> variables necessary to resolve all the edit failures. (Statistics Canada, 2003c, p.20)

The automated system CANCEIS (CANadian Census Edit and Imputation System) used minimum-change hot-deck to impute data on demographic characteristics such as age, sex, and marital status, as well as such variables as industry, transportation, mobility and place of work (Statistics Canada, 2003c).

> SPIDER (System for Processing Instructions from Directly Entered Requirements) was used to process the remaining census variables such as mother tongue, dwelling, income, etc. This tool translates subject-matter requirements, identified through decision logic tables, into computer-executable modules. SPIDER performed both deterministic and hot-deck imputation." (Statistics Canada, 2003c, p.20)

- Statistics Canada supplies a weighting variable to be used with the 2001 Census of Canada 20% sample.

> Data on age, sex, marital status, common-law status, mother tongue, and relationship to Person 1 were collected from all Canadians. However, the bulk of the information gathered in the census came from the 20% sampling of the population. Weighting, applied to the respondent data after Edit and Imputation, was used to adjust the census sample to represent the whole population. The weighting method produced fully representative estimates from the sample data. For the 2001 Census, weighting employed a methodology known as calibration (or regression) estimation. Calibration estimation started with initial weights of approximately 5 and then adjusted them by the smallest possible amount needed to ensure agreement between the sample estimates (e.g., number of males, number of people aged 15 to 19) and the actual population counts established from the 100% sample (that is, the six basic questions on both the 2A short-form and 2B long-form questionnaires). (Statistics Canada, 2003c, pp.21-22)

Note that Indian Reserves were sampled on a 100% basis (Statistics Canada, 2003c), and that, accordingly, a large proportion of Aboriginal people were assigned a weight of one. As per Statistics Canada's rules, illustrative statistics included in chapters 1 and 2 are weighted. My models, however, were constructed using unweighted data. This was the appropriate choice given the manner in which my research is conceptualized and the manner in which the data were collected. First, the fact that (generally speaking), the on-reserve population was sampled on a 100% basis while the off-reserve population was sampled on a 20% basis, complicates inference. That is, it is difficult to establish the extent to which results from this combined data set are representative of the total Aboriginal Identity population on census day, 2006. Using a "superpopulation model" solves this problem. Inference is often used to ascertain the probability of obtaining a specific sample statistic (or one more extreme) from a finite population. Say, for example, that I have a random sample of 5,000 Aboriginal people. In this sample, those who speak an Aboriginal language have, on average, $5,000 more income than those who do not. A hypothesis test ascertains the probability of selecting a random sample in which the income disparity is at least this large from a population wherein the real income disparity is zero. Alternatively, I can conceptualize my sample as having been drawn not from a finite population, but from a "superpopulation"; that is, having been

generated by a process that could, in principle, have produced a different "real" population. In this case, a hypothesis test will tell me the probability of finding an income disparity at least as large as the one in my sample if incomes were distributed to members of my sample in a random manner (i.e. in a manner unrelated to Aboriginal language use). In other words, while inferential statistics on a random sample from a finite population ascertain the generalizability of a sample statistic to that population, inferential statistics pertaining to a superpopulation assess whether it is likely that the results could have arisen by chance. The technicalities of these interpretations may seem unimportant. What is important is that conceiving of my data as a sample drawn from a superpopulation permits me to use inferential statistics in a straightforward manner. Superpopulation models are described in Thompson (2006).

2.3 The Models

2.3.1 Multilevel Modeling

My research questions speak to the hierarchical nature of the data with which I am working. Individuals are "nested" within communities, and I am interested in how individual and community level variables (and interactions between variables at these two levels) impact the socioeconomic well-being of individuals. Multilevel modeling[1] techniques

[1] Multilevel models are known by a variety of other names including mixed-effects models, random-effects models, random-coefficient regression models, covariance components models and hierarchical linear models (Raudenbush & Bryk, 2002, p.6)

are appropriate for these types of analyses. A brief introduction to multilevel models is provided below. More in-depth discussions of multilevel models and their applications in sociological research are available in Bickel (2007), Raudenbush and Bryk (2002), Hox (2002) and Kreft and de Leeuw (1998).

A traditional linear regression model with one predictor contains an intercept, a slope and an error term: $y_i = \beta_0 + \beta x_i + e_i$. The error term is a "random effect" with which is associated a variance component, $V(e_i) = \sigma^2$. The error is assumed to be normally distributed with mean zero and variance σ^2. A multilevel model permits the inclusion of additional random effects: one can designate the intercept and/or one or more slopes as random[1]. For example, suppose that one is looking at the effect of education (measured in years) on income (measured in dollars) among individuals nested within communities. In a traditional regression model, the intercept β_0 is the predicted value of income for those with zero years of education. Since income varies geographically in Canada, one might suspect that this value differs across communities; those with a given level of education in some communities might have higher levels of income than their counterparts in other communities. One could then designate the intercept as random, producing the following model: $y_{ij} = \beta_0 + \beta_1 X_{1ij} + e_{ij} + u_{0j}$. The y_{ij} is the observed income value of the i^{th} person in the j^{th}

[1] Generally, random slopes presuppose a random intercept, but this is not necessarily the case.

community. The coefficient β_0 is the weighed average[1] value of the communities' intercepts (i.e. the weighted average of the average expected incomes across communities, where education = 0 years). The coefficient β_1 represents the slope coefficient for the effect of education, and is interpreted in the traditional manner. The error term, e_{ij}, is also interpreted in the traditional manner; the addition of the 'j' to the subscript simply indicates applicability to individual *i* in community *j*. The u_{0j} are the level 2 residuals: effectively, the difference between community *j*'s intercept and β_0[2]. Like e, u_{0j} is assumed to be distributed normally around zero: $u_{0j} \sim N(0, \tau_{00})$. If the variance term τ_{00} is statistically significantly larger than zero, one can surmise that the intercept does differ across communities and that this random intercept model is an improvement over the traditional linear regression model. For linear multilevel models without random slopes, the individual level variance, σ^2, and the community-level variance, τ_{00}, may be used to calculate the variance partition coefficient (or intraclass correlation coefficient): $\tau_{00} / (\tau_{00} + \sigma^2)$. The coefficient, quite

[1] In calculating the fixed parts of random intercepts and slopes, larger groups are afforded more weight. For example, $\beta_{0j} = \beta_0 + u_{0j}$. The estimator for β_0 is a precision weighted average given by the following formula: $\hat{\gamma}_{00} = \sum \Delta_j^{-1} \bar{Y}_{.j} / \sum \Delta_j^{-1}$. Here, Δ_j^{-1} is the reciprocal of the individual level variance in group j, which is defined by $V_j = \sigma^2 / n_j$, n_j being the number of cases in group j (Raudenbush & Bryk, 2002, p.39-40). In an application, variance and covariance components are unknown parameters to be estimated along with the regression coefficients.

[2] Level two residuals are actually "shrunken residuals." The raw residual for a given group is the average of individual-level residuals within the group. Shrunken residuals are obtained by multiplying this average by a "shrinkage factor". This factor is always less than one, and decreases (reducing the magnitude of the level two residual) as the variance within the group increases and the number of cases within the group decreases (Rasbash et al., 2004, p.36).

straightforwardly, specifies the proportion of the unexplained variance in the model that exists between level two units.

Designation of a slope as random follows a similar logic. Suppose that one suspects that the effect of education on income varies across communities; in some communities, education has a more favourable effect on income than in others. One could designate $\beta_{education}$ as random, producing the following model: $y_{ij} = \beta_0 + \beta_1 X_{1ij} + e_{ij} + u_{0j} + u_{1j} X_{1ij}$. The outcome, y_{ij}, is the income of the i^{th} person in the j^{th} community. The coefficient β_0 is the weighed average of communities' intercepts. The u_{0j} are the intercept residuals. The coefficient β_1 is the weighted average of the slope coefficients across communities. The u_{1j} are the departures of communities' slopes from that average. Like e and u_{0j}, u_{1j} is assumed to be distributed normally around zero: $u_{1j} \sim N(0, \tau_{11})$. If τ_{11} is statistically significantly larger than zero, one can surmise that the slope does differ across communities and that this random slope model is an improvement over the simpler model with which it is being compared. Note that a model with a random intercept and slope will also include a term for the covariance between the level one intercepts and slopes: τ_{10}.

Once one has established the existence of random variation in intercepts and slope(s), one can introduce level two predictors. These predictors have the same value for every member of a given group, and can include variables aggregated from the level one (such as the average

education level in the community) or other characteristics of the groups (such as whether a community is urban or rural). The main effects of these level two predictors can help explain the intercept variance τ_{00}. For example, perhaps rural communities tend to have higher average incomes. Interactions between level one and level two predictors can help explain variation in a level one slope (e.g. τ_{11}). For example, perhaps education has a more positive effect on income in urban areas than in rural areas.

When intervals and/or slopes vary across groups, multilevel models also produce more realistic standard errors for the fixed effects of predictors than do traditional regression models. The latter assume independence of errors. When group effects are present, this assumption is violated. As a consequence, standard errors tend to be underestimated, and erroneous rejections of null hypotheses can occur. By acknowledging dependence among lower level units nested within higher level units, multilevel modeling techniques avoid this mistake.

Wald tests are typically used to assess the statistical significance of fixed effects in linear multilevel models. The test statistic, calculated by dividing the coefficient by its standard error, is compared to the standard normal distribution. Accordingly, coefficients that are at least twice the size of their standard errors can be regarded as statistically significant at the 95% confidence level. This procedure can also be used to test the

significance of variance and covariance terms. The likelihood ratio test is more accurate, however, and is therefore preferred (Raudenbush & Bryk, 2002, p.64; Hox, 1995, p.17). This test involves comparing the deviance (i.e. -2 log likelihood) of nested models. "Nested" means that a specific model can be derived from a more general model by removing terms from the general model (Hox 1995, p.17). For example, $y_{ij} = \beta_0 + \beta_1 X_{1ij} + e_{ij} + u_{0j}$ is nested within $y_{ij} = \beta_0 + \beta_1 X_{1ij} + e_{ij} + u_{0j} + u_{1j} X_{1ij}$ since the former excludes components that are present in the latter: the random slope component and the covariance component between the random slopes and intercepts. If $H = D_0 - D_1$, where D_0 is the deviance of the nested model and D_1 is the deviance of the model to which additional parameters have been added, H "has an approximate χ^2 distribution with *m* degrees of freedom where *m* is the difference in the number of unique variance and covariance components estimated in the two models" (Raudenbush & Bryk, 2002, p.64).

Linear multilevel models are estimated using maximum likelihood (ML) estimation. Computing maximum likelihood estimates requires an iterative procedure:

> At the beginning, the computer program generates reasonable starting values for the various parameters (in multilevel regression analysis these are usually based on single level regression estimates). In the next step, a computation procedure tries to improve upon the starting values, to produce better estimates. This second step is repeated (iterated) many times. After each iteration, the program inspects how much the estimates actually changed

> compared to the previous step. If the changes are very small, the program concludes that the estimation procedure has converged and that it is finished. (Hox, 2002, p.38)

"ML estimators provide values for the intercept and slopes that have the greatest likelihood of giving rise to the observed data" (Bickel 2007, p.115). I opted to use full maximum likelihood (FML) estimation rather than the more conservative and computationally intensive restricted maximum likelihood (REML) estimation. Given the extremely large size of my sample (at both level one and level two), the latter would not yield more accurate results[1].

The outcome variables under consideration in this dissertation include three continuous and two dichotomous variables. The linear mixed models described above are only appropriate for the former. When applied to the latter, several assumptions of the linear model are violated. First, predicted values are not restricted to the interval (0,1), which they should be if they are to be interpreted as the probability that that Y=1. Second, the level one residuals cannot be normally distributed since Y, and accordingly, e, can only take on one of two values. Third, the variance of the level one residuals will be heterogeneous since it varies with the predicted value of Y. Owing to these problems, multilevel generalized

[1] Unlike FML, REML accounts for the degrees of freedom lost by estimating the fixed effects in the model. The difference between FML and REML estimates tend to be small, however, and negligible when the number of level-2 groups is large (Hox, 2002, p.38). In such situations, the advantageous properties of FML make it the best option. First, FML is less computationally intensive. Second, it permits the use of likelihood ratio tests to test a model's fixed and random effects. Only random effects can be tested using likelihood ratio tests when a model is constructed using REML (Hox, 2002, p. 38).

linear models are more appropriate for the analysis of dichotomous outcomes (Raudenbush and Bryk, 2002, p.292). The logit model is the type of generalized linear model most commonly used to analyse binary outcomes, and is the type I opted to employ[1]. Generalized linear models include three components: 1) an outcome variable y with a specific error distribution that has a mean μ and a variance σ^2. In the case of logit models, the distribution is Bernouilli (a binary case of the binomial distribution where there is only one "trial"), the mean μ is the probability of a "success" (i.e. the probability that y=1) and the variance is defined by $\mu(1-\mu)$; 2) a linear additive regression equation that produces a predictor η of the outcome variable y (e.g. $\eta = \beta_0 + \beta_1 X_1 + \beta_2 X_2$) and; 3) a link function that links the expected values of the outcome variable y to the predicted values for η: $\eta=f(\mu)$ (Hox, 2002, p. 105). In the case of logit models, the link function is the logit function: $\eta=log[\mu/(1-\mu)]$. The logit is the log of the ratio of the probability that y=1 to the probability that y=0: $\text{logit}(\mu) = \log(\mu / (1-\mu))$. Probabilities are obtained using the following formula: $\mu = 1 / (1 + \exp(-\eta))$.

Unlike linear mixed models, generalized linear mixed models are ordinarily estimated using a modified form of maximum likelihood estimation. A variety of modifications exist, and different software

[1] Alternatives to logit models, such as probit models, exist. The latter have no substantive advantage over the former, however. Moreover, slope coefficients generated using logit models can be interpreted in a simpler manner: exponentiated coefficients from a logit model can be interpreted as odds ratios (Rasbash et al., 2004, p.104).

packages offer different estimation options. MLwin, the program I used, allows one to estimate logit models using first or second order marginal quazi likelihood (MQL) or penalized quazi-likelihood (PQL) methods[1]. These methods differ with respect to choices made concerning what is known as "Taylor series expansion":

> …combining multilevel and generalized linear models leads to complex models and estimation procedures. The prevailing approach, implemented e.g. in MLwin, HLM, and Prelis, is to approximate the nonlinear link by a nearly linear function, and to embed the multilevel estimation in the generalized linear model . . . The nonlinear function is linearized using an approximation known as Taylor series expansion. (Hox, 2002, p.108)

This linearization "leads to consideration of a linear model where the explanatory variables . . . are transformed using first and second derivatives of the nonlinear function" (Goldstein, 1999, p.80). Using only the first derivative produces a first order approximation. Using both the first and second yields a second order approximation. The latter are generally held to be superior to the former (Hox, 2002, p.108). "Taylor series linearization of a nonlinear function depends on the values of its parameters" (Hox, 2002, p.108). Since these values change with each iteration of the model, so must the Taylor series expansion. Marginal quazi-likelihood (MQL) updates the series using only the current estimated

[1] MLwin also supports advanced methods such as bootstrapping and Bayesian estimation. Because my level one and level two samples were very large, I was interested primarily in fixed effects ("the estimates provided by these methods differ primarily with respect to the random part"[Snijders & Bosker, 1999, p.219]), and my models did not exhibit major violations of the assumptions associated with quazi-likelihood methods, the latter were appropriate.

values of the model's fixed parameters. Penalized (or predictive) quazi-likelihood (PQL) also uses the current residuals. Again, the latter method is generally regarded as superior to the former (Hox, 2002, p.108). Given the general consensus respecting the superiority of second order over first order estimates and of PQL over MQL, I used second order PQL estimation. This type of estimation can encounter convergence problems (Hox, 2002, p.110, Rasbash et al., 2004, p.111). Consequently, following Rasbash et al. (2004), I used first order MQL estimation to produce starting values for second order PQL procedures.

Wald tests are used to ascertain the statistical significance of fixed effects in multilevel logit models. Likelihood ratio tests, however, the preferred method for testing the statistical significance of random effects, cannot be used for logit models estimated using quazi-likelihood procedures (Rasbash et al., 2004, p.113; Snijders & Bosker, 1999, p.218). Rasbash et al. (2004, p.113) recommend the Wald test as an alternative, but note that it is approximate since variance parameters are not normally distributed. More precise tests of significance exist. However, given my focus on fixed effects, plus the fact that Wald tests indicated that all of the random effects I examined were very highly statistically significant[1], more refined examinations were unnecessary.

[1] Wald tests generally lack power when applied to variance components (Berkhof & Snijders, 2001, p. 141).

Notably, "in the case of binary and other discrete response models, there is no single VPC [variance partition coefficient] measure since the level 1 variance is a function of the mean" (Rasbash et al., 2004, p.113). There are at least two different ways of defining the VPC for a multilevel logit model. Snijders and Bosker (1999, p.224) recommend (or at least highlight the advantages of) the following formula: $\tau_{00} / (\tau_{00} + (\pi^2/3))$. The level one variance ($\pi^2/3$) derives from the notion that an unobserved continuous variable underlies the observed binary outcome and is the variance of the logistic distribution on which the logit model is based.

2.3.2 The Response Variables

The response variables include five interrelated indicators of socioeconomic well-being: educational attainment, total income, employment income, labour force participation and employment.

2.3.2.1 Educational Attainment

Educational attainment is operationalized in terms of total years of schooling. This variable is part of the 2B microdata set[1], and was derived from question 26 through 28 of the 2001 Census. Preliminary analyses revealed that educational attainment is reasonably normally distributed. No transformations of the variable, consequently, were necessary.

[1] I.e. I did not derive it myself.

2.3.2.2. Total Income

This analysis of total income attempts to ascertain whether purchasing power is related to Aboriginal language use. Access to funds, whether derived from employment or not, often requires skill and motivation. This analysis will assess whether such skill and motivation is in greater or lesser supply among Aboriginal language users.

Total income refers to an individual's gross (i.e. before taxes) income from all sources. It is the sum of all income reported for an individual in question 51 (a through j) of the 2001 Census.

The distribution of total income has a strong positive skew. Consequently, I used the base-10 log of total income instead. For two reasons, the very small number[1] of individuals whose negative incomes (in absolute terms) composed more than 10% of their total incomes were excluded from these analyses. First, those with negative total incomes (particularly very large negative total incomes) complicated the distribution of the income variable. Second, those with negative incomes, particularly negative total incomes, tended to have complex income structures. For example, someone might have $150,000 in employment income and -$170,000 in investment income, leaving them with a total income of -$20,000. Placing such an individual on the "income continuum" is difficult. Most people's income varies somewhat from year to year, but fluctuation

[1] The actual number cannot be reported owing to confidentiality considerations but is less than a tenth of a percent of the sample.

is assumed to be fairly minimal. That is, what you made this year is assumed to be representative, more or less, of what you make generally. This assumption seems particularly untenable for those with substantial negative incomes, since few people are in the position to survive for long under such circumstances. Likewise, it seems unreasonable to classify such individuals as "making less" than people who reported no income, positive or negative, from any source.

Individuals between the ages of 20 and 69 only were included in this analysis. My decision to limit the population of interest to individuals 69 and younger was influenced by the bivariate relationship between age and total income. It is starkly curvilinear, resembling an upside-down "U" for those 18-69 years of age. After age 69, the total income appears to increase sharply and then to "level off". Attempts were made to capture this pattern using cubic splines. Interactions between the terms of the splines and the random regressors that constitute the Aboriginal language use variable, however, rendered the models unstable. I excluded 18 and 19 year olds because they also appeared to impact the fit of the model adversely, exaggerating the impact of age on total income. Simply, the relationship between age and total income for those 20-69 years of age seems to be captured very well by a second order polynomial. The number of cases outside of this age range is relatively small, and including

them compromises the fit of the model for what is really the population of primary interest: working-age adults.

2.3.2.3 Employment Income

Employment income consists of all income reported in question 51, *a* through *c*, of the 2001 Census of Canada. Analysis of this question aims to ascertain whether those who use an Aboriginal language tend to hold higher-paying (either by way of more hours employed or a higher rate of pay per hour) jobs than those who do not. The population being considered here is the adult Aboriginal Identity population (18 years and older) who reported employment income. Again, the small number of individuals whose negative employment incomes comprised more than 10% of their total employment incomes were excluded from these analyses. For the reasons discussed in the previous section, these analyses are also based only on individuals aged 20-69.

The distribution of employment income has a strong positive skew. Consequently, I used the base-10 log of employment income instead.

2.3.2.4 Labour Force Participation

This is a binary variable. It is coded as "Yes" for individuals who were in the labour force in the week prior to the census and "No" for those who were not. The indicator was derived from a more complex variable labeled LFTAG. This variable and my recoding scheme are presented below:

LFTAG
Labour Market Activities : Labour Force Activity
Refers to the labour market activity of the population 15 years of age and over, excluding institutional residents, in the week (Sunday to Saturday) prior to Census Day. Respondents were classified as either employed, unemployed or not in the labour force. The labour force includes the employed and the unemployed.

1 Employed - Worked in reference week - Armed Forces
2 Employed - Worked in reference week - Civilian
3 Employed - Absent in reference week - Armed Forces
4 Employed - Absent in reference week - Civilian
5 Unemployed - Temporary layoff - Experienced - Did not look for work
6 Unemployed - Temporary layoff - Experienced - Looked for full-time work
7 Unemployed - Temporary layoff - Experienced - Looked for part-time work
8 Unemployed - New job - Experienced – Did not look for work
9 Unemployed - New job - Experienced - Looked for full-time work
10 Unemployed - New job - Experienced - Looked for part-time work
11 Unemployed - New job - Inexperienced – Did not look for work
12 Unemployed - New job - Inexperienced - Looked for full-time work
13 Unemployed - New job - Inexperienced - Looked for part-time work
14 Unemployed - Looked for full-time work - Experienced
15 Unemployed - Looked for part-time work - Experienced
16 Unemployed - Looked for full-time work - Inexperienced
17 Unemployed - Looked for part-time work - Inexperienced
18 Not in labour force - Last worked in 2001
19 Not in labour force - Last worked in 2000
20 Not in labour force - Last worked before 2000
21 Not in labour force - Never worked
(Statistics Canada, 2007b, p.631)

Individuals who were either employed or unemployed were classified as being in the labour force. Individuals between the ages of 18 and 69 only were included in this analysis, the rationale being that I am interested in the "adult working age population." What constitutes the "working age population" is, of course, debatable. My decision to limit the population of interest to individuals 69 years old and younger was influenced by the relationship between age and labour force participation. The relationship resembles an upside-down "U" for those 18-69 years of age. After 69 years of age, in part because of the sparseness of the Aboriginal population, the relationship becomes erratic.

2.3.2.5 Employment

Employment is also a binary variable. This analysis is based on those members of the Aboriginal population aged 18-69 who reported being labour force participants. LFTAG codes one through four were recoded as "Employed", therefore, while codes five through 17 were coded as "Not Employed." Probability of employment among labour force participants is intended to capture the likelihood of getting a job, provided one is looking for a job.

2.3.3 Individual Level Predictors and Control Variables

2.3.3.1 Aboriginal Language Use

I derived the variable "Aboriginal Language Use" from census questions 13 though 16. These questions captured information on mother

tongue (the language first learned and still understood), home language (language(s) used most often or regularly in the home) and knowledge of non-official languages (the ability to carry on a conversation in a language other than French or English). Aboriginal Language Use includes the following five categories:

1) Speakers[1] (of an Aboriginal language) with an Aboriginal mother tongue and an Aboriginal home language

2) Speakers with an Aboriginal mother tongue and a non-Aboriginal home language

3) Speakers with a non-Aboriginal mother tongue and an Aboriginal home language

4) Speakers with a non-Aboriginal mother tongue and a non-Aboriginal home language

5) Non-speakers[2].

Individuals composing category one represent the archetypal traditional Aboriginal language user. These users learned the language as children (likely from their parents or guardians), and continue to employ it as their main language of communication, at least in the private sphere.

[1] Those who reported the ability to speak an Aboriginal language are deemed "speakers" and are also referred to as Aboriginal language users.

[2] Category five includes individuals who reported an Aboriginal mother tongue but not knowledge of an Aboriginal language. It is assumed that these individuals, who claim to understand their Aboriginal first language but cannot carry on a conversation in that language, have a sufficiently limited fluency in the language to classify them as "non-users." Notably, including this small group of individuals as a sixth category increased the number of terms (particularly random effects) to such an extent that some of the models exhibited convergence problems.

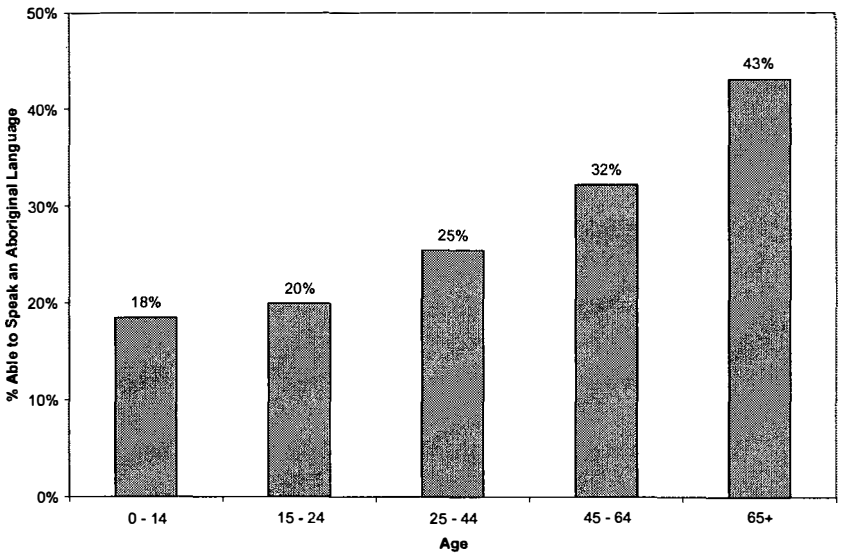
Category two includes individuals who learned an Aboriginal language as children, but no longer employ it as their main means of communication. For example, these individuals may use their Aboriginal language primarily to speak to their parents or other elders. Category three includes those with an Aboriginal second language that comprises their main mode of communication in the private sphere. Category four includes those with an Aboriginal second language who use another language as their primary mode of communication, but who are nonetheless capable of conversing in their Aboriginal language. Category five includes those who cannot speak an Aboriginal language. It perhaps worth emphasizing that individuals in category five are not necessarily completely unfamiliar with Aboriginal languages. For example, they may have had an Aboriginal first language, but have lost their capacity to speak it. Conversely, they may have gained some familiarity with an Aboriginal second language (or with their lost first language), but do not regard themselves as sufficiently fluent to converse in that language.

2.3.3.2 Age

Age is measured in years. As noted by Norris (2003), Aboriginal language use is more common among older individuals. Figure 2.1 depicts how knowledge of an Aboriginal language varies across age groups[1].

[1] Note that Figure 2.1 is derived from published data on the total Aboriginal Identity population, and not from the microdata upon which my own results are based. There is no substantive difference between the two data sources, but the published data have been rounded in accordance with Statistics Canada's confidentiality rules.

Figure 2.1: Knowledge of an Aboriginal Language Across Age Groups, Aboriginal Identity Population, 2001 Census of Canada



Source: Statistics Canada, 2003a

Age is also linked to educational attainment. On one hand, young adults have had insufficient time to attain higher levels of education. On the other, educational attainment has been increasing in Canada as formal credentials are pursued increasingly by successive cohorts.

Bivariate relationships between age and the response variables were uniformly nonlinear. Most followed the pattern of an inverted "U". Consequently, I incorporated age into all models as a second-order polynomial (i.e. I included both age and age squared). Employment is an exception. Using the base-10 log of age was sufficient to linearize its relationship with employment. As discussed above, interactions between age and Aboriginal language use are included in all models to evaluate

differences in the effects of Aboriginal language use on well-being across age groups.

2.3.3.3 Gender

Men and women, within and without the Aboriginal Identity population, tend to have different levels of well-being. Within the Aboriginal Identity population, for example, educational attainment appears to be slightly higher among women (Statistics Canada, 2003d, online). Men, however, have a higher average income (Statistics Canada, 2003b, online). While knowledge of an Aboriginal language was equally common among men as women in 2001 (Statistics Canada, 2003a), patterns of Aboriginal language use have been noted to vary by gender (Norris, 2006).

2.3.3.4 Knowledge of an Official Language

Lack of proficiency in English and/or French seems likely to hinder socioeconomic success. Successful participation in mainstream education, for example, practically presupposes fluency in at least one of those languages. Respecting Aboriginal peoples in Canada specifically, the small size and diversity of Aboriginal language groups, for the most part, negates the possibility of many monolingual Aboriginal language users finding economic success in an ethnic enclave[1].

[1] Research on immigrants to America reveal that some minority groups achieve prosperity by maintaining their minority cultures and languages and capitalizing on resulting niche markets and community cohesion. See, for example, Portes and Rumbaut (2001).

As indicated in chapter 1, some assert that minority language use reduces dominant language proficiency. More importantly, inability to converse in a dominant tongue is going to be related to Aboriginal language use by default since Aboriginal people who do not speak an official language must be speaking *something,* and that something is very likely to be an Aboriginal language[1]. Controlling for knowledge of an official language, then, is intended to reveal whether Aboriginal language use per se is related to socioeconomic outcomes.

2.3.3.5 Aboriginal Group

I differentiate among four Aboriginal groups: Registered Indians, non-Registered Indians, Métis and Inuit. Aboriginal language use varies across these groups (Norris 2006), as does socioeconomic well-being (Mendelson, 2006; Senécal et al., 2006). For the most part, classifying respondents into one of the four groups was straightforward. Most members of the Aboriginal Identity population identified with only one Aboriginal group: North American Indian, Inuit, or Métis (Statistics Canada, 2003a). Slightly over half a percent (6,660 of 976,305), however, identified with two or even all three groups (Ibid). I assigned these

[1] Approximately 15,000 members (~2%) of the Aboriginal Identity population were unable to speak an official language in 2001. Approximately 70% of these individuals reported the ability to speak only an Aboriginal language (Statistics Canada, 2003a). Some may be surprised that this figure is not higher. It in important to keep in mind, however, that the many members of the Aboriginal Identity population are of mixed ancestry and that they may be monolingual in the tongue of their non-Aboriginal parent or guardian. More importantly, the fact that some of the monolingual Aboriginal Identity population speaks a non-Aboriginal language in no way negates the importance of using "ability to speak an official language" as a control variable.

individuals randomly to one of the two or three groups with which they identified[1]. The category "Registered Indians" is also somewhat complex. Given the legal and financial ramifications of being a status Indian, I opted to categorize all Registered Indians as such, even if they identify as Inuit or Métis. More than 90% of Registered Indians are North American Indians (Ibid). The remaining ten percent, however, includes individuals who identify as Métis and/or Inuit, either exclusively or in addition to North American Indian.

2.3.3.6 Homogeneous Aboriginal versus Heterogeneous Ancestry

The 2001 Census of Canada permitted respondents to list up to six different ethnic origins. I classified respondents as having either homogeneous or heterogeneous ancestry. Those with homogeneous ancestry identified themselves as having only Aboriginal ethnic origins. Those with heterogeneous ancestry identified themselves as having at least one ethnic origin that is not North American Indian, Inuit, or Métis. Admittedly a crude measure, this variable is an attempt to quantify "Aboriginality." As indicated above, I tested the interaction between Aboriginal language use and ancestry to address my third research question: Does the impact of Aboriginal language use depend on whether one has homogeneous ancestry or heterogeneous ancestry? Ancestry is

[1] Another option would have been to exclude such individuals from my analysis. Since ethnic group is a control variable and not a factor in which I am explicitly interested, however, it would have been inappropriate to exclude cases on account of it.

also an important control variable, however. Individuals with only Aboriginal origins are about 12 times more likely to speak an Aboriginal language than individuals with heterogeneous ancestry[1]. This is not surprising. Those with mixed ethnic origins, for example, are more likely to have grown up with a non-Aboriginal parent and, hence, are less likely to have grown up using an Aboriginal language at home. It also seems possible the socioeconomic ills associated with Aboriginal populations may be less common among individuals who may be more integrated into different ethnic communities. A spurious relationship between Aboriginal language use and ancestry may therefore exist.

2.3.4 Community Level Predictors

2.3.4.1 Community Type

CSDs are classified as either legal reserves, other Aboriginal communities, or non-Aboriginal communities. A legal reserve is a tract of land that is set apart for the use and benefit of an Indian Band, the legal title of which is held by the Crown, and which is administered under the provisions of the Indian Act. "Other Aboriginal communities" include CSDs that are not legal reserves but at least three quarters of whose populations claim an Aboriginal identity. The balance of CSDs are deemed "non-Aboriginal communities."

[1] I derived this statistic from the 20% sample of the 2001 Census of Canada.

It is necessary to control for legal reserve status owing to the greater prevalence of Aboriginal language use on-reserve combined with the impediments to economic development that exist on reserves. About half of the on-reserve Aboriginal Identity population claimed knowledge of an Aboriginal language in 2001, compared to about 13% of the off-reserve Aboriginal Identity population (Statistics Canada 2003b). The lower levels of well-being found on-reserve (see, for example, O'Sullivan and McHardy, 2007; Cooke and Beavon, 2007) have been attributed to the financial and organizational obstacles to economic development on-reserve that arise from the Indian Act. For example, the Act prohibits seizure of reserve lands. Their consequential ineligibility as collateral for loans has proven an impediment to economic development on reserve (Fiscal Realities, 1999). Complex and unfamiliar rules arising from the fact that development on-reserve is controlled by the federal government introduce additional obstacles (Fiscal Realities, 1999). Essentially, a spurious negative relationship may exist between Aboriginal language use and well-being as the reserve-dwellers among whom Aboriginal language use is more common also face peculiar barriers to economic success.

A cross-level interaction between Aboriginal language use and community type tests my second research question: Does the impact of Aboriginal language use on one's well-being depend on whether one resides in an Aboriginal community? Notably, it is this cross-level

interaction that necessitated the inclusion of the category "other Aboriginal communities" and its distinction from legal reserves. It is conceivable that whatever motivation Aboriginal language use produces within Aboriginal communities cannot overcome the economic realities of the reserve system. If Aboriginal language use is a boon in the context of Aboriginal communities, therefore, its benefits may be less pronounced in Aboriginal communities governed by the Indian Act than in those that are not.

Some might regard the cutoff of 75% Aboriginal Identity population – which determines inclusion in the category "other Aboriginal community" – as too high. A sense of Aboriginal community should, after all, be possible in communities composed of, say, 50% Aboriginal people. The cutoff of 75% is justifiable, however, for two reasons. First, any cutoff is ultimately arbitrary. Second, the average Aboriginal identity population of legal reserves is over 90% (Statistics Canada, 2002)[1]. Using a lower cutoff for "other Aboriginal communities" would introduce the question of whether differences between the two community types was due to the Indian Act or simply to lower concentrations of Aboriginal people in "other Aboriginal

[1] This figure is based on those reserves whose data for 2001 are not suppressed (i.e. which have at least 40 inhabitants).

communities." Ultimately, I recognize that this categorization is imperfect. Modifications, however, would introduce their own imperfections[1].

2.3.4.2 Aboriginal Language Use at the Community Level

This variable is defined as the percentage of Aboriginal community members that can speak an Aboriginal language. The main effect of the variable is interesting to the extent that it might explain some of the between-group variation in the response variables. My main interest in Aboriginal language use at the community level, however, lies in its potential interaction with individual level Aboriginal language use. This interaction tests my third research question: Does the impact of Aboriginal language use on one's well-being depend on the extent to which Aboriginal languages are used in one's community? Note that discussions of this predictor refer explicitly to "Aboriginal language use at the community level." "Aboriginal language use" refers to the individual level variable.

[1] One obvious alternate operationalization of "Aboriginal community" deserves discussion. One could include a two-category dummy variable categorizing communities as legal reserves or "other" and "Aboriginal proportion of the population" as a separate, continuous variable. Such an operationalization would eliminate the need to assign "other Aboriginal community" status to communities on the basis of an arbitrary proportion of Aboriginal people. This operationalization has a prohibitive drawback, however. Most reserves are populated almost entirely by Aboriginal people. A variable distinguishing between "on-reserve" and "off-reserve" will, therefore, be highly collinear with "Aboriginal proportion of the population." Preliminary analyses revealed that, predictably, this colinearity rendered the coefficients associated with both variables difficult to interpret.

2.3.4.3 Changes in Aboriginal Language Use at the Community Level

In the interest of brevity, I refer to this variable as "language change." It is defined in terms of the percentage of community members who use an Aboriginal language in the home less the percentage of community members who have an Aboriginal mother tongue. This definition is a slight adaptation of Norris's "index of continuity," "which measures the number of people who speak the language at home for every 100 persons who speak it as their mother tongue" (Norris, 2006, p.224). Norris regards this ratio as a key indicator of how Aboriginal language use is changing within communities, and of languages' long-term viability. Ratios less than one indicate language decline, but less rapid decline as they approach one. Ratios greater than one are indicative of increases in Aboriginal language use. Accordingly, positive values of language change are indicative of increases in Aboriginal language use, while negative values indicate declines. The main effect of language change and its interaction with Aboriginal language use pertains to the first and second portions, respectively, of research question number 6: Does change in Aboriginal language use at the community level affect well-being, and does its effect vary across categories of Aboriginal language use?

2.3.4.4 Proximate Population

This variable is a measure of community isolation: communities with larger proximate populations are regarded as less isolated than communities with smaller proximate populations. Proximate population refers to the population within a 150 km radius of a given CSD. More specifically, the variable includes the populations of Canadian CSDs, as defined by a single geographical coordinate, within 150 km of a given CSD, which is also defined in terms of a single geographical coordinate. The 150 km radius is defined in terms of "Great Circle Distance" [1,2]. Scatter plots of proximate population against the response variables revealed a slight curve. Consequently, I used the base-10 log of the variable instead.

The main effect of proximate population is of interest given its potential to introduce a spurious negative relationship between Aboriginal language use and well-being. As discussed previously, contact with dominant languages tends to erode minority language use. Accordingly, higher levels of Aboriginal language use have been observed in more isolated communities. Almost by definition, isolated communities also

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[1] Great Circle Distance is the shortest straight-line distance between two points on a sphere. Its formula is as follows: 6,378.8 * arccos[sin(lat1) * sin(lat2) + cos(lat1) * cos(lat2) * cos(lon2 - lon1)]

[2] I produced this variable using the CSD latitudes and longitudes available in 2001 Geosuite. For the sake of efficiency, I divided CSDs into subsets of 100.I then calculated the distance between each in the set with all other CSDs within an area defined by two degrees plus the highest latitude in the subset and two degrees plus the highest longitude in the subset. As one degree is approximately 100km, two degrees should have captured all CSDs within 150km.

have reduced access to educational and employment opportunities. The interaction between proximate population and Aboriginal language use pertains to my seventh research question: Does the effect of Aboriginal language use on one's well-being depend on the isolation of the community in which one resides?

2.3.5 Centering

Note that all continuous predictors apart from language change are grand-mean centered. Centering predictors is standard practice in multilevel models, as it ensures that zero (i.e. the value at which the regression line crosses the y-axis) is an interpretable value (i.e. the mean of the predictor, when grand mean centering is employed) and "permits the use of multiplicative interaction terms without generating troublesome multicolinearity" (Bickel, 2007, p.134). Grand-mean (as opposed to group-mean) centering is appropriate for my purposes as I am attempting to "account for variability in a level one dependent variable, using independent variables at more than one level" (Bickel, 2007, p.144). I opted not to centre language change as zero already had an ideal interpretation: where language change equals zero, the level of Aboriginal language use in a community is static.

2.3.6 Random Effects

In all models, the intercept and the coefficients associated with Aboriginal language use are tested for random effects. Several of my

research questions imply that contextual factors may impact the effect of Aboriginal language use on the outcome variables. Accordingly, Aboriginal language use is modeled as random, and attempts are made to explain the variance in its coefficients using level two predictors. Intercepts are tested for random effects because random slopes generally presuppose random intercepts, and to ensure accurate standard errors.

Chapter 3: Results

3.1 Introductory Notes

This chapter is organized as follows: a separate section is devoted to each response variable. Since analyses of each response variable are based on a different subset of data, each section begins with statistics describing those data. Subsequently, a "full model" is presented, which includes all the main and interaction effects discussed in chapter 2. Either this full model, or a model from which non-significant interactions are excluded, is then interpreted[1]. For all outcomes save educational attainment, an additional model is then presented. These models control for educational attainment. They are discussed briefly, with a focus on how they differ from their counterparts that do not control for educational attainment. Tables of coefficients are provided in Appendix 1.

Owing to the complexity of these models, effects are generally discussed in terms of predicted values. Predicted values are calculated by varying the predictors of interest while holding the other predictors in the model constant at their means or reference categories. Factor variable reference categories are listed in table 3.1.1.

The onerously lengthy titles of the Aboriginal language use categories are often abbreviated. Apart from non-speakers, whose label (NS) is intuitive, Aboriginal language use categories are labeled according

[1] Appendix 2 provides guidance on how these models should be interpreted.

to whether they have an Aboriginal mother tongue and whether they have an Aboriginal home language. For example, those with a non-Aboriginal mother tongue and Aboriginal home language are labeled as NY (i.e. "no, yes"). The remainder of the abbreviated forms are provided in Table 3.1.1.

Table 3.1.1: Factor Variables and Reference Categories

Variable	Regressor	Reference Category
Aboriginal Language Use	Non-Speakers (NS)	Non-speakers
	Aboriginal Mother Tongue, Non-Aboriginal Home Language (YN)	
	Non-Aboriginal Mother Tongue, Aboriginal Home Language (NY)	
	Non-Aboriginal Mother Tongue, Non-Aboriginal Home Language (NN)	
	Aboriginal Mother Tongue, Aboriginal Home Language (YY)	
Knowledge of an Official Language	Yes	Yes
	No	
Gender	Female	Female
	Male	
Ancestry	Heterogeneous	Heterogeneous
	Homogeneous	
Aboriginal Group	Registered Indian	Registered Indian
	Non-Registered North American Indian	
	Métis	
	Inuit	
Community Type	Non-Aboriginal Community	Non-Aboriginal Community
	Legal reserve	
	Other Aboriginal Community	

In the interest of brevity, effects are sometimes discussed without specific reference to statistical significance. Readers may assume that,

unless otherwise stated, effects discussed are statistically significant at or beyond the 0.05 significance level. With one exception, this statement applies to the individual coefficients comprising factor variables. The exception is the set of terms involving interactions between Aboriginal language use and age polynomials, as these individual terms are difficult to interpret directly. Readers may refer to specified tables for p-values.

For each of the models, individual level effects are presented before community-level effects. An exception is community type. Its effects are presented first, since significant interactions between Aboriginal language use and community type occur in all models and impact interpretations of other predictors' effects[1,2].

Differences in the relationships between the four categories of Aboriginal language users and the outcome variables will be apparent in most of the figures below. They are idiosyncratic however, so will not be discussed until chapter 4, which addresses model results with explicit reference to the research questions introduced in chapter 2.

Finally, as indicated in chapter 2, a number of variables were transformed into their base-10 logarithms. These include total income,

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[1] If the effects of Aboriginal language use differ markedly across community types, it is not sensible to examine the effects of continuous predictors with which Aboriginal language use interacts for non-Aboriginal communities (the reference category of community type) only. Ancestry also interacts with Aboriginal language use in some models. Since its effects are smaller and less ubiquitous, however, they are discussed without reference to their impact on interpretations of other predictors' effects.

[2] Where predicted values are discussed without specific reference to community type, those values pertain to the reference category for community type: non-Aboriginal communities.

employment income, proximate population and, in one model, age. Readers are to interpret the term "log," when used in reference to these transformed variables, as the base-10 logarithm.

3.2 Educational Attainment

Table 3.2.1 describes the data set used to model the relationship between Aboriginal language use and educational attainment.

Table 3.2.1: Description of the Educational Attainment Data Set

Total N	274,445
Variable	**Mean**
Age	39 years
Continuity Index	-3.07
Log of Proximate Population	4.97 ($10^{4.97}$=92,315)
Community Level Aboriginal Language Use	39%
	Count (%)
Gender	
Male	135,265 (49%)
Female	139,180 (51%)
Knowledge of an Official Language	
Yes	267,945 (98%)
No	6,495 (2%)
Ancestry	
Heterogeneous ancestry	69,365 (25%)
Homogeneous ancestry	205,080 (75%)
Aboriginal Group	
Registered Indian	193,330 (70%)
Non-Registered North American Indian	14,785 (5%)
Métis	45,480 (15%)
Inuit	20,850 (8%)
Community Type	
Non-Aboriginal community	89,310 (33%)
Legal reserve	147,725 (54%)
Non-reserve Aboriginal community	37,410 (14%)
Aboriginal Language Use	
Non-speakers (NS)	144,000 (52%)
Aboriginal Mother Tongue, Non-Aboriginal Home Language (YN)	21,620 (8%)
Non-Aboriginal Mother Tongue, Aboriginal Home Language (NY)	8,550 (3%)
Non-Aboriginal Mother Tongue, Non-Aboriginal Home Language (NY)	14,835 (5%)
Aboriginal Mother Tongue, Aboriginal Home Language (YY)	85,435 (31%)

Table 3.2.2 displays the average educational attainment of respondents in each of the five language use categories. Non-speakers

have the highest average level of educational attainment. Those with neither an Aboriginal home language nor mother tongue trail non-speakers by just under one year, while those with both an Aboriginal mother tongue and Aboriginal home language trail non-speakers by three years.

Table 3.2.2: Mean Educational Attainment Across Aboriginal Language Use Categories

Aboriginal Language Use	Average Total Years of School
Non-speakers (NN)	11.6
Aboriginal mother tongue, non-Aboriginal home language (YN)	10.0
Non-Aboriginal mother tongue, Aboriginal home language (NY)	10.4
Non-Aboriginal mother tongue, non-Aboriginal home language (NN)	10.7
Aboriginal mother tongue, Aboriginal home language (YY)	8.6

Table A.1 (in appendix 1) details model 1, the "full model" for educational attainment. Standard errors and Wald tests for each coefficient are provided, as are joint Wald tests of the variables composed of multiple regressors. These tests support the retention of all of the model's terms: even in the two instances where main effects of regressors are not statistically significant, interactions involving those regressors are. Wald tests suggest that the variance components for both the random intercept and random slopes are statistically significant. Table 3.2.3

presents likelihood ratio tests of model 1 against models that exclude a random intercept and random slopes, respectively. These tests, which are more accurate than Wald tests, confirm the statistical significance of the variance and covariance components for the random intercept and slopes.

Table 3.2.3: Likelihood Ratio Tests of the Full Model of Educational Attainment Against a Model Without a Random Intercept and a Model Without Random Slopes

	-2 Log Likelihood	Difference	P Value
Full Model	1362134	-	-
Less Random Intercept	1367113	4979	<0.00001 (1 df)
Less Random Slopes	1363470	1336	<0.00001 (14 df)

Table 3.2.4 reports predicted educational attainment for members of the five language use categories in each of the three community types. Living in an Aboriginal community appears to be slightly disadvantageous for non-speakers. The opposite is generally true for Aboriginal language users. For example, Aboriginal language users who reside in non-Aboriginal communities are expected to have obtained between 0.2 and 0.6 fewer years of education than their counterparts in non-reserve Aboriginal communities. Accordingly, gaps in predicted educational attainment between Aboriginal language users and non-speakers vary by community type. In non-Aboriginal communities, non-speakers are

predicted to have attained 0.7, 0.6, 0.5 and 0.9 more years of education than the YN, NY, NN and YY groups, respectively. In Aboriginal communities, however, non-speakers have no clear advantage.

Table 3.2.4: Predicted Educational Attainment as a Function of Community Type and Aboriginal Language Use

	Predicted Years of School			Difference	
Language Use Category	Non-Aboriginal Communities (A)	Legal Reserves (B)	Non-reserve Aboriginal Communities (C)	B - A	C - A
NS	12.5	12.2	12.4	-0.3	-0.1
YN	11.8	12.2	12.2	0.4	0.3
NY	11.9	12.2	12.5	0.4	0.6
NN	12.0	12.0	12.2	0.0	0.2
YY	11.6	12.0	12.0	0.4	0.4

Figure 3.2.1 displays predicted educational attainment as a function of age and Aboriginal language use in non-Aboriginal communities. Differences across categories are small among young adults, with the YY category having the highest predicted level of educational attainment until age 24. As age increases, non-speakers exhibit an increasing advantage over Aboriginal language users. By age 40, the predicted educational attainments of the YN, NY, NN and YY groups are 0.7, 0.6, 0.5 and 0.9 years lower, respectively, than non-speakers' predicted educational attainment. By age 70, these disparities have grown to 1.6, 1.5, 1.1 and 1.9 years, respectively. Disparities among the four categories of Aboriginal

language users emerge as well, as age increases. These disparities are non-negligible, with the largest measured at about 0.8 years. Nonetheless, the four groups of Aboriginal language users form a distinct cluster.

Figure 3.2.1: Predicted Educational Attainment as a Function of Age and Aboriginal Language Use in Non-Aboriginal Communities

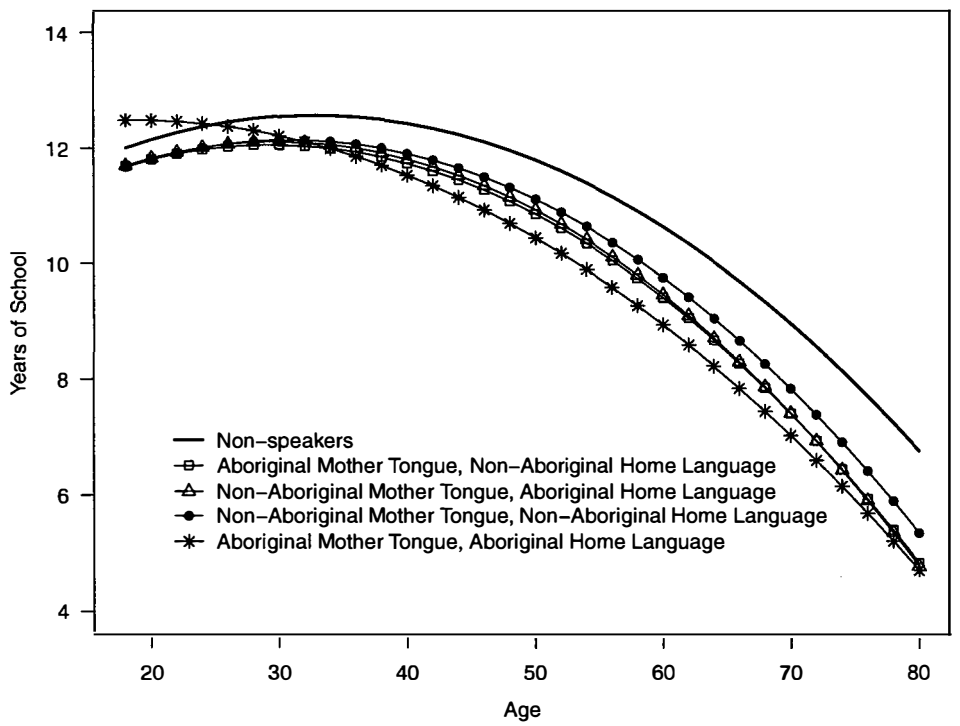


Figure 3.2.2 and 3.2.3 plot predicted educational attainment as a function of age and Aboriginal language use in legal reserves and other Aboriginal communities, respectively.

Figure 3.2.2: Predicted Educational Attainment as a Function of Age and Aboriginal Language Use in Legal Reserves

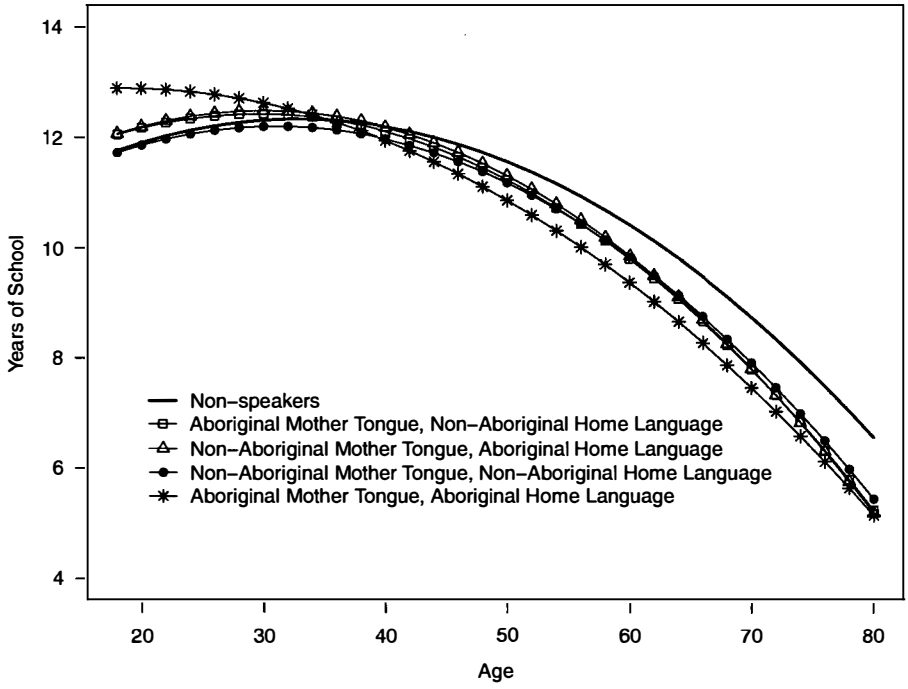
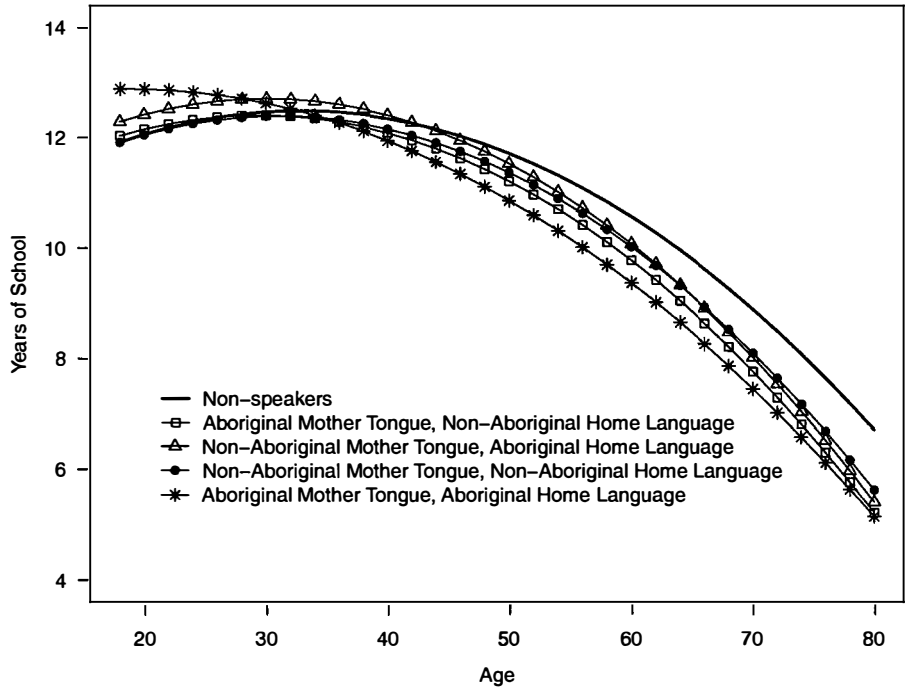


Figure 3.2.3: Predicted Educational Attainment as a Function of Age and Aboriginal Language Use in Non-Reserve Aboriginal Communities



Figures 3.2.2 and 3.2.3 indicate that the advantage of non-speakers over Aboriginal language users is less pronounced in Aboriginal than in non-Aboriginal communities. In Aboriginal communities, younger Aboriginal language users are predicted to have as high or higher educational attainment than non-speakers. Further, non-speakers exhibit noticeable advantages at higher ages than in non-Aboriginal communities and the advantages they do exhibit are smaller than those measured in non-Aboriginal communities. For example, in legal reserves at 20 years of age, non-speakers are predicted to have between zero and one fewer years of education than the four groups of Aboriginal language users. At age 70, non-speakers are predicted to have between 0.8 and 1.3 more years of education than Aboriginal language users.

The highly statistically significant main effect of ancestry indicates that non-speakers with heterogeneous ancestry are predicted to have about 0.6 more years of education than non-speakers with homogeneous ancestry. The interaction between ancestry and Aboriginal language is also statistically significant, but the terms involving the YN and NN categories are not. The statistically significant interaction terms associated with the NY and YY categories are negative, suggesting that having homogeneous ancestry is even more disadvantageous for members of these categories than for non-speakers or, equivalently, that having heterogeneous ancestry is even more advantageous. The effects are very

modest, however. The largest and most statistically significant interaction term is associated with the YY category, but the additional negative impact of homogeneous ancestry on its members amounts to less than three tenths of a year of school. Table 3.2.5 provides details.

Table 3.2.5: Predicted Educational Attainment as a Function of Ancestry and Aboriginal Language Use

Aboriginal Language Use Category	Predicted Educational Attainment		
	Heterogeneous Ancestry (A)	Homogeneous Ancestry (B)	Difference (A - B)
NS	12.5	11.8	0.64
YN	11.8	11.2	0.60
NY	11.9	11.0	0.85
NN	12.0	11.4	0.54
YY	11.6	10.7	0.90

The main effects of the remaining level-one predictors are highly statistically significant. Males are predicted to have approximately 0.4 fewer years of education than females. Those who do not know an official language are predicted to have approximately 3.5 fewer years of education than those who do. Métis persons are predicted to have about 0.2 more years of education than Registered Indians, while Inuit people and non-Registered North American Indians are predicted to have about

0.4 and 0.1 fewer years of education, respectively, than Registered Indians.

The interaction between Aboriginal language use and community-level Aboriginal language use is highly statistically significant, though the main effect of the former is not. Figures 3.2.4 through 3.2.6 plot predicted educational attainment as a function of community-level Aboriginal language use in the three community types. The figures illustrate how the fitted values of educational attainment decrease for Aboriginal language users as community-level Aboriginal language use increases. The largest effect is associated with individuals with both an Aboriginal mother tongue and home language. Such individuals living in communities in which 100% of Aboriginal people use an Aboriginal language are predicted to have completed about two fewer years of schooling than equivalent individuals in communities in which zero percent of Aboriginal people use an Aboriginal language[1].

[1] Zero percent should be interpreted as "rounded to zero percent", since the notion that residence in communities devoid of Aboriginal language use affects Aboriginal language users is contradictory.

Figure 3.2.4: Predicted Educational Attainment as a Function of Individual and Community Level Aboriginal Language Use, Non-Aboriginal Communities

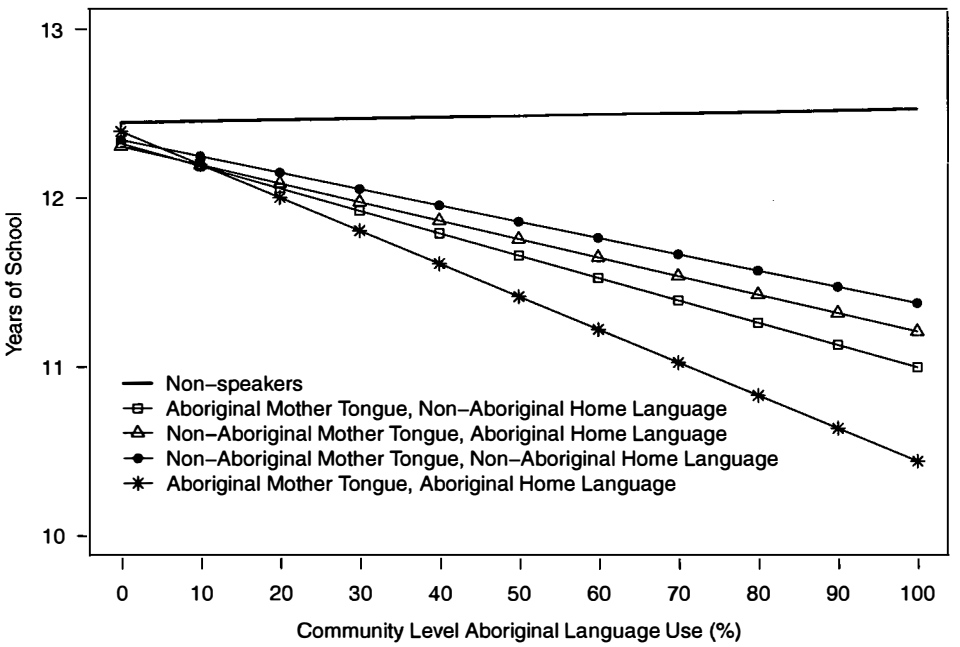


Figure 3.2.5: Predicted Educational Attainment as a Function of Individual and Community Level Aboriginal Language Use, Legal Reserves

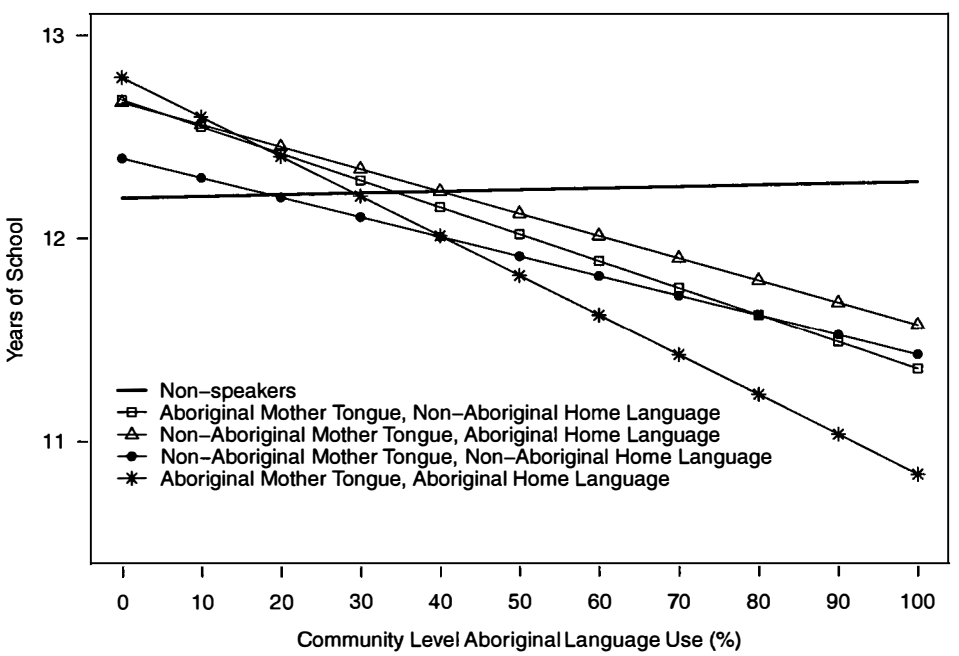
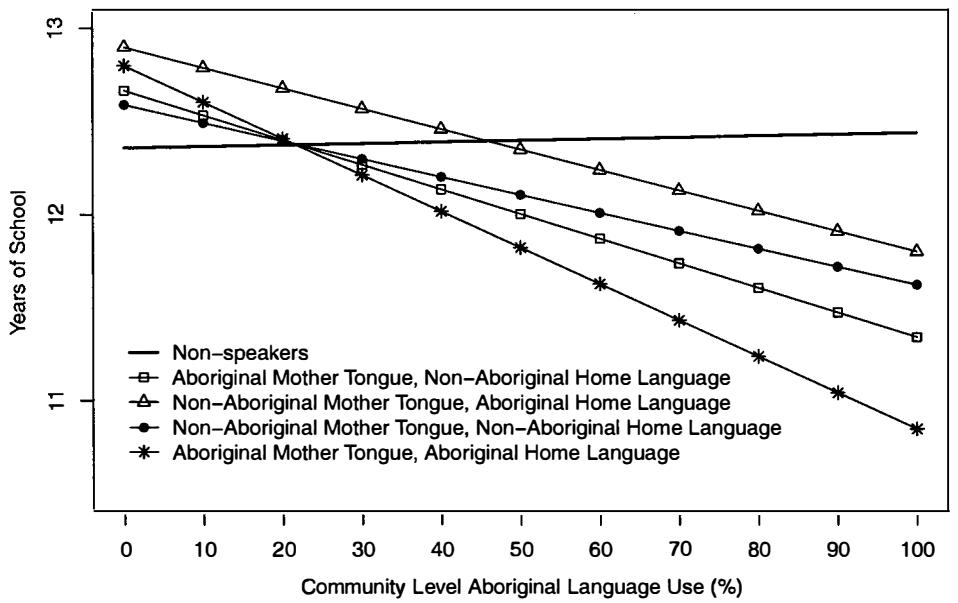


Figure 3.2.6: Predicted Educational Attainment as a Function of Individual and Community Level Aboriginal Language Use, Non-Reserve Aboriginal Communities



The figures also demonstrate that the clear advantage exhibited by non-speakers in non-Aboriginal communities is not evident in Aboriginal communities. In non-Aboriginal communities, non-speakers have a minute advantage over Aboriginal language users at low levels of community-level Aboriginal language use and a considerable advantage at high levels of community-level Aboriginal language use. Non-speakers in non-Aboriginal communities whose entire Aboriginal populations use an Aboriginal language are predicted to have between 1.1 and 2.1 more years of education than the four groups of Aboriginal language users. In Aboriginal communities, Aboriginal language users have an advantage over non-speakers at low levels of community level Aboriginal language

use, and a less pronounced disadvantage at high levels of community level Aboriginal language use. For example, non-speakers in legal reserves in which zero percent of Aboriginal people use an Aboriginal language are predicted to have between 0.2 and 0.6 fewer years of education than the four groups of Aboriginal language users. Non-speakers in legal reserves in which all Aboriginal people speak an Aboriginal language are predicted to have between 0.7 and 1.4 more years of education than Aboriginal language users.

Figure 3.2.7 displays predicted levels of educational attainment in non-Aboriginal communities as a function of proximate population and Aboriginal language use. The positive association between proximate population and educational attainment is more pronounced for Aboriginal language users. Non-speakers in communities with proximate populations of seven million are predicted to have about 1.4 more years of education than non-speakers in communities with proximate populations of 1,000[1]. Aboriginal language users in communities with proximate populations of seven million are predicted to have between 2.1 and 2.8 more years of education than their counterparts in communities with proximate populations of 1,000.

[1] Approximately 95% of respondents reside in communities whose proximate populations fall between 1,000 and seven million.

Figure 3.2.7: Predicted Educational Attainment as a Function of Proximate Population and Aboriginal Language Use in Non-Aboriginal Communities

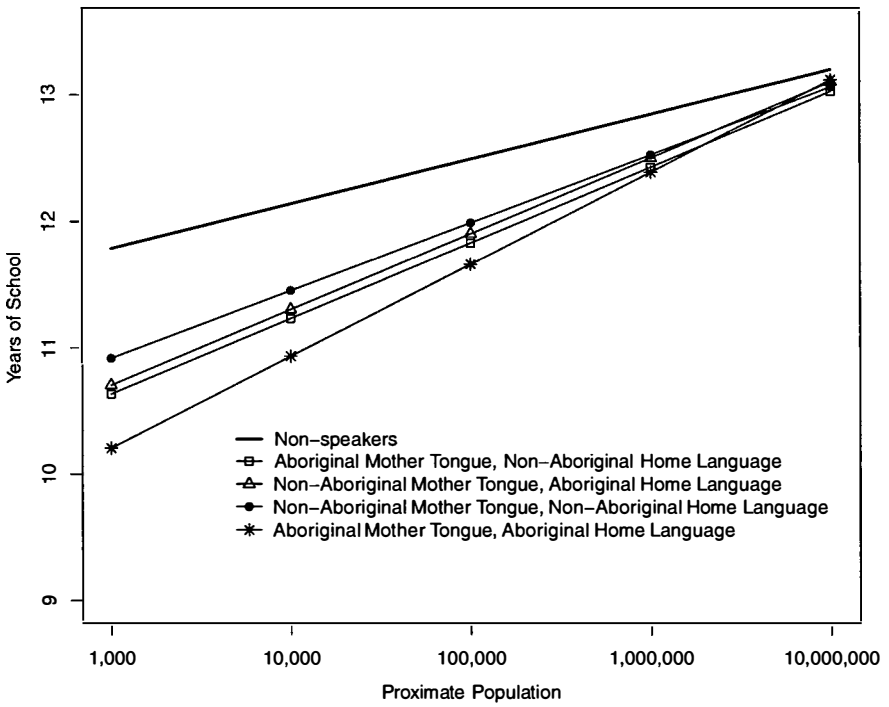


Figure 3.2.7 demonstrates that, in the most isolated non-Aboriginal communities, non-speakers are predicted to have completed between 0.9 and 1.6 more years of school than the four groups of Aboriginal language users. Little difference exists across language use groups in non-Aboriginal communities with high proximate populations. Figures 3.2.8 and 3.2.9 indicate that, in Aboriginal communities, Aboriginal language users have an advantage over non-speakers at high levels of proximate population, and a less pronounced disadvantage at low levels of proximate population. For example, in legal reserves with proximate populations of 1,000, non-speakers are predicted to have between 0.5 and

0.9 more years of education than the four groups of Aboriginal language users. In legal reserves with proximate populations of seven million, non-speakers are predicted to have between 0.1 and 0.5 *fewer* years of education than Aboriginal language users

Figure 3.2.8: Educational Attainment as a Function of Proximate Population and Aboriginal Language Use in Legal Reserves

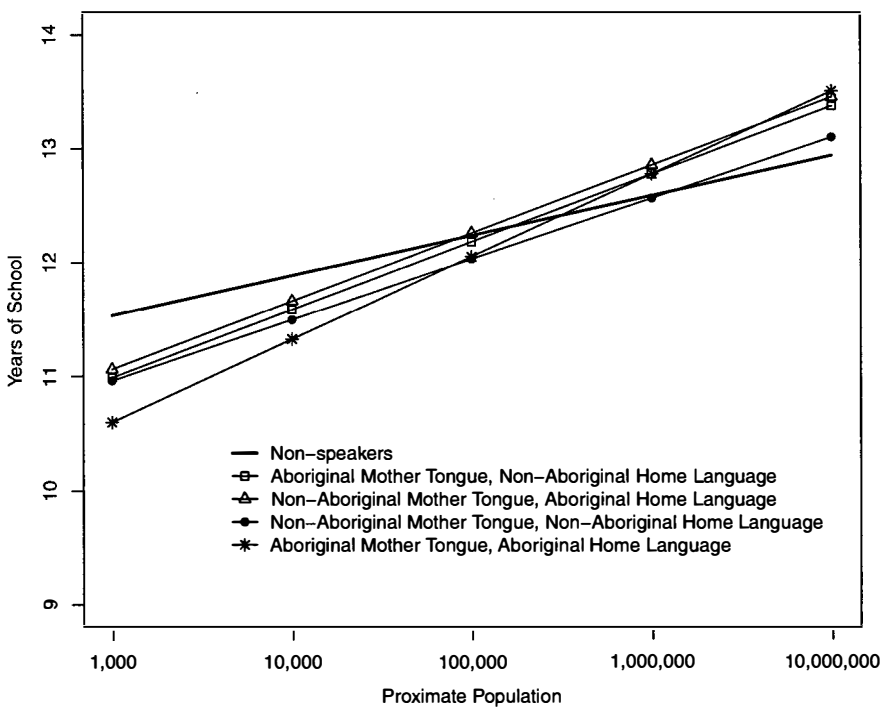
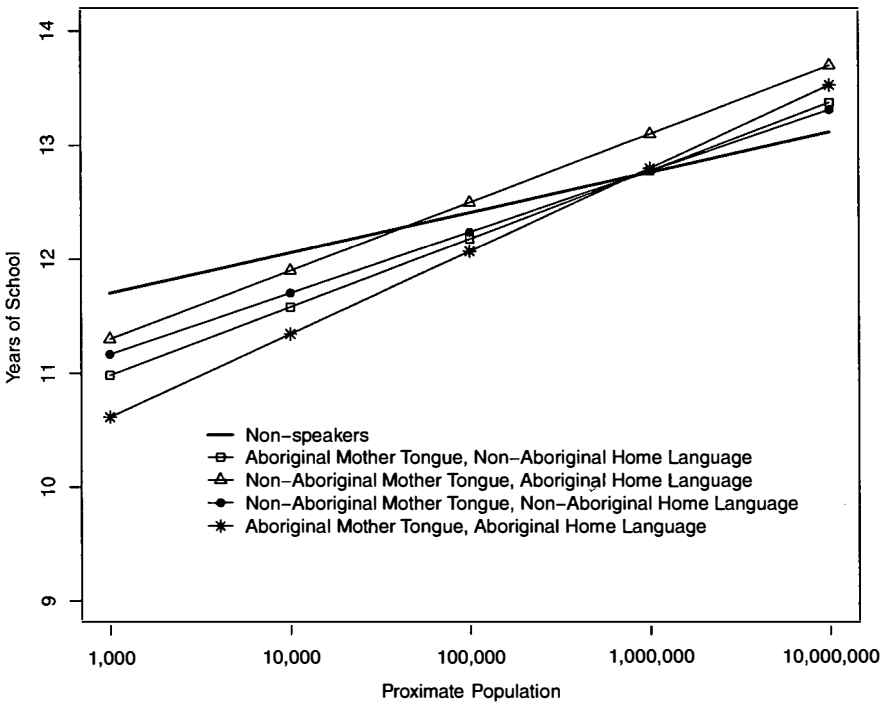


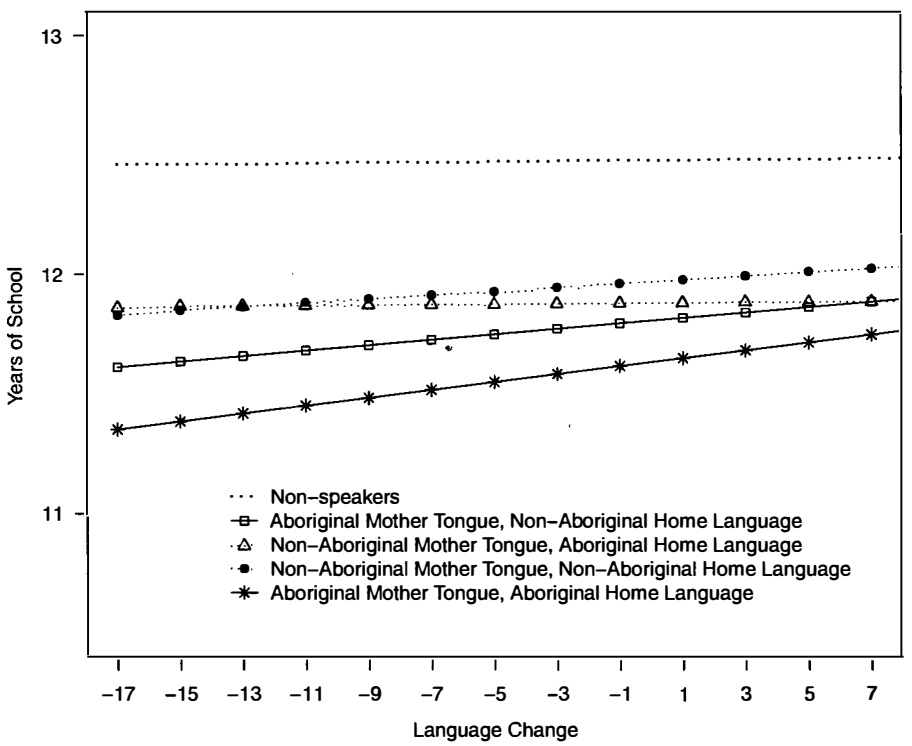
Figure 3.2.9: Educational Attainment as a Function of Proximate Population and Aboriginal Language Use in Non-Reserve Aboriginal Communities



The main effect of language change is not statistically significant, but its interaction with Aboriginal language use is. Only the YN and YY categories, however, have statistically significant interaction terms. Fitted values at the approximate boundaries of the interior 95% of the language change distribution indicate that the practical import of these terms is minute. As figure 3.2.10 illustrates, individuals in communities with language change values of -17 are predicted to have about three tenths of a year less education than individuals in communities with language change values of seven. The lines associated with the NS, NY and NN groups are dashed to reflect the lack of a statistically significant

relationship between language change and educational attainment within them.

Figure 3.2.10: Predicted Educational Attainment as a Function of Language Change and Aboriginal Language Use



3.3 Total Income

Table 3.3.1 describes the data set used to model the relationship between Aboriginal language use and total income.

Table 3.3.1: Description of the Total Income Data Set

Total N	244,785
Variable	**Mean**
Age	39 years
Continuity Index	-3.05
Log of Proximate Population	4.97 ($10^{4.97}$=92,315)
Community Level Aboriginal Language Use	39%
Educational Attainment	10.7 years
	Count (%)
Gender	
Male	120,650 (49%)
Female	124,135 (51%)
Knowledge of an Official Language[1]	
Yes	-
No	-
Ancestry	
heterogeneous ancestry	62,395 (25%)
homogeneous ancestry	182,390 (75%)
Aboriginal Group	
Registered Indian	172,065 (70%)
Non-Registered North American Indian	13,215 (5%)
Métis	40,860 (17%)
Inuit	18,645 (8%)
Community Type	
Non-Aboriginal community	80,795 (33%)
Legal reserve	130,900 (53%)
Non-reserve Aboriginal community	33,090 (14%)
Aboriginal Language Use	
Non-speakers (NS)	128,655 (53%)
Aboriginal Mother Tongue, Non-Aboriginal Home Language (YN)	19,545 (8%)
Non-Aboriginal Mother Tongue, Aboriginal Home Language (NY)	7,675 (3%)
Non-Aboriginal Mother Tongue, Non-Aboriginal Home Language (NN)	13,485 (6%)
Aboriginal Mother Tongue, Aboriginal Home Language (YY)	75,420 (31%)

[1] These values have been suppressed to protect respondent confidentiality. The difference between at least one of these numbers and its corresponding value in the "educational attainment dataset" is less than 100. Statistics Canada does not release unweighted counts smaller than 100.

Table 3.3.2 displays the average total income[1] of respondents in each of the five Aboriginal language use categories. The average total income received by non-speakers in the year 2000 is $660, $1,770, $1,715 and $1,386 higher than the average total incomes of the YN, NY, NN and YY groups, respectively.

Table 3.3.2: Comparing Mean Total Income Across Aboriginal Language Use Categories

Aboriginal Language Use	Average Total Income
Non-speakers	$9,707
Aboriginal mother tongue, non-Aboriginal home language	$9,047
Non-Aboriginal mother tongue, Aboriginal home language	$7,937
Non-Aboriginal mother tongue, non-Aboriginal home language	$7,992
Aboriginal mother tongue, Aboriginal home language	$8,321

Table A.2 details model 2, the full model for total income. Joint Wald tests indicate that the interactions between the following variables and Aboriginal language use are not statistically significant: ancestry, community level Aboriginal language use, language change and proximate population. A few of the individual regressors comprising the interactions terms have reasonably low p-values. The coefficients are

[1] More specifically, it shows the average of the log of total income, converted back to dollars.

small and not highly statistically significant, however, so do not provide cause to retain the interactions in the model. Table A.3 describes model 3, from which they have been excluded. Table 3.3.3 presents likelihood ratio tests of model 3 against models that exclude a random intercept and random slopes, respectively. These tests support the retention of all random effects.

Table 3.3.3: Likelihood Ratio Tests of the Full Model of Total Income (Excluding Non-Significant Interactions) Against a Model Without a Random Intercept and a Model Without Random Slopes

	-2 Log Likelihood	Difference	P Value
Full Model	550005	-	-
Less Random Intercept	553070	3065	<0.00001 (1 df)
Less Random Slopes	550166	161	<0.00001 (14 df)

Interpretation of model 3 follows. Table 3.3.4 reports predicted total income for members of the five language use categories in each of the three community types. Non-speakers living in legal reserves are predicted to receive 88% of the total income received by non-speakers living in non-Aboriginal communities, about $1,500 less. Non-speakers living in non-reserve Aboriginal communities, however, are predicted to receive 127% of the income received by non-speakers living in non-Aboriginal communities, about $3,393 more.

The interaction between community type and Aboriginal language use is statistically significant, but the terms involving non-reserve Aboriginal communities are not. While the effect of living in legal reserves apparently differs between Aboriginal language users and non-speakers, then, the effect of living in a non-reserve Aboriginal community does not. In contrast to non-speakers, living in a legal reserve seems mildly advantageous for Aboriginal language users. As is the case for non-speakers, however, predicted total income is considerably higher for Aboriginal language users who reside in non-reserve Aboriginal communities.

Table 3.3.4: Total Income as a Function of Community Type and Aboriginal Language Use

	Predicted Total Income ($)			Differences [$(%)]	
Language Use Category	Non-Aboriginal Communities (A)	Legal reserves (B)	Other Aboriginal Communities (C)	B – A (B/A)	C – A (C/A)
NS	12,672	11,171	16,065	-1,500 (88%)	3,393 (127%)
YN	9,395	11,072	12,145	1,677 (118%)	2,750 (129%)
NY	10,057	10,687	13,885	630 (106%)	3,828 (138%)
NN	9,286	10,383	12,004	1,097 (112%)	2,719 (129%)
YY	9,020	9,590	10,866	571 (106%)	1,846 (120%)

Table 3.3.4 also demonstrates that, in non-Aboriginal communities and non-reserve Aboriginal communities, non-speakers have a considerable advantage over Aboriginal language users. In non-Aboriginal communities, for example, members of the four Aboriginal language use groups are predicted to receive between 71% and 79% of the total income received by non-speakers. This advantage is far less apparent in reserves, where Aboriginal language users are predicted to receive between 86% and 99% of the total income received by non-speakers.

Figures 3.3.1 and 3.3.2 plot predicted total income in legal reserves and non-Aboriginal communities, respectively, as a function of age and Aboriginal language use. Figure 3.3.3 plots predicted total income, in non-Aboriginal communities, for the four groups of Aboriginal language users as percentages of non-speakers' predicted total income. In legal reserves, none of the language use groups has a clear advantage, though the YN group has somewhat higher levels of expected income beyond middle age. In non-Aboriginal communities, however, non-speakers have a fairly clear advantage during the prime working years, after which the opposite is true. At age 20, the four groups of Aboriginal language users are predicted to receive between 78% and 89% of the total income of non-speakers; between $986 and $501 less. At age 44, the four groups of Aboriginal language users are predicted to receive between 74% and 81% of the total income of non-speakers; between $3,434 and $2,574 less. At

age 69, the four groups of Aboriginal language users are predicted to receive between 103% and 139% of the total income of non-speakers; between $114 and $1,632 more.

Figure 3.3.1: Predicted Total Income as a Function of Age and Aboriginal Language Use in Legal Reserves

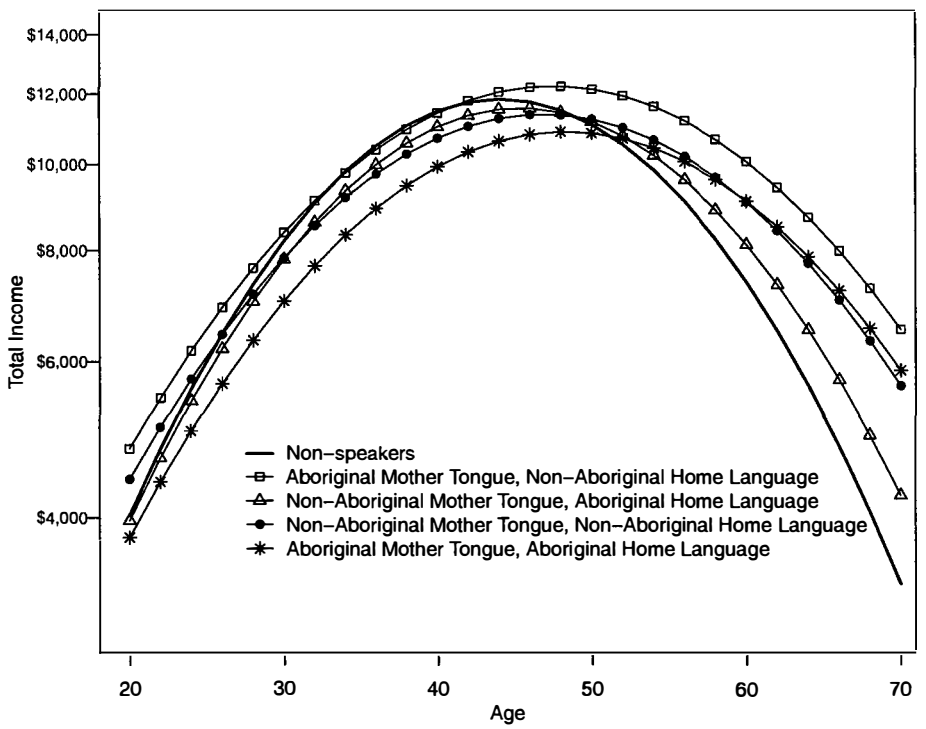


Figure 3.3.2: Predicted Total Income as a Function of Age and Aboriginal Language Use in Non-Aboriginal Communities

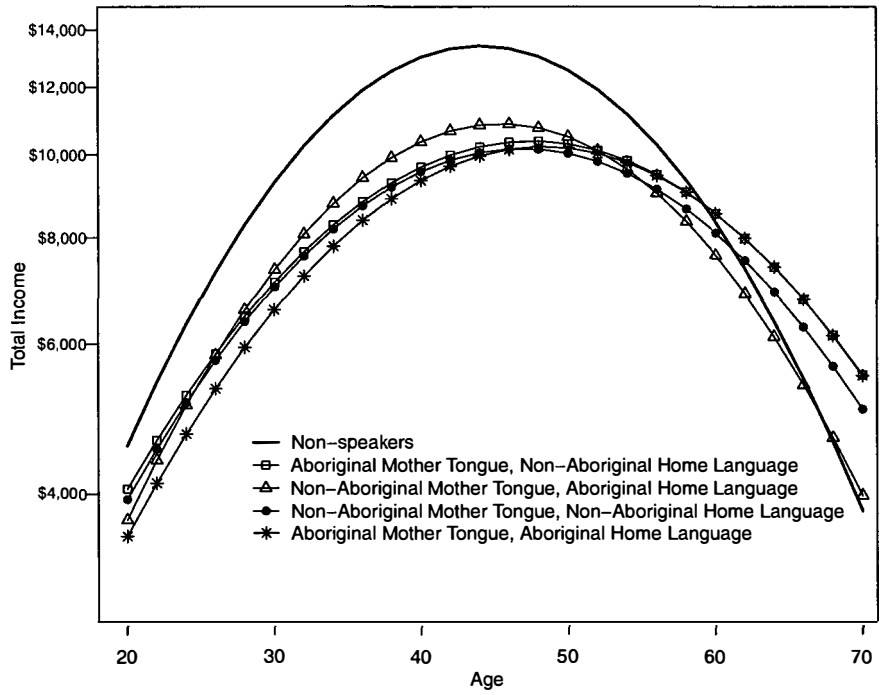
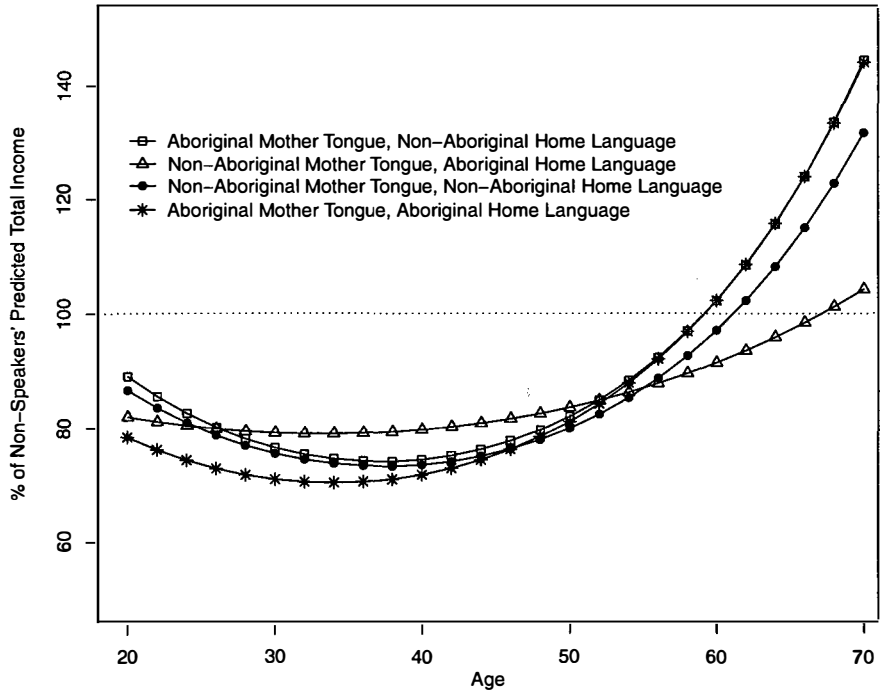


Figure 3.3.3: Predicted Total Income of Aboriginal Language Users as a Function of Age, Expressed as a Percentage of Non-Speakers' Predicted Total Income, Non-Aboriginal Communities



As a whole, the main effect of Aboriginal group is statistically significant. Only the coefficient associated with the Métis, however, is statistically significant. Métis persons are predicted to receive about 116% of the total income Registered Indians receive, or $2,081 more. The main effects of the remaining individual level predictors are highly statistically significant. Females are predicted to receive approximately 74% of the total income males receive, or $4,449 less. Those with homogeneous ancestry are predicted to receive approximately 77% of the total income received by those with heterogeneous ancestry: $2,944 less. Those who do not know an official language are predicted to receive approximately 68% of the income received by those who do, or $4,058 less.

The main effect of proximate population is not statistically significant, though two of the terms comprising the interaction between Aboriginal language use and proximate population are. Figure 3.3.4 and 3.3.5 display predicted total income as a function of proximate population and Aboriginal language use in non-Aboriginal communities and legal reserves, respectively. To reflect the apparent lack of effect of proximate population on the NS, NY and NN groups, the lines pertaining to them are dashed.

Figure 3.3.4: Predicted Total Income as a Function of Proximate Population and Aboriginal Language Use, Non-Aboriginal Communities

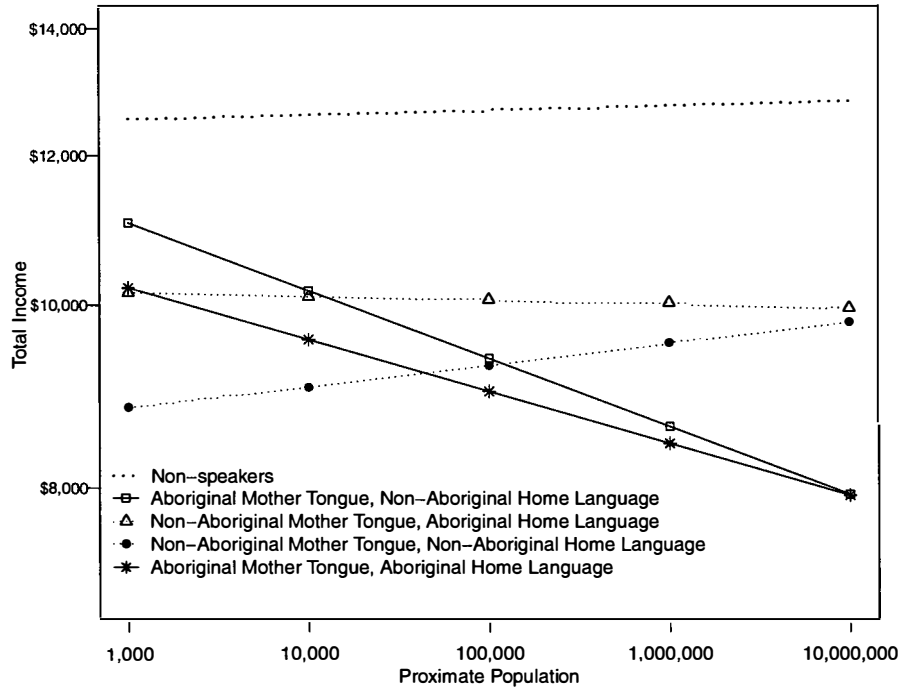
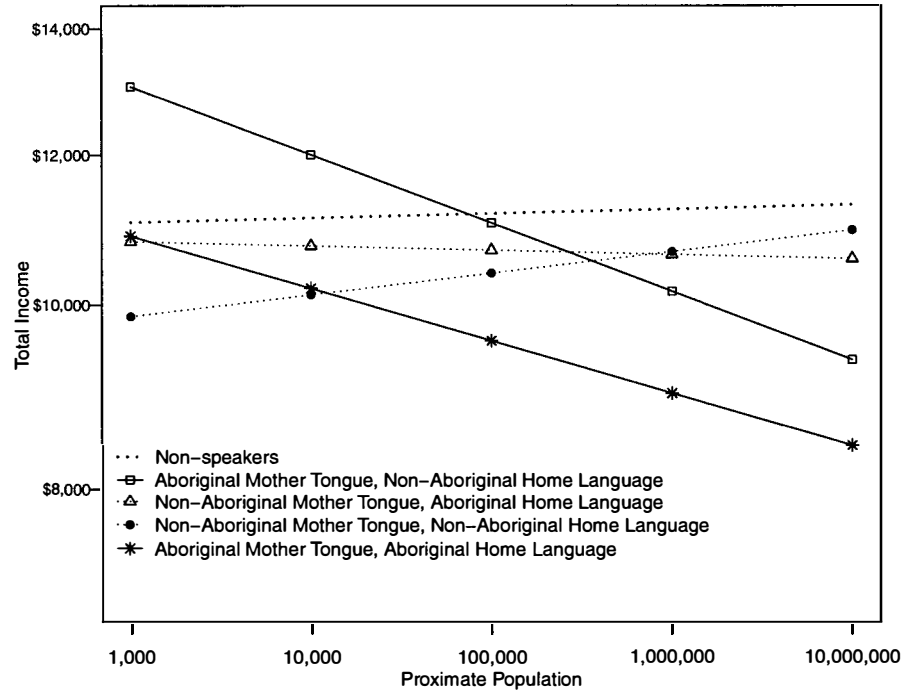


Figure 3.3.5: Predicted Total Income as a Function of Proximate Population and Aboriginal Language use in Legal Reserves



Predicted total incomes of the YN and YY groups decline as proximate population increases. Members of the YN language group living in communities with proximate populations of seven million are predicted to receive about 73% of the total income received by their counterparts in communities with proximate populations equal to 1,000. Members of the YY language group living in communities with proximate populations of seven million are predicted to receive about 78% of the total income received by their counterparts in communities with proximate populations equal to 1,000. In non-Aboriginal communities, these percentages translate into total income differences of approximately $3,000 and $2,000, respectively.

Differences in the disparities across the language use groups in non-Aboriginal communities and legal reserves are also noteworthy. In non-Aboriginal communities with proximate populations of 1,000, non-speakers are predicted to receive 123% and 113% of the YY and YN groups' predicted total incomes, respectively. In non-Aboriginal communities with proximate populations of seven million, non-speakers are predicted to receive about 160% of the YY and YN groups' predicted total incomes. In legal reserves, non-speakers have a much smaller advantage over Aboriginal language users where proximate population is large, and are actually disadvantaged relative to the YN group where proximate population is small.

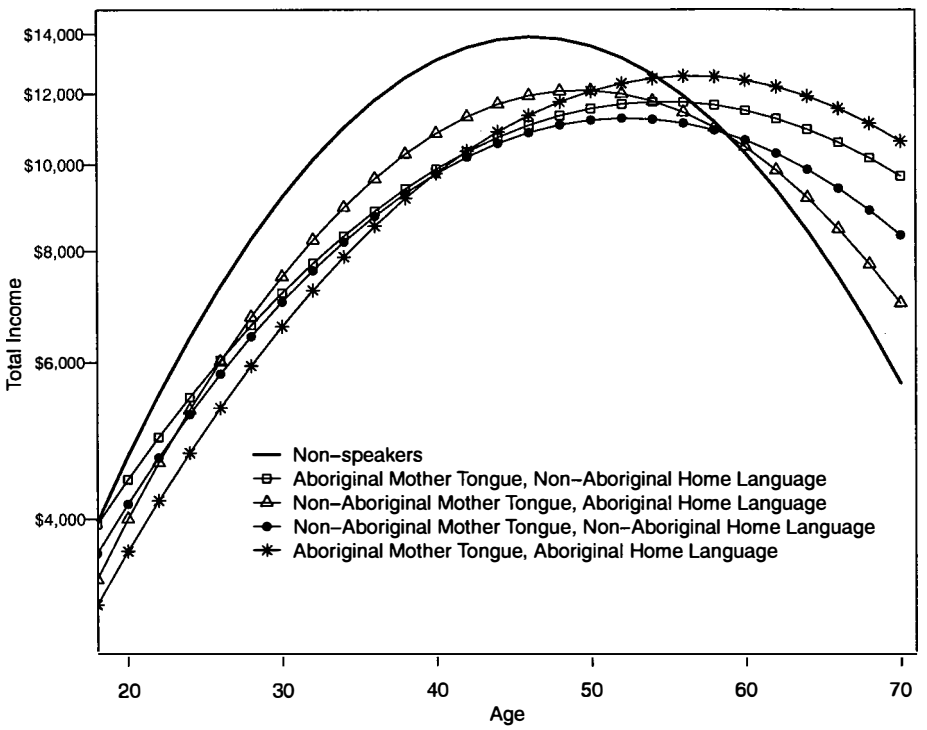
The main effect of community level Aboriginal language use is statistically significant. Residents of communities in which zero percent of Aboriginal people use an Aboriginal language are predicted to receive 89% of the income received by residents of communities whose entire Aboriginal populations use an Aboriginal language. The disparity amounts to about $1,539 in non-Aboriginal communities.

3.3.2 Controlling for Educational Attainment

Controlling for education has little apparent effect on the relationship between Aboriginal language use and total income. Figure 3.3.6 plots predicted total income as a function of age and Aboriginal language use[1]. The figure is derived from model 4[2], which is identical to model 3 except that it includes educational attainment as a predictor. This chart is similar to figure 3.3.2, though Aboriginal language users' advantages beyond age 60 are slightly more pronounced.

[1] As indicated above, predicted values refer to non-Aboriginal communities, unless otherwise stated.
[2] See table A.4.

Figure 3.3.6: Predicted Total Income as a Function of Age and Aboriginal Language Use in Non-Aboriginal Communities (Based on Model 4)



3.4 Employment Income

Table 3.4.1 describes the data set used to model the relationship between Aboriginal language use and employment income.

Table 3.4.1: Description of the Employment Income Data Set

Total N	159,785
Variable	**Mean**
Age	38 years
Continuity Index	-2.96
Log of Proximate Population	4.95 ($10^{4.97}$=92,315)
Community Level Aboriginal Language Use	37%
Educational Attainment	11.4 years
	Count (%)
Gender	
Male	84,640 (53%)
Female	75,145 (47%)
Knowledge of an Official Language[1]	
Yes	-
No	-
Ancestry	
heterogeneous ancestry	47,155 (30%)
homogeneous ancestry	112,635 (70%)
Aboriginal Group	
Registered Indian	105,845 (66%)
Non-Registered North American Indian	9,230 (6%)
Métis	30,620 (19%)
Inuit	14,090 (9%)
Community Type	
Non-Aboriginal community	57,685 (36%)
Legal reserve	78,425 (49%)
Non-reserve Aboriginal community	23,675 (15%)
Aboriginal Language Use	
Non-speakers (NS)	90,470 (57%)
Aboriginal Mother Tongue, Non-Aboriginal Home Language (YN)	12,095 (8%)
Non-Aboriginal Mother Tongue, Aboriginal Home Language (NY)	4,750 (3%)
Non-Aboriginal Mother Tongue, Non-Aboriginal Home Language (NN)	8,360 (5%)
Aboriginal Mother Tongue, Aboriginal Home Language (YY)	44,110 (28%)

[1] These values have been suppressed, in accordance with Statistics Canada's regulations, to protect respondent confidentiality.

Table 3.4.2 displays the average employment income[1] of respondents in each of the five Aboriginal language use categories. The average employment income received by non-speakers in the year 2000 is $746, $2,972, $2,141 and $1,909 higher than the average employment incomes received by the YN, NY, NN and YY groups, respectively.

Table 3.4.2: Comparing Mean Employment Income Across Aboriginal Language Use Categories

Aboriginal Language Use	Average Employment Income
Non-speakers	$12,592
Aboriginal mother tongue, non-Aboriginal home language	$11,846
Non-Aboriginal mother tongue, Aboriginal home language	$9,620
Non-Aboriginal mother tongue, non-Aboriginal home language	$10,451
Aboriginal mother tongue, Aboriginal home language	$10,683

Table A.5 details model 5, the full model of employment income. Joint Wald tests indicate that the interactions between the following variables and Aboriginal language use are not statistically significant: community level Aboriginal language use, language change and proximate population. These terms are excluded from model 6, detailed in table A.6. The interaction between Aboriginal language use and ancestry

[1] Again, it actually shows the average of the log of employment income, converted back into dollars.

is excluded as well, as only one of the terms comprising it is statistically significant and its standard error is relatively large. Table 3.4.3 presents likelihood ratio tests of model 6 against models that exclude a random intercept and random slopes, respectively. These tests support the retention of all random effects.

Table 3.4.3: Likelihood Ratio Tests of the Full Model of Employment Income (Excluding Non-significant Interactions) Against a Model Without a Random Intercept and a Model Without Random Slopes

	-2 Log Likelihood	Difference	P Value
Full Model	261623	-	-
Less Random Intercept	266813	5190	<0.00001 (1 df)
Less Random Slopes	261844	221	<0.00001 (14 df)

Interpretation of model 6 follows. The main effect of community type is statistically significant, but the regressor associated with non-reserve Aboriginal communities is not. Non-speakers living in legal reserves are predicted to receive 75% of the employment income received by non-speakers in non-Aboriginal communities. This value corresponds to a disparity of approximately $4,034. The interaction between community type and Aboriginal language use is statistically significant. Only three of the individual interaction terms – those between legal reserves and the YN, NN and YY groups – are statistically significant at the 0.01

significance level, however. Members of these groups are predicted to receive 93%, 84%, and 95% of the employment income received by their counterparts in non-Aboriginal communities, respectively. These percentages translate into deficiencies of $870, $2,284 and $662, respectively. Living in a legal reserve, then, seems less disadvantageous for members of these three groups of Aboriginal language users than for non-speakers. Living in a non-reserve Aboriginal community does not appear to affect employment income differently than living in a non-Aboriginal community, though the interaction between non-reserve Aboriginal communities and the YN group is statistically significant at the 0.05 significance level. For this group, living in a non-reserve Aboriginal community appears to be mildly advantageous.

As was the case with total income, non-speakers exhibit a clear advantage over Aboriginal language users in non-Aboriginal communities and non-reserve Aboriginal communities, but not in reserves. In non-Aboriginal communities, the YN, NY, NN and YY language groups are predicted to receive 79%, 80%, 86% and 76% of non-speakers' predicted employment income, respectively. These percentages translate into disparities of $3,409, $3,295, $2,258 and $3,829, respectively. Similarly, in non-reserve Aboriginal communities, Aboriginal language users are predicted to receive between 76% and 90% of the employment income received by non-speakers. In legal reserves however, Aboriginal language

users are predicted to receive between 88% and 98% of the employment income received by non-speakers. Table 3.4.4 provides details.

Table 3.4.4: Predicted Employment Income as a Function of Community Type and Aboriginal Language Use

	Predicted Employment Income ($)			Differences [$(%)]	
Language Use Category	Non-Aboriginal Communities (A)	Legal reserves (B)	Other Aboriginal Communities (C)	B – A (B/A)	C – A (C/A)
NS	16,196	12,162	16,515	-4,033 (75%)	320 (102%)
YN	12,787	11,916	14,852	-870 (93%)	2,066 (116%)
NY	12,900	10,756	12,612	-2,144 (83%)	-288 (98%)
NN	13,937	11,653	13,007	-2,284 (84%)	-930 (93%)
YY	12,367	11,704	12,886	-662 (95%)	520 (104%)

Figures 3.4.1 and 3.4.2 plot predicted employment income in legal reserves and non-Aboriginal communities, respectively, as a function of age and Aboriginal language use. Figures 3.4.3 and 3.4.4 plot predicted employment income in the two community types as percentages of the predicted employment income of non-speakers.

Figure 3.4.1: Predicted Employment Income as a Function of Age and Aboriginal Language Use in Legal Reserves

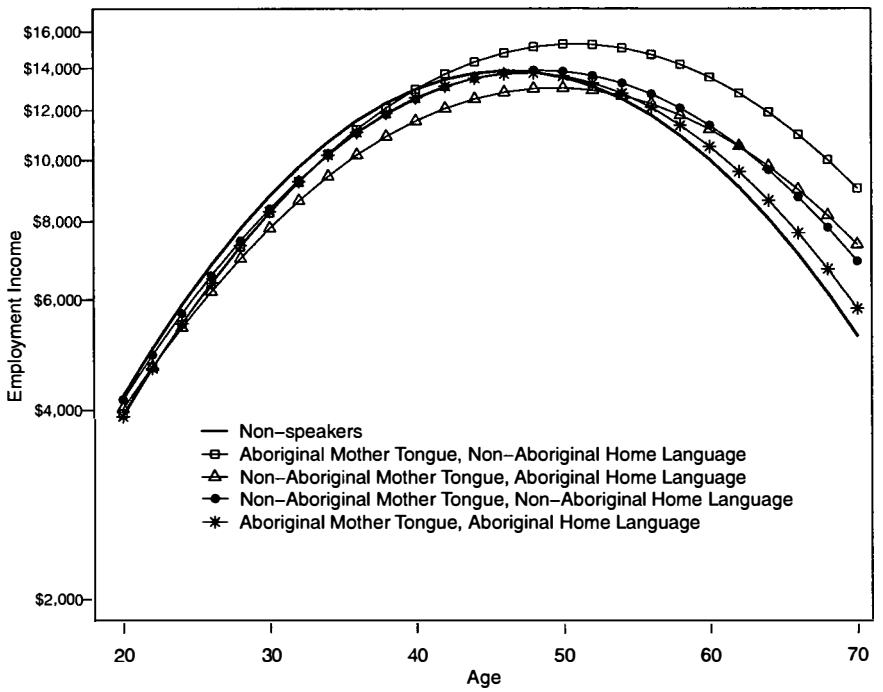


Figure 3.4.2: Predicted Employment Income as a Function of Age and Aboriginal Language Use in Non-Aboriginal Communities

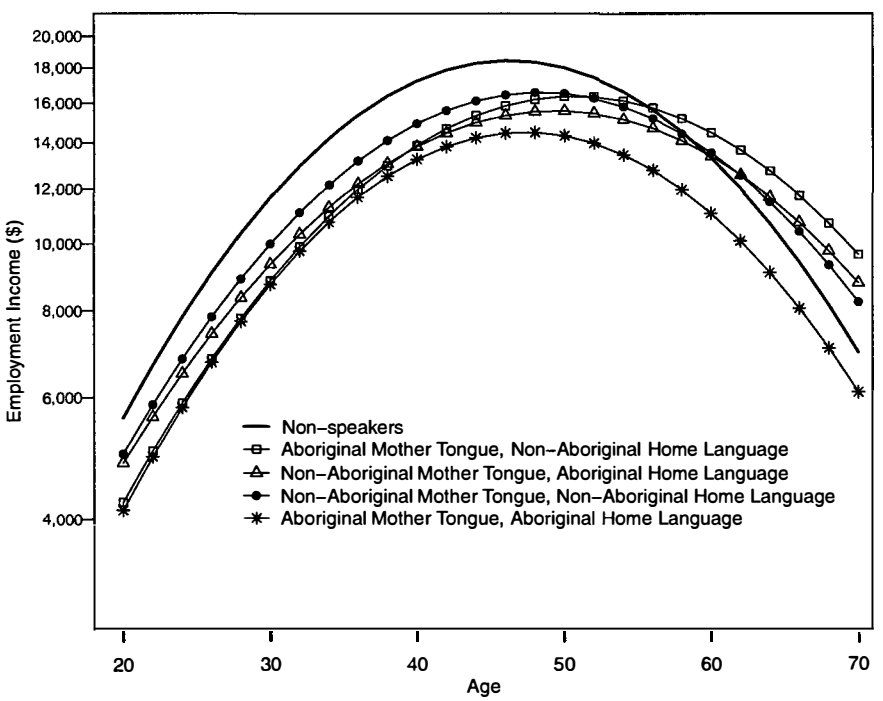


Figure 3.4.3: Predicted Employment Income as a Percentage of the Predicted Employment Income of Non-Speakers, Legal Reserves

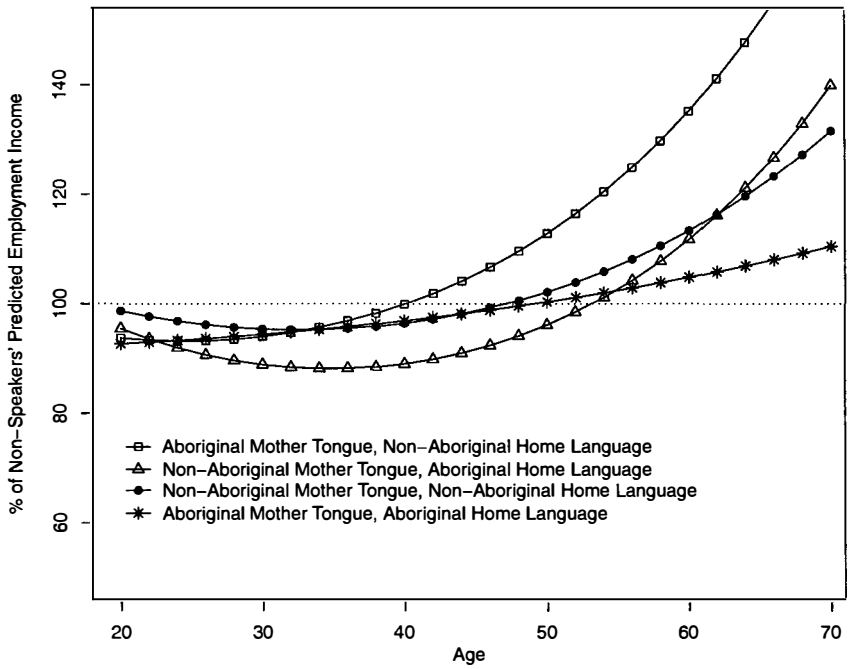
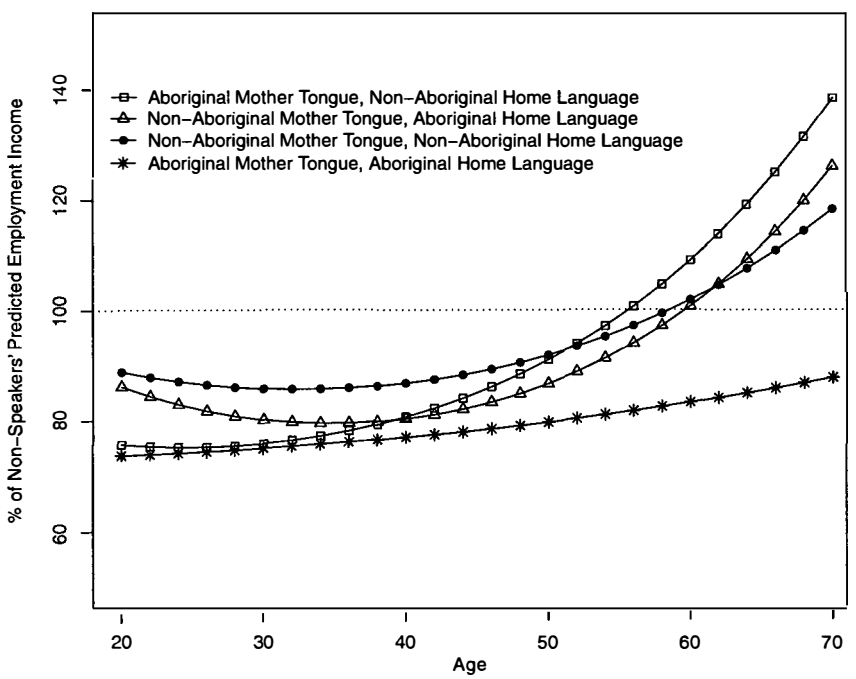


Figure 3.4.4: Predicted Employment Income as a Percentage of the Predicted Employment Income of Non-Speakers, Non-Aboriginal Communities



In legal reserves, the five language use groups have very similar predicted employment incomes until middle age, after which Aboriginal language users – particularly the YN group – exhibit a distinct advantage. At age 56, the four groups of Aboriginal language users are predicted to receive between 103% and 125% of the employment income received by non-speakers. These percentages translate into income disparities of between $345 and $2,925. By age 69, the four groups of Aboriginal language users are predicted to receive between 110% and 167% of the employment income received by non-speakers. These percentages translate into income disparities of between $562 and $3,824.

In non-Aboriginal communities, however, non-speakers have higher predicted employment incomes during the prime working years: at age 20, the four groups of Aboriginal language users are predicted to receive between 74% and 89% of the employment income received by non-speakers. These percentages translate into income disparities of $1,480 and $634, respectively. At age 46, the four groups of Aboriginal language users are predicted to receive between 78% and 89% of the employment income received by non-speakers: between $3,974 and $1,993 less. At age 69, the four groups of Aboriginal language users are predicted to receive between 87% and 135% of the employment income received by non-speakers: between $970 less and $2,633 more. The YY group stands out as being somewhat more disadvantaged.

The main effects of gender, ancestry and knowledge of an official language are highly statistically significant. Females are predicted to receive approximately 76% of the employment income males receive, about $5,001 less. Those with homogeneous ancestry are predicted to receive approximately 84% of the employment income received by those with heterogeneous ancestry, about $2,577 less. Those who do not know an official language are predicted to receive approximately 57% of the employment income received by those who do, about $6,933 less.

The main effect of Aboriginal group is statistically significant, although the coefficient associated with Inuit people is not. Registered Indians are predicted to receive about 88% and 96% of the employment income received by Métis persons and Non-Registered North American Indians, respectively. These values correspond to differences of approximately $2,150 and $690, respectively.

The main effect of community level Aboriginal language use is statistically significant. Residents of communities in which zero percent of Aboriginal people use an Aboriginal language are predicted to receive an average of $15,135 in employment income. Residents of communities whose entire Aboriginal populations use an Aboriginal language are predicted to receive $18,176, $3,040 more. Language change has a positive but small effect that is significant at the 0.05 level. Individuals in communities with language change values of -17 are predicted to earn

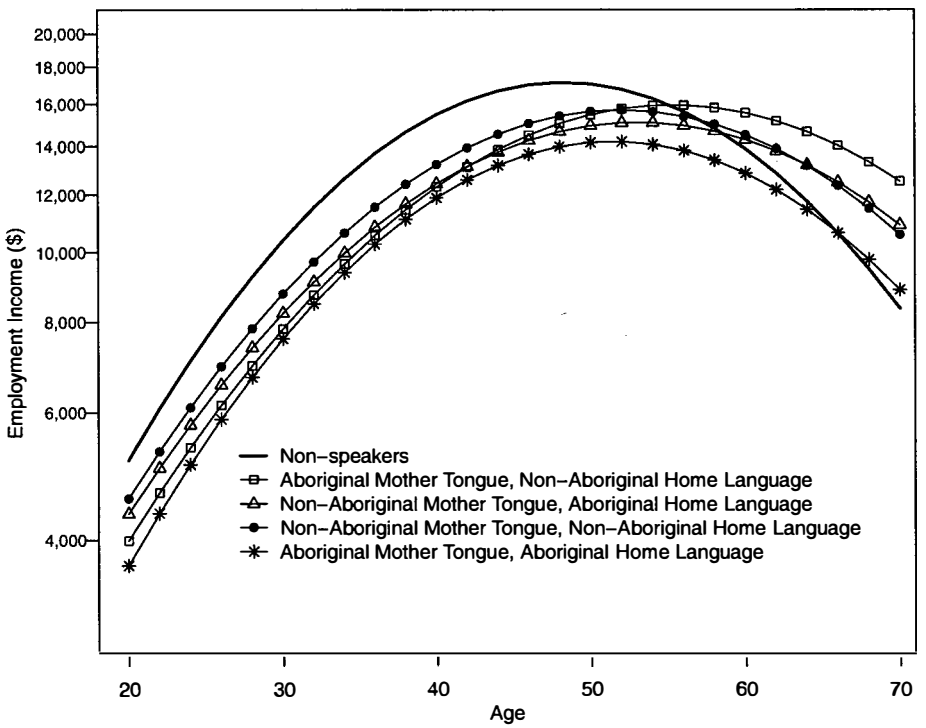
about a thousand dollars less than individuals in communities with language change values of 7.

3.4.1 Controlling for Educational Attainment

Controlling for educational attainment has little apparent effect on the relationship between Aboriginal language use and employment income. Figure 3.4.5 is derived from model 7[1], which is identical to model 6 except that it includes educational attainment as a predictor. It plots predicted employment income as a function of age and Aboriginal language use in non-Aboriginal communities. The figure exhibits a similar pattern as figure 3.4.2, though Aboriginal language users appear slightly more advantaged beyond age 56.

[1] See Table A.7

Figure 3.4.5: Predicted Employment Income as a Function of Age and Aboriginal Language Use (Based on Model 7)



3.5 Labour Force Participation

Table 3.5.1 describes the data set used to model the relationship between Aboriginal language use and labour force participation

Table 3.5.1: Description of the Labour Force Participation Data Set

Total N	159,785
Variable	**Mean**
Age	38 years
Continuity Index	-3.06
Log of Proximate Population	4.97 ($10^{4.97}$=92,315)
Community Level Aboriginal Language Use	39%
Educational Attainment	10.7 years
	Count (%)
Gender	
Male	129,535 (49%)
Female	132,735 (51%)
Knowledge of an Official Language[1]	
Yes	-
No	-
Ancestry	
heterogeneous ancestry	66,995 (25%)
homogeneous ancestry	195,270 (75%)
Aboriginal Group	
Registered Indian	184,290 (70%)
Non-Registered North American Indian	14,150 (5%)
Métis	43,645 (17%)
Inuit	20,185 (8%)
Community Type	
Non-Aboriginal community	86,155 (33%)
Legal reserve	140,080 (54%)
Non-reserve Aboriginal community	35,635 (14%)
Aboriginal Language Use	
Non-speakers (NS)	140,090 (53%)
Aboriginal Mother Tongue, Non-Aboriginal Home Language (YN)	20,130 (8%)
Non-Aboriginal Mother Tongue, Aboriginal Home Language (NY)	8,255 (3%)
Non-Aboriginal Mother Tongue, Non-Aboriginal Home Language (NN)	14,250 (5%)
Aboriginal Mother Tongue, Aboriginal Home Language (YY)	79.550 (30%)

[1] These values have been suppressed, in accordance with Statistics Canada's regulations, to protect respondent confidentiality.

Table 3.5.2 displays labour force participation rates for each of the five language use categories. The labour force participation rate of the non-speaking group is 8, 7, 8, and 14 percentage points higher than the participation rates of the YN, NY, NN and YY groups, respectively.

Table 3.5.2: Comparing Labour Force Participation Rates Across Aboriginal Language Use Categories

Aboriginal Language Use	% in the Labour Force
Non-speakers	69%
Aboriginal mother tongue, Non-Aboriginal home language	61%
Non-Aboriginal mother tongue, Aboriginal home language	62%
Non-Aboriginal mother tongue, non-Aboriginal home language	61%
Aboriginal mother tongue, Aboriginal home language	55%

Table A.8 details model 8, the full model of labour force participation. Joint Wald tests indicate that the interactions between Aboriginal language use and the following variables are not statistically significant: community level Aboriginal language use, language change and proximate population. These terms are excluded from model 9, detailed in Table A.9. As indicated in chapter 2, likelihood ratio tests cannot be conducted on logit models produced by MLwin. Wald tests are an imperfect substitute. Since they have low power when applied to

variance components[1], however, they tend to be most problematic in situations of borderline statistical significance. Wald tests of the variance and covariance components of the random intercept and slopes in model 9 indicate that they are highly statistically significant.

Interpretation of model 9 follows. Table 3.5.3 displays the multiplicative effects of community type on the predicted odds of labour force participation for each of the five language use categories. Table 3.5.3 also presents the labour force participation rates predicted for the four Aboriginal language use groups in the three community types.

Table 3.5.3: Labour Force Participation as a Function of Community Type and Aboriginal Language Use

Language Use Category	Multiplicative Effect on the Odds		Predicted Labour Force Participation Rate		
	Legal Reserves	Other Aboriginal Communities	Non-Aboriginal Communities	Legal Reserves	Other Aboriginal Communities
NS	0.92	1.18	0.80	0.78	0.82
YN	1.42	1.74	0.70	0.77	0.80
NY	1.43	1.76	0.71	0.78	0.81
NN	1.35	1.69	0.72	0.78	0.81
YY	1.44	1.77	0.70	0.77	0.80

Non-speakers living in legal reserves have 0.92 times the odds of labour force participation of non-speakers living in non-Aboriginal

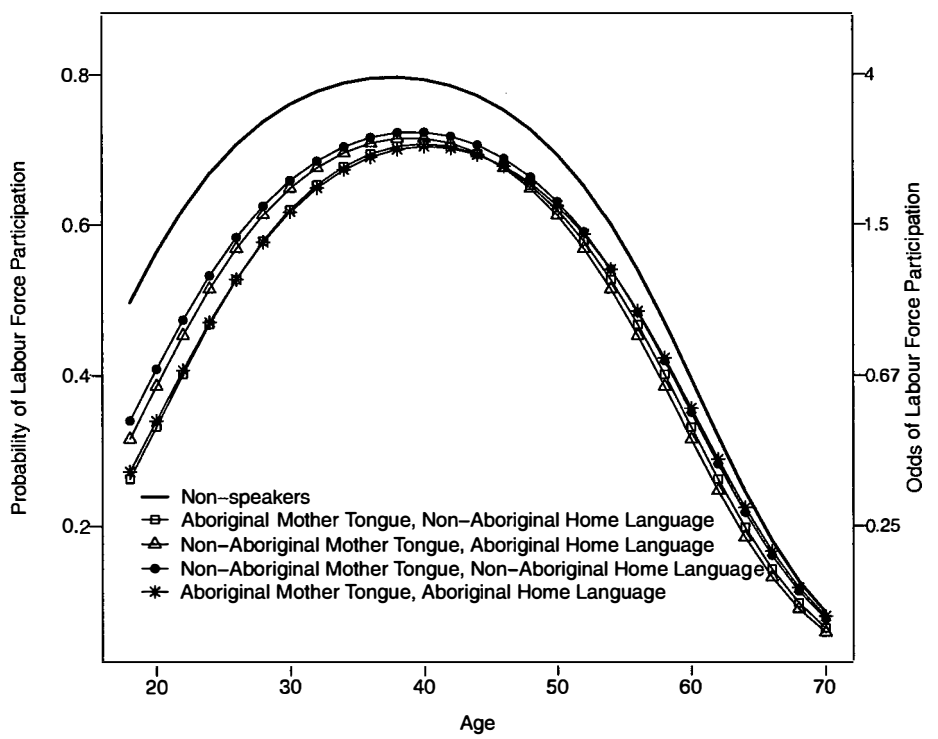
[1] As indicated earlier, Wald tests generally lack power when applied to variance components (Berkhof & Snijders, 2001, p.141)

communities. Non-speakers living in other Aboriginal communities have 1.18 times the odds of labour force participation of non-speakers living in non-Aboriginal communities. With the other predictors in the model held constant at their means or reference categories, these values translate to differences in labour force participation rates of 1.5 and 2.6 percentage points, respectively. This slight disadvantage associated with living on a legal reserve is not evident among Aboriginal language users. In fact, Aboriginal language users who live in legal reserves have higher predicted levels of labour force participation than their counterparts in non-Aboriginal communities. The slight advantage of residence in non-reserve Aboriginal communities that is associated with non-speakers is even more pronounced for Aboriginal language users.

In non-Aboriginal communities, labour force participation is predicted to be more common among non-speakers than Aboriginal language users. The predicted odds of labour force participation for the YN, NY, NN and YY language categories are, respectively, 60%, 64%, 66%, and 59% of the predicted odds of labour force participation for non-speakers. These multiplicative effects translate into deficiencies in participation rates of 9.5, 8.3, 7.5, and 9.9 percentage points, respectively. In Aboriginal communities, however, the labour force participation rate is similar across language use groups.

Figure 3.5.1 through 3.5.3 plot predicted probability of labour force participation[1] in the three community types as a function of age and Aboriginal language use. Figure 3.5.4 plots the multiplicative effects of Aboriginal language use on the odds of labour force participation as a function of age in non-Aboriginal communities.

Figure 3.5.1: Predicted Probability of Labour Force Participation in Non-Aboriginal Communities as a Function of Age and Aboriginal Language Use



[1] Predicted odds are supplied on the right side of the figure.

Figure 3.5.2: Predicted Probability of Labour Force Participation in Legal Reserves as a Function of Age and Aboriginal Language Use

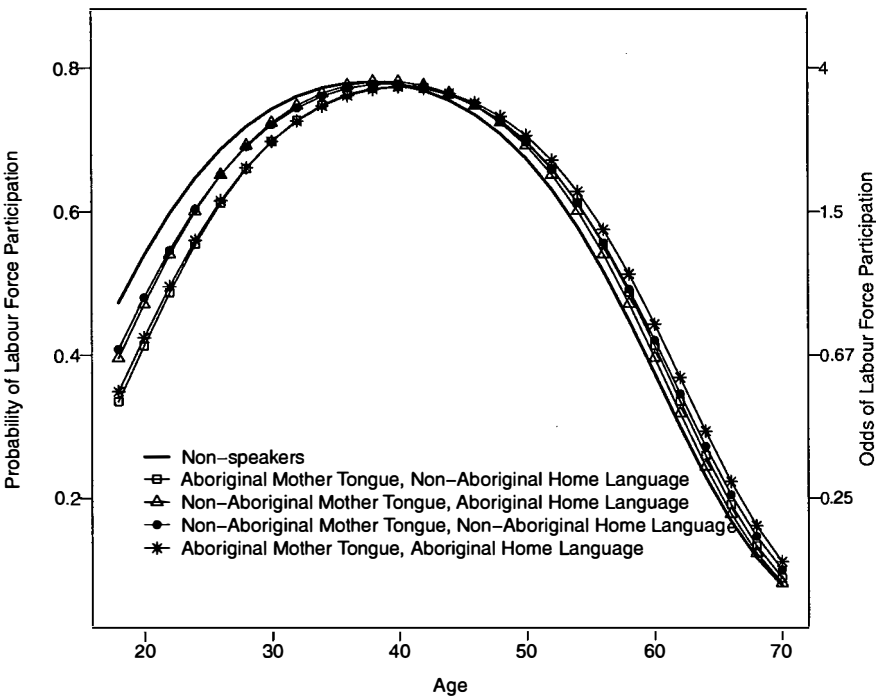


Figure 3.5.3: Predicted Probability of Labour Force Participation in Non-Reserve Aboriginal Communities as a Function of Age and Aboriginal Language Use

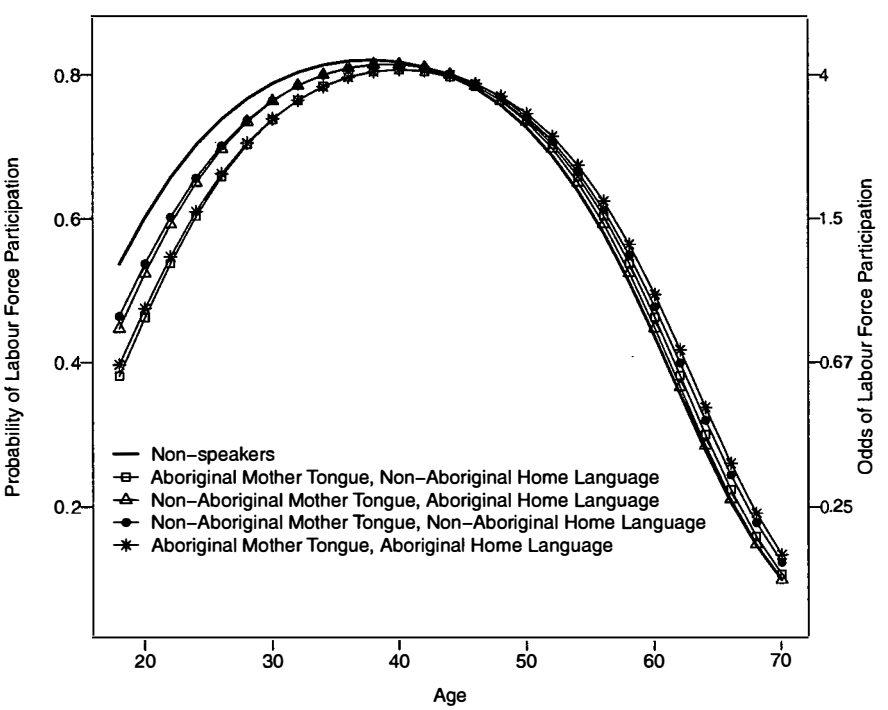
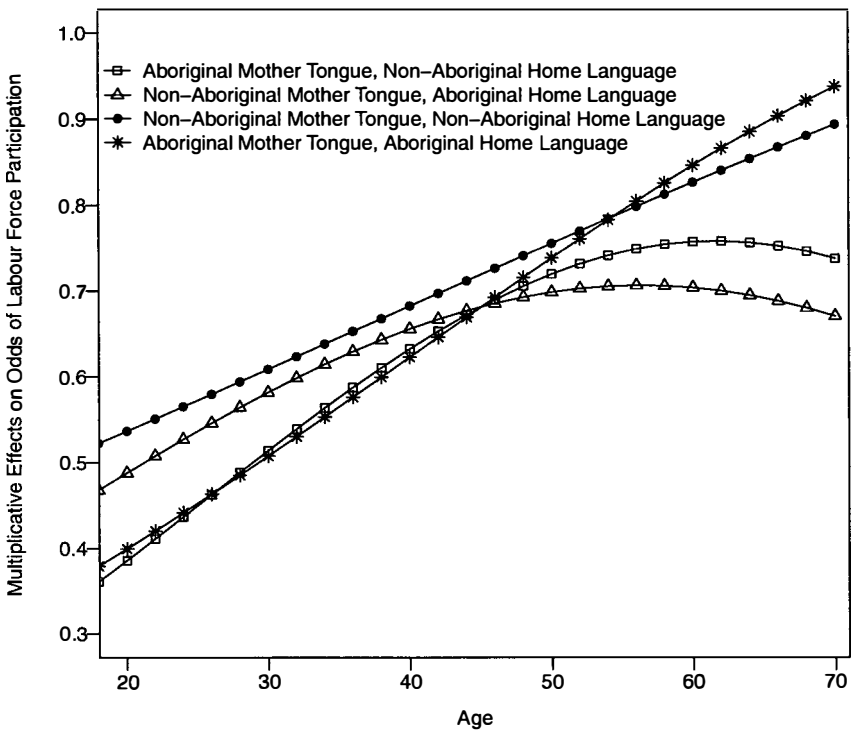


Figure 3.5.4: Multiplicative Effects of Aboriginal Language Use on the Odds of Labour Force Participation as a Function of Age, Non-Aboriginal Communities



In legal reserves and other Aboriginal communities, non-negligible differences in predicted labour force participation rates exist across Aboriginal language use categories, but none of the language use groups has a clear advantage. In non-Aboriginal communities, however, labour force participation is predicted to be more common among non-speakers, though the disparity decreases with age. At age 20, being in the YN, NY, NN and YY groups multiplies the predicted odds of labour force participation by 0.39, 0.49, 0.54 and 0.40, respectively. These differences in odds translate into differences in labour force participation rates of 23, 18, 15 and 22 percentage points, respectively. At age 38, these

multiplicative effects have increased to 0.61, 0.64, 0.67 and 0.60, respectively, translating into differences in labour force participation rates of 9, 8, 7 and 10 percentage points, respectively. By age 69, the multiplicative effects have increased again to 0.74, 0.68, 0.89 and 0.93, respectively, translating into differences in labour force participation rates of 2, 3, 1 and 1 percentage points, respectively.

The main effect of ancestry is highly statistically significant. The odds of labour force participation for non-speakers with heterogeneous ancestry is about 1.6 times the odds of labour force participation for non-speakers with homogeneous ancestry. This corresponds to a disparity in labour force participation rate of approximately eight percentage points. The interaction between ancestry and Aboriginal language use is also statistically significant. The coefficients comprising the interaction are uniformly positive, suggesting that homogeneous ancestry is less disadvantageous for Aboriginal language users than for non-speakers. Only one of these coefficients, however, is statistically significant at the 0.01 significance level. The odds of labour force participation for members of the YN group with heterogeneous ancestry is about 1.2 times the odds of labour force participation for equivalent individuals with homogeneous ancestry. This difference corresponds to a labour force participation rate disparity of approximately five percentage points. The coefficient associated with the NY group is significant at the 0.05 level. The odds of

labour force participation for members of the NY group with heterogeneous ancestry is about 1.3 times the odds of labour force participation for equivalent individuals with homogeneous ancestry. This difference corresponds to a labour force participation rate disparity of approximately six percentage points.

The main effects of gender and knowledge of an official language are highly statistically significant. The odds of labour force participation for males are approximately 1.7 times the odds for females. This difference corresponds to a labour force participation rate disparity of 7.5 percentage points. The odds of labour force participation for those who know an official language are approximately two times the odds for those who do not. This difference corresponds to a labour force participation rate disparity of approximately 14 percentage points.

The effect of Aboriginal group is statistically significant. The coefficient associated with non-registered North American Indians, however, is not. The odds of labour force participation for the Métis are approximately 1.3 times the odds for Registered Indians. This corresponds to a difference in labour force participation rates of approximately four percentage points. The odds of labour force participation for the Inuit are approximately 1.2 times the odds for Registered Indians. This corresponds to a difference in labour force participation rates of approximately two percentage points.

Of the remaining community level predictors, community level Aboriginal language use and proximate population have statistically significant main effects. Figure 3.5.5 shows the predicted odds and probability of labour force participation decline as community level Aboriginal language use increases. A one percent increase in community level Aboriginal language use multiplies the predicted odds of labour force participation by approximately 0.995. The predicted labour force participation rate of communities in which zero percent of Aboriginal people use an Aboriginal language is approximately nine points higher than that of communities whose entire Aboriginal populations use an Aboriginal language.

Figure 3.5.5: Predicted Probability of Labour Force Participation as a Function of Community Level Aboriginal Language Use

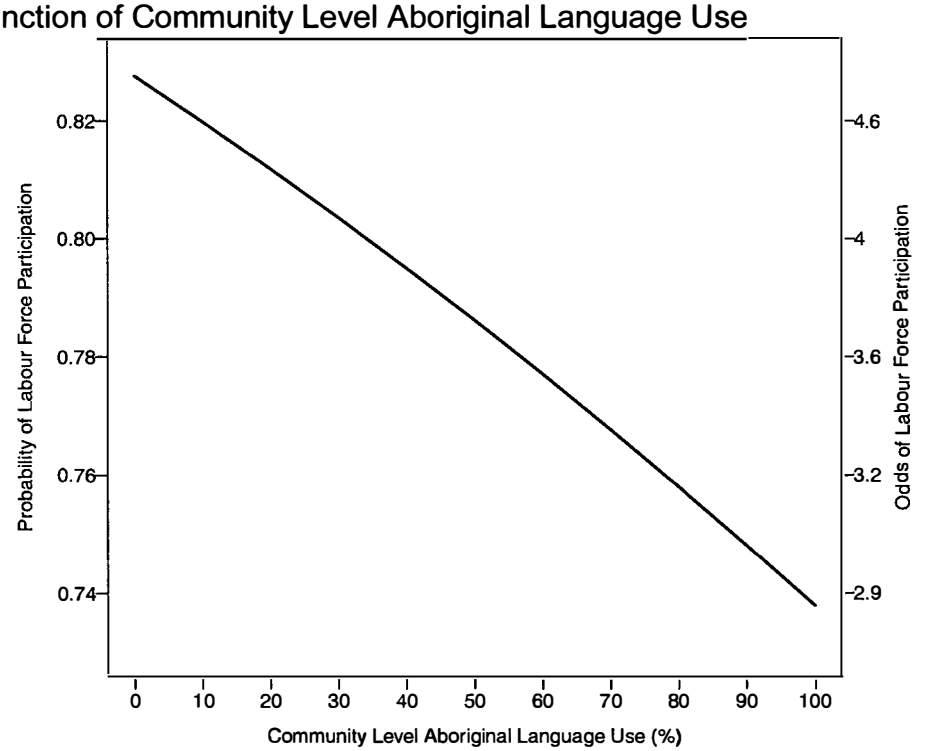
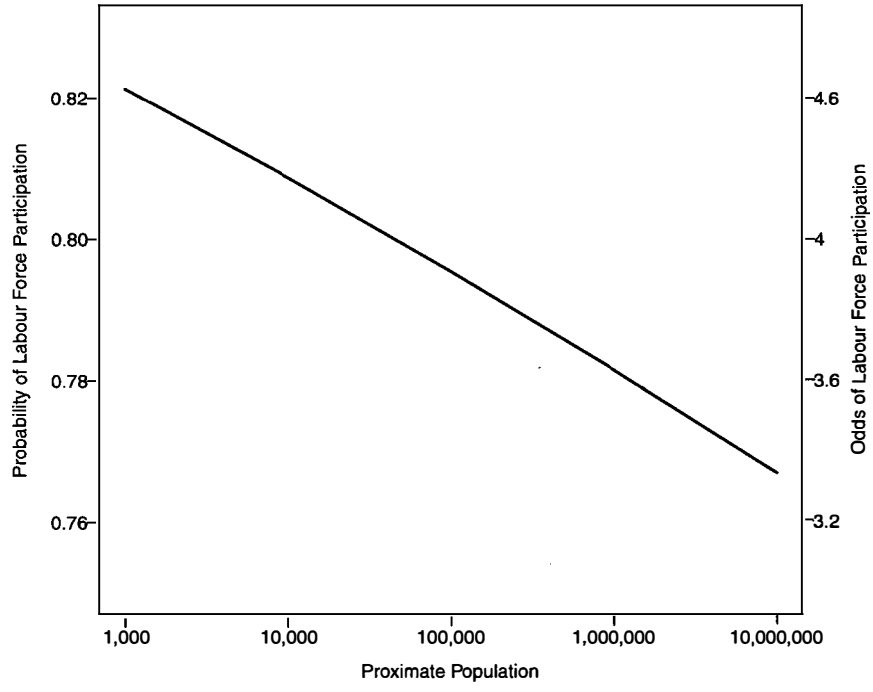


Figure 3.5.6 shows a decrease in the predicted odds of labour force participation as proximate population increases. Increasing the log of proximate population by one unit (i.e. multiplying proximate population by ten) multiplies the predicted odds of labour force participation by approximately 0.92. This effect translates into a five percentage point difference between the labour force participation rates of communities with proximate populations of 1,000 and seven million, a very small effect.

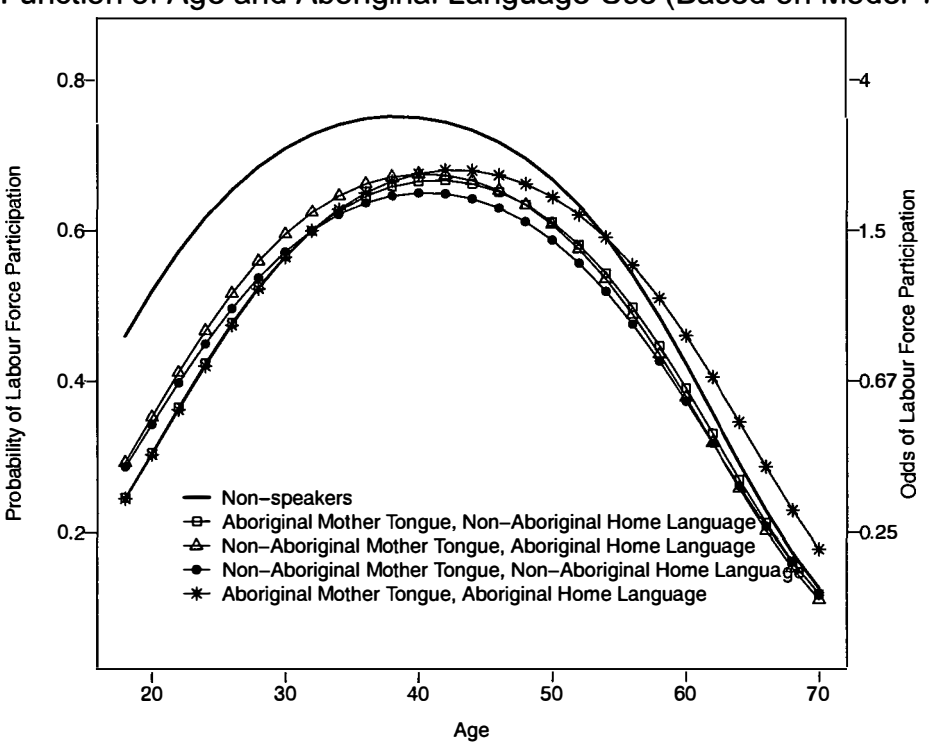
Figure 3.5.6: Predicted Odds and Probability of Labour Force Participation as a Function of Proximate Population



3.5.1 Controlling for Educational Attainment

Figure 3.5.7 is derived from model 10[1], which is identical to model 9 except that it includes educational attainment as a predictor. It plots the predicted probability of labour force participation in non-Aboriginal communities as a function of age and Aboriginal language use. Its similarity to figure 3.5.1 suggests that controlling for educational attainment has little effect on the relationship between Aboriginal language use and labour force participation. The elevation of the YY group above non-speakers as retirement age approaches is noteworthy, though difficult to explain.

Figure 3.5.7: Predicted Probability of Labour Force Participation as a Function of Age and Aboriginal Language Use (Based on Model 10)



[1] See Table A.10.

It is worth noting that controlling for educational attainment eliminates the effect of knowledge of an official language on the probability of labour force participation. This phenomenon was also observed when modeling total income, though not when modeling employment income. Controlling for educational attainment also eliminates the small positive main effect of living in a non-reserve Aboriginal community: non-speakers in such communities no longer have discernibly higher predicted odds of labour force participation than do non-speakers in non-Aboriginal communities.

3.6 Employment

Table 3.6.1 describes the data set used to model the relationship between Aboriginal language use and employment.

Table 3.6.1: Description of the Employment Data Set

Total N	166,220
Variable	**Mean**
Age	37 years
Continuity Index	-2.97
Log of Proximate Population	4.99 ($10^{4.99}$=97,734)
Community Level Aboriginal Language Use	36%
Educational Attainment	11.5 years
	Count (%)
Gender	
Male	88,865 (53%)
Female	77,355 (47%)
Knowledge of an Official Language[1]	
Yes	-
No	-
Ancestry	
heterogeneous ancestry	49,725 (30%)
homogeneous ancestry	116,495 (70%)
Aboriginal Group	
Registered Indian	110,690 (67%)
Non-Registered North American Indian	9,785 (6%)
Métis	31,990 (19%)
Inuit	13,755 (8%)
Community Type	
Non-Aboriginal community	60,930 (37%)
Legal reserve	81,895 (49%)
Non-reserve Aboriginal community	23,300 (14%)
Aboriginal Language Use	
Non-speakers (NS)	96,920 (58%)
Aboriginal Mother Tongue, Non-Aboriginal Home Language (YN)	12,250 (7%)
Non-Aboriginal Mother Tongue, Aboriginal Home Language (NY)	5,090 (3%)
Non-Aboriginal Mother Tongue, Non-Aboriginal Home Language (NN)	8,670 (5%)
Aboriginal Mother Tongue, Aboriginal Home Language (YY)	44,005 (26%)

[1] These values have been suppressed, in accordance with Statistics Canada's regulations, to protect respondent confidentiality.

Table 3.6.2 displays the proportion of employed labour force participants in each of the five Aboriginal language use categories. The employment rate of the NS group is 3, 9, 7 and 6 percentage points higher than those of the YN, NY, NN and YY groups, respectively.

Table 3.6.2: Comparing Employment Rates Across Aboriginal Language Use Categories

Aboriginal Language Use	Employment Rate
Non-speakers	79%
Aboriginal mother tongue, Non-Aboriginal home language	76%
Non-Aboriginal mother tongue, Aboriginal home language	70%
Non-Aboriginal mother tongue, non-Aboriginal home language	72%
Aboriginal mother tongue, Aboriginal home language	73%

Table A.11 details model 11, the full model of employment. Joint Wald tests indicate that the interactions between Aboriginal language use and community level Aboriginal language use and language change are not statistically significant. These terms are excluded from model 12, detailed in Table A.12. Wald tests support the retention of all of the model's random terms.

Interpretation of model 12 follows. The main effect of living in a legal reserve is statistically significant, as are the interaction terms involving Aboriginal language use and legal reserve. Non-speakers living in legal reserves are predicted to have 0.62 times the odds of employment

of non-speakers living in non-Aboriginal communities. This difference in odds corresponds to a difference in employment rate of about five percentage points. As table 3.6.3 illustrates, living in a legal reserve appears to be less disadvantageous for the NN and YY groups, neutral for the YN group, and slightly advantageous for the NY group.

Table 3.6.3: Predicted Probability of Employment as a Function of Community Type and Aboriginal Language Use

Language Use Category	Multiplicative Effect on the Odds		Predicted Employment Rate		
	Legal Reserves	Other Aboriginal Communities	Non-Aboriginal Communities	Legal Reserves	Other Aboriginal Communities
NS	0.62	0.87	0.89	0.84	0.88
YN	1.00	1.25	0.80	0.80	0.83
NY	1.07	1.73	0.80	0.81	0.87
NN	0.88	0.95	0.85	0.83	0.84
YY	0.93	1.09	0.81	0.80	0.82

Table 3.6.3 also displays the predicted probability of employment for residents of non-reserve Aboriginal communities. The main effect of the associated regressor is not statistically significant, nor are the interaction terms between non-reserve Aboriginal communities and the NN or YY groups. There is evidence, however, that residence in such a community has a mild positive effect on employment rates in the YN and NY groups. Members of these groups who live in non-reserve Aboriginal communities are predicted to be employed at rates three and seven

percentage points higher than their counterparts in non-Aboriginal communities.

In non-Aboriginal communities, the predicted odds of employment for the YN, NY, NN and YY language categories are, respectively, 48%, 47%, 67%, and 51% of the predicted odds of employment for non-speakers. These multiplicative effects translate into differences in employment rates of 9.2, 9.5, 4.5, and 8.4 percentage points, respectively. These disparities are smaller in reserves, where non-speakers are predicted to be employed at rates between one and four percentage points lower than non-speakers.

Figures 3.6.1 through 3.6.3 plot predicted probability of employment as a function of age and Aboriginal language use in the three community types. Figure 3.6.4 plots changes in the multiplicative effects of Aboriginal language use, in non-Aboriginal communities, as age increases.

Figure 3.6.1: Predicted Probability of Employment as a Function of Age and Aboriginal Language Use for Residents of Legal Reserves

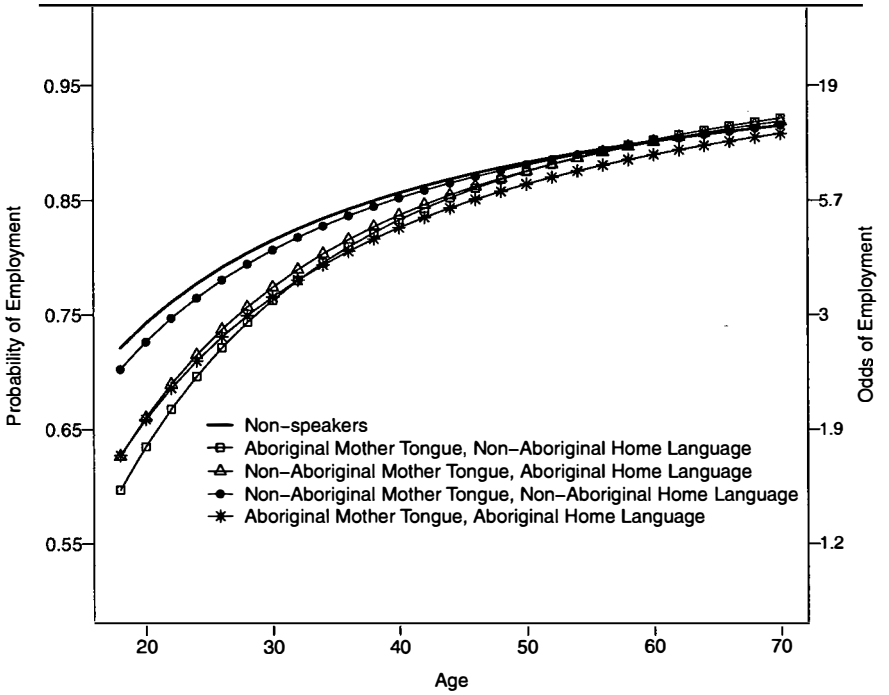


Figure 3.6.2: Predicted Probability of Employment as a Function of Age and Aboriginal Language Use for Residents of Non-Reserve Aboriginal Communities

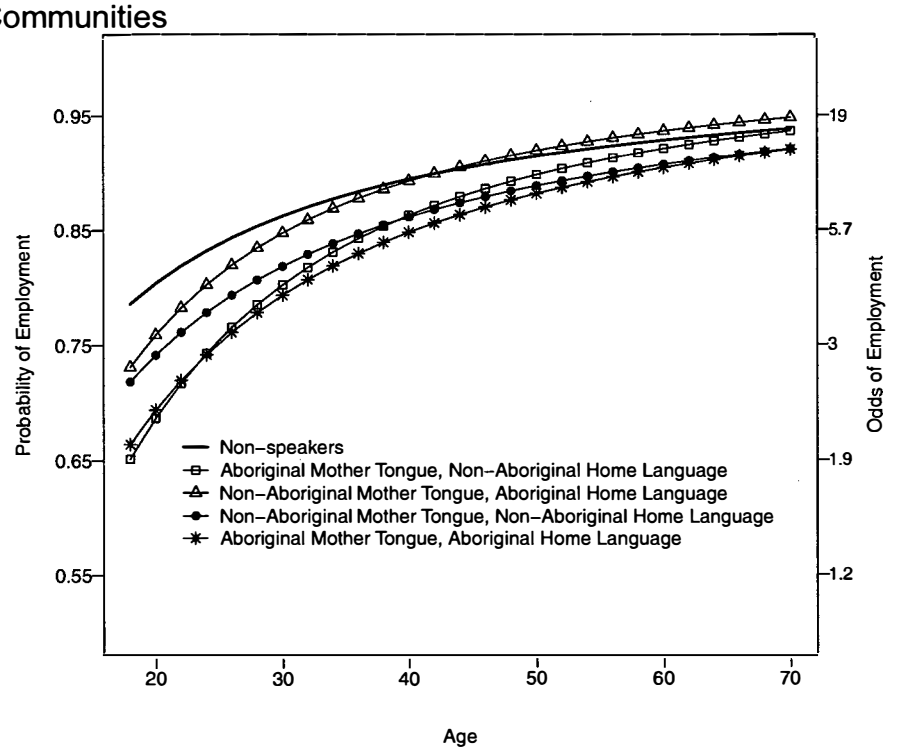


Figure 3.6.3: Predicted Probability of Employment as a Function of Age and Aboriginal Language Use in Non-Aboriginal Communities

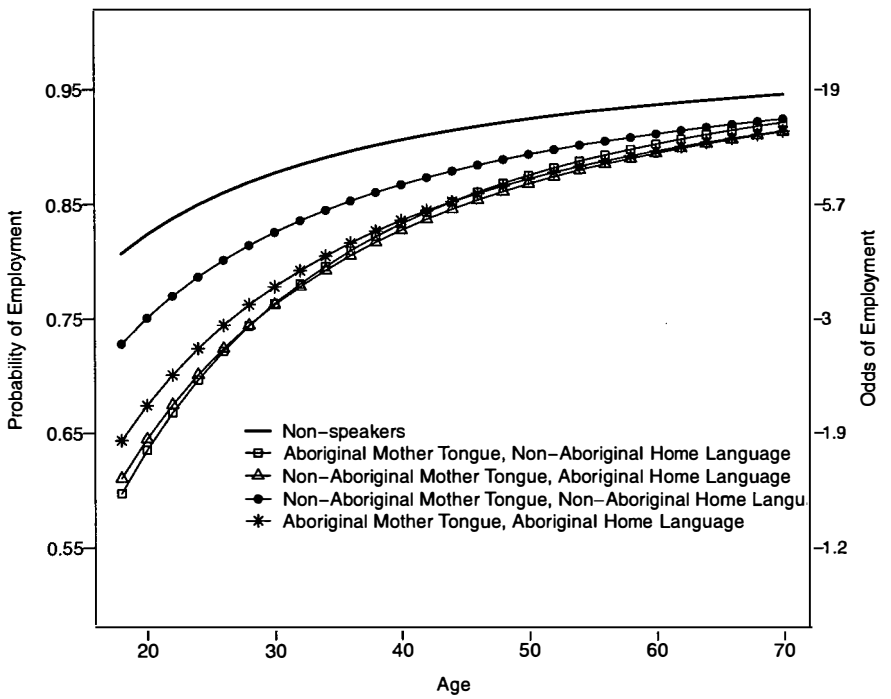
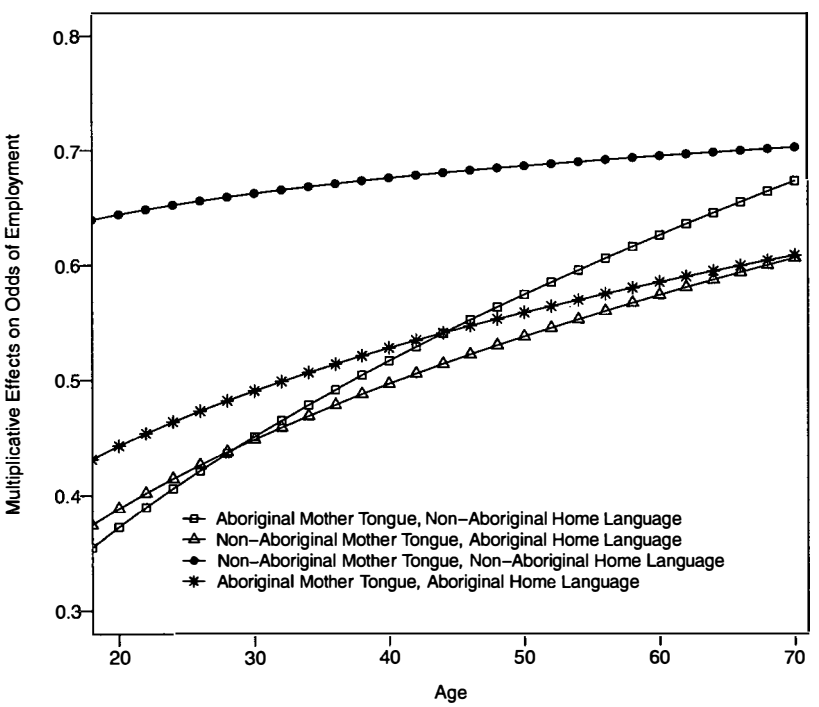


Figure 3.6.4: Multiplicative Effects of Aboriginal Language Use on Odds of Employment as a Function of Age, Non-Aboriginal Communities



Viewed across the age range, none of the language use groups has a marked advantage in Aboriginal communities. In non-Aboriginal communities, non-speakers have a notable advantage. The disparity in predicted odds of employment between non-speakers and Aboriginal language users in non-Aboriginal communities increases with age. The practical import of the disparity in employment declines, however. At age 20, being in the YN, NY, NN and YY groups multiplies the predicted odds of employment by 0.37, 0.39, 0.64 and 0.44, respectively. These differences translate into employment rate deficiencies of 19, 18, 7, and 15 percentage points, respectively. At age 44, being in the YN, NY, NN and YY groups multiplies the predicted odds of employment by 0.54, 0.51, 0.68 and 0.54, respectively. These differences translate into employment rate deficiencies of 6, 7, 4, and 6 percentage points, respectively. At age 69, being in the YN, NY, NN and YY groups multiplies the odds of employment by 0.67, 0.60, 0.70 and 0.61, respectively. These differences translate into employment rate deficiencies of 3, 3, 2, and 3 percentage points, respectively.

The main effect of ancestry is highly statistically significant and negative. The predicted odds of employment for non-speakers with heterogeneous ancestry are about 1.4 times those for non-speakers with homogeneous ancestry. This corresponds to a difference in predicted employment rate of about four percentage points. The interaction between

ancestry and Aboriginal language use is also statistically significant. The coefficients comprising the interaction are uniformly positive, suggesting that homogeneous ancestry is less disadvantageous for Aboriginal language users than for non-speakers. The coefficients associated with the NN and NY groups, however, are not statistically significant. For members of the YN and YY language use groups, homogeneous ancestry multiplies the odds of employment by 0.88 and 0.79, respectively. These differences correspond to differences in probability of employment of about two and four percentage points, respectively. As table 3.6.4 illustrates, the relationship between ancestry and employment is modest, as is the difference in that relationship across Aboriginal language groups.

Table 3.6.4: Predicted Probability of Employment as a Function of Aboriginal Language Use and Ancestry.

Language Use Group	Predicted Probability of Employment		
	Heterogeneous Ancestry (A)	Homogeneous Ancestry (B)	Difference (A - B)
NS	0.89	0.85	0.04
YN	0.80	0.78	0.02
NY	0.80	0.74	0.05
NN	0.85	0.80	0.05
YY	0.81	0.77	0.04

The main effect of gender is highly statistically significant. The odds of employment for females are approximately 1.6 times the odds for males. This disparity corresponds to an approximate six percentage point difference in employment rates. Knowledge of an official language is only statistically significant at the 95% level. The odds of employment for those with knowledge of an official language are approximately 1.2 times the odds for those without such knowledge. This difference corresponds to an approximate two percentage point difference in employment rate. It is notable that employment is the only outcome with which lack of knowledge of an official language is not powerfully negatively associated.

The main effect of Aboriginal group is highly statistically significant, although the coefficient associated with the Inuit is not. The odds of employment for the Métis are approximately 1.3 times the odds for Registered Indians, corresponding to a difference in predicted employment rate of about two percentage points. The odds of employment for non-registered North American Indians are approximately 1.1 times the odds for Registered Indians, corresponding to a difference in predicted employment rate of about one percentage point. Overall, the effect of Aboriginal group affiliation on employment is unremarkable.

The main effect of proximate population is statistically significant. Its interaction with Aboriginal language use is statistically significant as well, though the term associated with the NY group is not. Figures 3.6.5

through 3.6.7 display predicted probability of employment as a function of proximate population and Aboriginal language use in the three community types.

Figure 3.6.5: Predicted Probability of Employment as a Function of Proximate Population and Aboriginal Language Use, Non-Aboriginal Communities

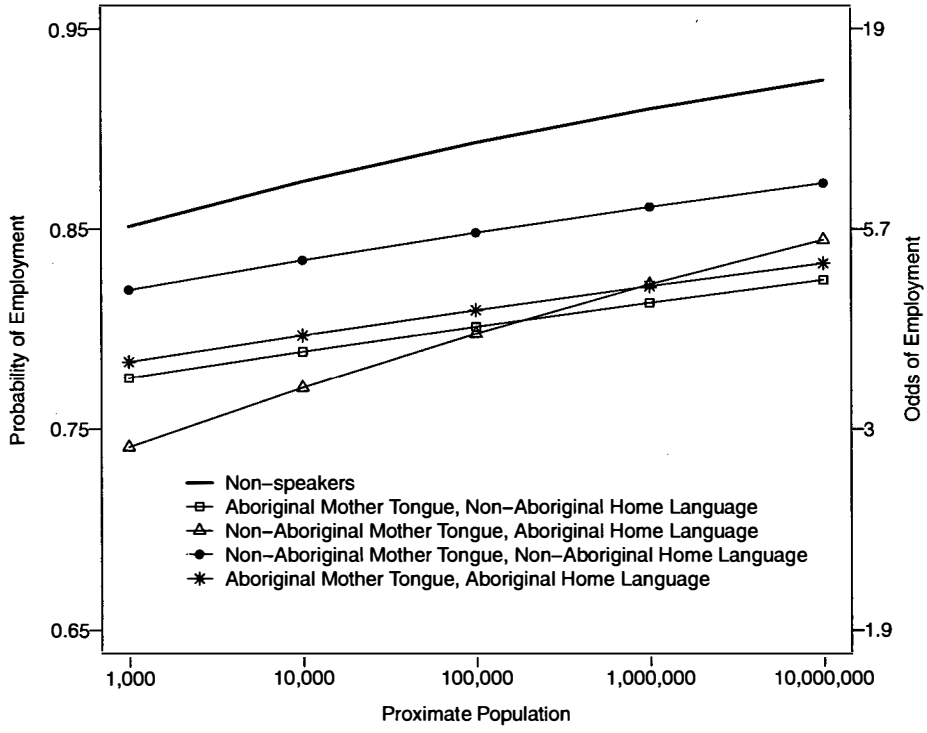


Figure 3.6.6: Employment Rate as a Function of Proximate Population and Aboriginal Language Use, Legal Reserves

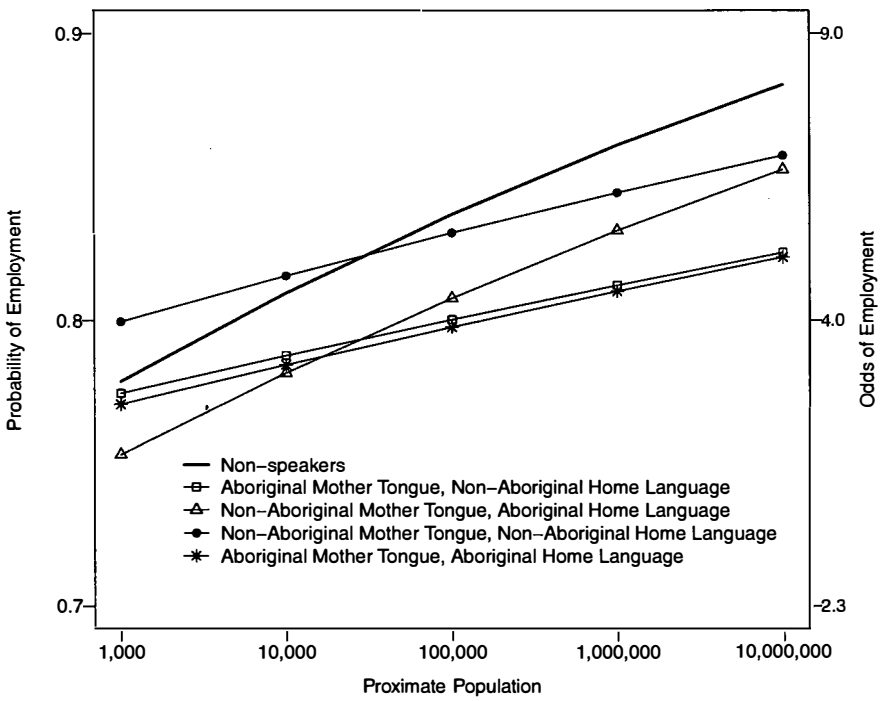
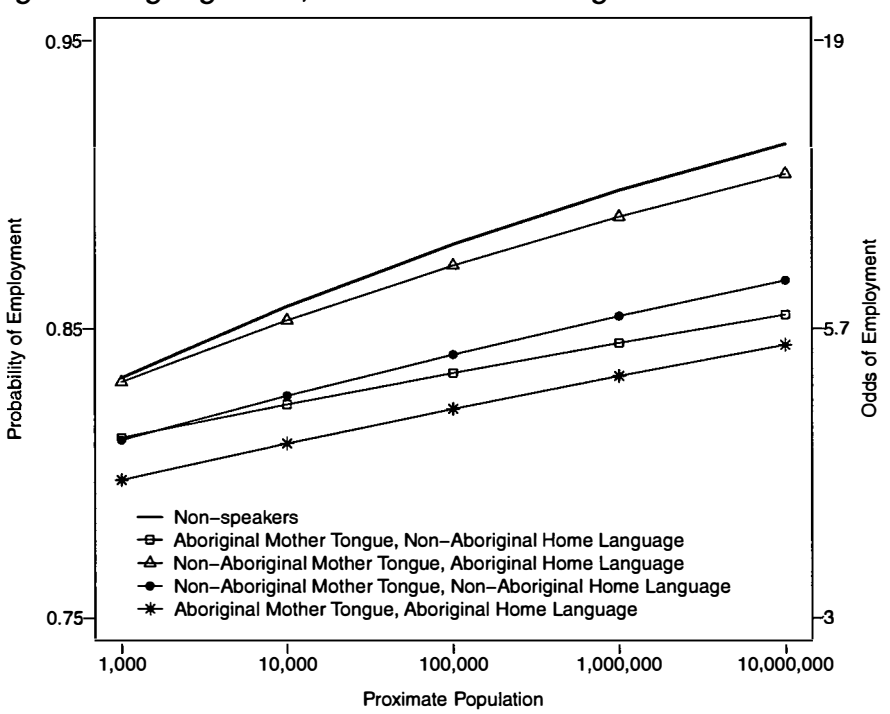


Figure 3.6.7: Employment Rate as a Function of Proximate Population and Aboriginal Language Use, Non-Reserve Aboriginal Communities



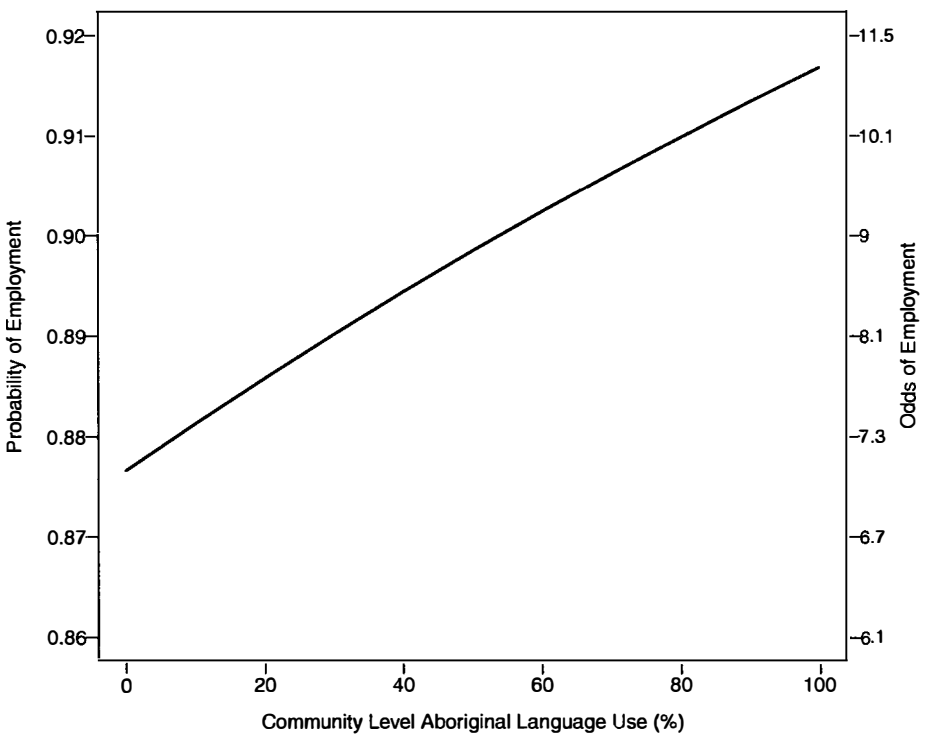
A one-unit increase in the log of proximate population multiplies non-speakers' odds of employment by 1.2. The predicted employment rate for non-speakers in non-Aboriginal communities with proximate populations of 1,000 is about 85%, seven percentage points lower than the predicted rate for non-speakers in communities with proximate populations of seven million. Increasing proximate population appears to be less advantageous for Aboriginal language users. A one-unit increase in the log of proximate population multiplies the predicted odds of employment for members of the YN, NN and YY groups by about 1.1. For these groups, employment rates in non-Aboriginal communities with proximate populations of one thousand versus seven million are predicted to differ by roughly five percentage points.

Again, in non-Aboriginal communities, non-speakers have a clear advantage over Aboriginal language users across the range of proximate population. In Aboriginal communities, however, while non-negligible differences in predicted employment rates exist across language use categories, neither Aboriginal language users nor non-speakers have a clear advantage.

Of the remaining community level predictors – language change and community level Aboriginal language use – only the latter has a highly statistically significant main effect. Figure 3.6.8 shows an increase in the predicted probability of employment as community level Aboriginal

language use increases. A one percent increase in community level Aboriginal language use multiplies the predicted odds of employment by approximately 1.004. This effect translates into a difference in employment rate of approximately four percentage points between communities in which zero percent of Aboriginal people speak an Aboriginal language and communities in which all Aboriginal people speak an Aboriginal language.

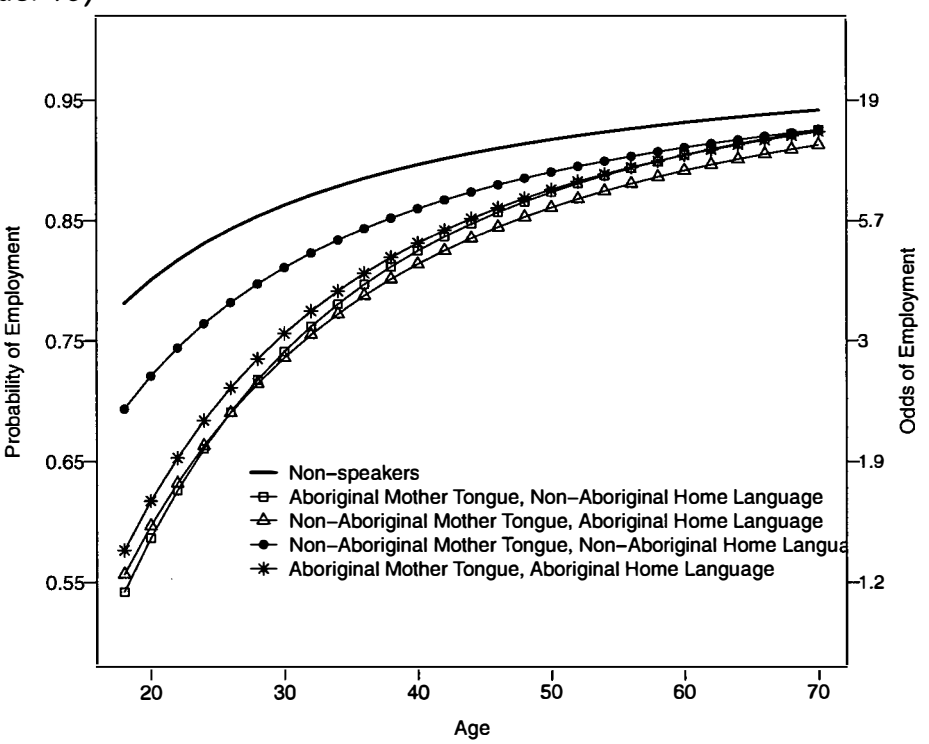
Figure 3.6.8: Predicted Probability of Employment as a Function of Community Level Aboriginal Language Use



3.6.1 Controlling for Educational Attainment

Figures 3.6.9 is derived from model 13[1], which is identical to model 12, except that it includes educational attainment as a predictor. It plots the predicted probability of employment in non-Aboriginal communities as a function of age and Aboriginal language use and exhibits a pattern very similar to that of figure 3.6.2. While the disparities in employment rate seem to narrow somewhat more rapidly with age when one controls for educational attainment, doing so does not have a major impact on the relationship between Aboriginal language use and employment.

Figure 3.6.9: Predicted Probability of Employment as a Function of Age and Aboriginal Language Use (in Non-Aboriginal Communities, Based on Model 13)



[1] See Table A.13.

Oddly, controlling for education produced a statistically significant effect for knowledge of an official language. More strangely, that coefficient is positive: being without the ability to speak an official language multiplies one's odds of employment by about 1.5. This is equivalent to an employment rate difference of about three percentage points.

3.7 Summary

The preceding analyses demonstrate that relationships exist between Aboriginal language use and the outcome variables. It is clear, however, that these relationship are more complex than the basic descriptive statistics relating Aboriginal language use to well-being suggest. Chapter 4 provides in-depth analysis, contextualization and synthesis of these results.

Chapter 4: Discussion and Conclusions

4.1 Introductory Notes

The primary purpose of this chapter is to address, with specific reference to the research questions introduced in chapter 2, the results presented in chapter 3. Section 4.2 is devoted to this end. Section 4.3 discusses additional findings of interest. These concern the control variables whose own effects are not directly relevant to the subject of this dissertation. Section 4.4 discusses some limitations of this dissertation. Section 4.5 highlights questions generated or unanswered by this dissertation and discusses opportunities for future research. Section 4.6 endeavors to synthesize all findings into a coherent statement about the relationship between Aboriginal language use and well-being.

For ease of reference, the abbreviated labels for the five language use categories are reproduced below.

NS: Non-speakers

YN: Aboriginal Mother Tongue, Non-Aboriginal Home Language

NY: Non-Aboriginal Mother Tongue, Aboriginal Home Language

NN: Non-Aboriginal Mother Tongue, Non-Aboriginal Home Language

YY: Aboriginal Mother Tongue, Aboriginal Home Language

4.2 Addressing the Research Questions

The research questions introduced in chapter 2 are reiterated below. Subsequently, each question is addressed, though not in the order in which they are listed.

1) Is Aboriginal language use related to well-being?

2) Does the impact of Aboriginal language use vary with age?

3) Does the impact of Aboriginal language use depend on whether one has only Aboriginal ancestry (i.e. homogeneous ancestry) or mixed Aboriginal and non-Aboriginal ancestry (i.e. heterogeneous ancestry)?

4) Do different "types" of Aboriginal language use impact well-being differently?

5) Is the effect of Aboriginal language use on well-being dependent on whether one resides in an Aboriginal community?

6) Is the effect of Aboriginal language use on well-being dependent on the level of Aboriginal language use in one's community?

7) Do changes in Aboriginal language use at the community level affect individuals' well-being, and does this effect differ across language use categories?

8) Does one's well-being depend on the isolation of the community in which one resides, and does this effect differ across language use categories?

Research Question 1: Is Aboriginal language use related to well-being?

The answer to this very general question is "yes." The bivariate relationships between Aboriginal language use and the outcome variables provide considerable support for the ghettoization hypothesis. Non-speakers have between about one and three more years of education, on average, than the four groups of Aboriginal language users. Non-speakers also have more total income (about $650-$1,750 more) and more employment income (about $750-$3,000 more). Non-speakers participate in the labour force at a rate between seven and 14 percentage points higher than Aboriginal language users and are employed at a rate between three and nine percentage points higher. The complexity of the models described in the previous chapter, however, undermine any facile conclusions one might draw from these basic descriptive statistics.

This dissertation does provide strong evidence that, under certain circumstances, Aboriginal language users have notably different levels of well-being than non-speakers. No sweeping statements, however, can be made about the direction of the relationship between Aboriginal language use and well-being. Under some conditions, non-speakers appear to have an advantage over Aboriginal language users. Under other conditions, the opposite is true.

Research Question 5: Is the effect of Aboriginal language use on well-being dependent on whether one resides in an Aboriginal community?

Chapter 2 suggests that, if Aboriginal language use is a cohesive force, it should be more beneficial when used in an Aboriginal community. Conversely, if Aboriginal language use is a ghettoizing force, it should be more detrimental when used in an Aboriginal community. Results clearly supporting the former supposition would have Aboriginal language users at higher levels of well-being, especially if they reside in Aboriginal communities. Results clearly supporting the latter supposition would have Aboriginal language users with lower levels of well-being, especially if they reside in Aboriginal communities. The results discussed in chapter 3 do not match either of these patterns exactly. Rather, results suggest that non-speakers have notably higher levels of well-being in non-Aboriginal communities but that this advantage is typically smaller, nonexistent, or even inverted in Aboriginal communities[1].

In non-Aboriginal communities, non-speakers are predicted[2] to have slightly higher levels of educational attainment than the four groups of Aboriginal language users. In non-reserve Aboriginal communities, non-speakers are predicted to have slightly more education than the YN, NN and YY groups, but less than the NY group. In legal reserves, differences

[1] This statement is reasonable, generally. It is not necessarily true, however, at all levels of the other variables with which Aboriginal language use interacts. These interactions are discussed later.
[2] Where the other predictors in the model are set to their means or reference categories.

in predicted educational attainment across language use groups are minute.

In non-Aboriginal communities, non-speakers are predicted to receive between 126% and 140% of the total income received by the four groups of Aboriginal language users. Similar disparities are predicted in non-reserve Aboriginal communities. In legal reserves, however, non-speakers are predicted to receive only 101% - 116% of the total income received by Aboriginal language users. The model for employment income exhibits similar patterns.

In non-Aboriginal communities, non-speakers are predicted to participate in the labour force at a rate eight to ten percentage points higher than those of the four groups of Aboriginal language users. In reserves and other Aboriginal communities, non-speakers have a maximum advantage of only two percentage points. Non-speakers are predicted to have higher employment rates in all three types of communities. The gaps tend to be smaller in non-reserve Aboriginal communities. Gaps are smaller still in legal reserves, where they fall between only one and four percentage points.

It seems evident, then, that the relationship between Aboriginal language use and well-being is dependent on community type. A more explicit examination of the effects of community type within language use groups, however, is required to address this research question. The

cohesion hypothesis suggest that Aboriginal language use will be beneficial in all circumstances. It is already evident that this dissertation does not support that notion. However, the idea of language-based cohesion is still applicable if Aboriginal language users tend to "do best" in Aboriginal communities. The idea is less convincing if Aboriginal language users fare better in non-Aboriginal communities. The results discussed in chapter 3 are inconsistent with respect to this issue. The model for educational attainment supports the notion of language-based cohesion, since non-speakers are predicted to have lower levels of education in Aboriginal communities while the opposite is true of Aboriginal language users.

With respect to total income, Aboriginal language users also tend to "do best" in Aboriginal communities. That predicted income is highest in non-reserve Aboriginal communities for all language use groups (non-speakers included) is not contrary to the notion of cohesion. The pattern does not, however, support the notion of language-based cohesion[1]. The situation with employment income is quite different. Predicted levels of employment income are not significantly different between non-Aboriginal communities and non-reserve Aboriginal communities. Predicted levels of employment income in reserves, however, are substantially lower, for all

[1] The lower predicted levels of total income in legal reserves are consistent with the claim, made in chapter two, that impediments to economic development exist in legal reserves.

language use groups. The negative effect of residence on reserve is less pronounced, however, for Aboriginal language users. This pattern is consistent with a variety of scenarios, each of which has different implications for the cohesion hypothesis. For example, perhaps cohesive forces allow Aboriginal language users to overcome, to some extent, the negative influence of reserve living on employment income. On the other hand, perhaps that negative influence tends towards a certain minimum level. Since non-speakers still have higher predicted employment incomes than Aboriginal language users in reserves, it is possible that the minimum level is approximately that obtained by Aboriginal language users. The negative impact of reserve living, that is, may be limited for that group inherently.

The relationship between Aboriginal language use and community type in the labour force participation model is similar to that in the total income model. Aboriginal language users are predicted to fare better in legal reserves than in non-Aboriginal communities while non-speakers are predicted to fare worse in legal reserves. Everyone, however, is predicted to "do best" in non-reserve Aboriginal communities.

The relationship between Aboriginal language use and community type is weak and somewhat inconsistent in the employment model. Generally, Aboriginal language users in non-Aboriginal communities and legal reserves are not predicted to have very different employment rates.

Aboriginal language users in non-reserve Aboriginal communities are predicted to have somewhat higher employment rates. Non-speakers in reserves, however, have a notably (if five percentage points can be regarded as notable) lower predicted employment rate than non-speakers in non-Aboriginal communities. The fact that Aboriginal language users tend to "do best" in Aboriginal communities while non-speakers do best in non-Aboriginal communities provides some support for the notion of language-based cohesion. The effects, however, are quite small.

Ultimately, the relationships between Aboriginal language use, community type, and the outcome variables provide no firm support for either the cohesion or the ghettoization hypothesis. Results do not support the cohesion hypothesis as it is conceptualized in chapter 2, as residence in an Aboriginal community does not bolster an already positive effect of Aboriginal language use. Aboriginal language users do not always fare best in Aboriginal communities and, even when they do, non-speakers often do as well. These patterns also undermine the notion of language-based cohesion. On the other hand, residence in an Aboriginal community apparently sometimes benefits Aboriginal language users more than non-speakers or benefits Aboriginal language users while costing non-speakers. These patterns do support the notion of language-based cohesion.

Research Question 2: Does the impact of Aboriginal language use vary with age?

The outcomes examined in this dissertation vary greatly with age. The shapes of the relationships between age and outcomes tend to be very similar across language use categories. Nonetheless, there is evidence that those relationships are different. As a result, the relationships between Aboriginal language use and the outcome variables differ across the age span.

Aboriginal language use has little apparent impact on educational attainment among young people. The effect increases with age, however, until a substantial gap in educational attainment exists among seniors who do and do not use an Aboriginal language. In non-Aboriginal communities, at age 24, non-speakers have advantages of between zero and 0.4 years of education over the four groups of Aboriginal language users. By age 70, however, non-speakers have advantages of between 1.1 and 1.9 years. In Aboriginal communities, Aboriginal language users exhibit a mild advantage over non-speakers until early middle age. Non-speakers do not exhibit marked advantages until beyond age 50. By age 70, though, gaps of nearly one and a half years are still predicted.

Age appears to have a strongly curvilinear relationship with both total and employment income. Income increases until middle age, then begins to decline. In non-Aboriginal communities, the disparities between

non-speakers and Aboriginal language users favour non-speakers increasingly until middle age. Subsequently, the gaps begin to narrow, and then to favour Aboriginal language users at about age sixty and beyond. At twenty years old, non-speakers are predicted to receive, at most, roughly one thousand dollars more total income than the four groups of Aboriginal language users. At middle age, however, gaps are more substantial. At age 44, non-speakers are predicted to receive between $2,574 and $3,434 more total income and between $2,161 and $4,040 more employment income than the four groups of Aboriginal language users. At age 69, however, non-speakers are predicted to receive up to roughly $1,600 *less* total income and roughly $2,600 *less* employment income than the four groups of Aboriginal language users. It is difficult to interpret these patterns. On one hand, if total income is regarded as equally salient at all ages, then the disparities between Aboriginal language users and non-speakers appear to "balance out" somewhat. Unfortunately, income is not an equally meaningful measure of financial well-being across the age span. For example, if Aboriginal language users have lower incomes during the prime working years, they may have accumulated less wealth than non-speakers. They would have to work more as their age advanced than non-speakers, who would have larger amounts of accumulated wealth with which to supplement their incomes. That Aboriginal language users are predicted to have higher incomes than

non-speakers beyond "retirement age", therefore, is not an unambiguously positive reflection on Aboriginal language use.

In Aboriginal communities, neither Aboriginal language users nor non-speakers have consistently higher incomes across the age span. Instead, groups that have lower predicted values before middle age tend to have higher predicted values after middle age. This pattern could simply be interpreted as predicted incomes in the different language groups "peaking" at slightly different ages. The notably higher employment income at which the YN group "peaks" is of interest, though difficult to explain.

Labour force participation rates also increase until middle age, declining subsequently. In non-Aboriginal communities, disparities favouring non-speakers decline as age increases. At age 20, the predicted labour force rates of the four groups of Aboriginal language users are between 16 and 23 percentage points lower than the rate of non-speakers. When labour force participation peaks around age 38, Aboriginal language users trail non-speakers by between seven and ten percentage points. The gaps are between only one and three percentage points wide by age 69.

Predicted employment rates increase with age, but the slopes get shallower as age increases. Again, in non-Aboriginal communities, disparities favoring non-speakers decline with age. At age 20, the four

groups of Aboriginal language users are predicted to be employed at rates seven to 19 percentage points lower than non-speakers. At age 44, Aboriginal language users trail non-speakers by between four and seven percentage points. The gaps are between only two and three percentage points wide by age 69. In Aboriginal communities, there are not any clear disparities in labour force participation or employment rates between Aboriginal language users and non-speakers across the age range.

To summarize, age is an important predictor of all outcomes and the relationship between Aboriginal language use and each of the outcomes varies with age. Disparities in educational attainment favour non-speakers more with age while disparities in income and labour force activity favour non-speakers less as age increases. These conflicting patterns are particularly relevant to the cohesion versus ghettoization debate. Recall that, even in non-Aboriginal communities, young Aboriginal language users are predicted to have educational attainment levels comparable to those of non-speakers, while Aboriginal language use is associated with substantially lower levels of educational attainment among seniors. This pattern has an intuitively appealing interpretation, one which affirms the historical significance of the ghettoization hypothesis while heralding the salience of the cohesion hypothesis. As suggested in chapter 2, while Aboriginal identity and its trappings may have once been isolating and economically disadvantageous, Aboriginal people in

Canada's current multicultural society can perhaps enjoy "the best of both worlds." In the past, socioeconomic isolation resulting from prejudice, geographic isolation, a lack of opportunity to practice dominant languages, and a concomitant lack of awareness of the economic opportunities education affords may have encouraged Aboriginal language users to abandon formal education. Since education is cumulative and usually obtained early in life, elder speakers would continue to have low levels of educational attainment. Younger speakers, however, would be capable of integrating their Aboriginal identities, of which their Aboriginal language use is a part, into mainstream economic culture. Their efforts would be aided, perhaps, by the availability of communications technologies. Such technologies could give youths a broader notion of the opportunities education offers, as well as giving them greater opportunity to practice their skills in dominant languages. As indicated earlier, the young may also be less burdened by prejudice; they may be more confident in their capacity to acquire skills and in the existence of demand for Aboriginal employees.

This interpretation seems less feasible, however, when one observes that significant gaps in the other four outcomes exist among young adults in non-Aboriginal communities. Contrary to the patterns observed in the model of educational attainment, these gaps suggest that the characteristics or consequences of Aboriginal language use that

hampered the economic success of earlier generations are still relevant. Education, income and labour force activity, after all, are path-dependent. Significant gaps in income and labour force activity between young Aboriginal language users and non-speakers suggest that Aboriginal language use is still an obstacle to the commencement of successful socioeconomic careers in non-Aboriginal communities. This is especially true given that controlling for educational attainment has relatively little impact on the relationships between Aboriginal language use and the four other outcomes. It does not appear to be the case, that is, that Aboriginal language users tend to be less successful economically simply because they acquire less education than non-speakers. Since something about Aboriginal language use appears to adversely affect income and labour force activity directly, the importance of the near parity in educational attainment between young Aboriginal language users and non-speakers should not be over-emphasized.

Research Question 3: Does the impact of Aboriginal language use depend on whether one has homogeneous ancestry or heterogeneous ancestry?

Ancestry was included in these models primarily as a control variable. Since being Aboriginal is associated with various socioeconomic deficiencies, it followed that those with homogeneous Aboriginal ancestry might exhibit larger deficiencies than those with heterogeneous ancestry. Since those with homogeneous ancestry are more likely to use an

Aboriginal language, such a phenomenon could produce a spurious negative relationship between Aboriginal language use and well-being. Interactions between Aboriginal language use and ancestry were tested because positive effects of Aboriginal language use are alleged to be contingent on the level of symbolic importance attached to Aboriginal language use by users[1]. Since those with homogeneous ancestry have no competing ancestral identity, they may attach more importance than those with heterogeneous ancestry to Aboriginal culture and language.

The models described in chapter 3 support the supposition that those with homogeneous Aboriginal ancestry have lower levels of well-being. Those with homogeneous ancestry are predicted to receive 77% and 84% of the total and employment incomes, respectively, received by those with heterogeneous ancestry. The models of educational attainment, labour force participation and employment include statistically significant interactions between ancestry and Aboriginal language use. Homogeneous ancestry is associated with lower levels of these outcomes for all five language use groups. However, while the negative associations between homogeneous ancestry and labour force activity are smaller for Aboriginal language users than for non-speakers, the negative association between ancestry and educational attainment is larger. The differences

[1] This notion is discussed in section 1.4.2 (pp.24-46) and section 2.1 (pp.74, 78).

across language use categories are very small, however, so offer no clear support for either the cohesion or ghettoization perspective.

Research Question 6: Is the effect of Aboriginal language use on well-being dependent on the level of Aboriginal language use in one's community?

Chapter 2 suggests that "if Aboriginal language use enhances well-being, it should be a more strongly positive force when one's neighbours use it as well. Conversely, if Aboriginal language use ghettoizes, it should be a more powerfully negative force when employed among other users." The models described in chapter 3 do not support either of these suggestions, exactly. The educational attainment model aligns quite clearly with the notion of language-based ghettoization. Community-level Aboriginal language use has no apparent effect on non-speakers. Predicted educational attainments of the four groups of Aboriginal language users, however, decline as community-level Aboriginal language use increases. The most pronounced effect is on traditional users (i.e. the YY group), who are predicted to have about two more years of education if they live in a community in which zero percent[1] of Aboriginal people speak an Aboriginal language versus a community whose entire Aboriginal population speaks an Aboriginal language.

[1] As indicated in chapter 3, zero percent should be interpreted as "rounded to zero percent", since the notion that residence in communities devoid of Aboriginal language use affects Aboriginal language users is contradictory.

Community level Aboriginal language use appears to affect the other four outcomes, as well. Those effects are contradictory, however, and are not dependent on individual level Aboriginal language use. Community level Aboriginal language use is mildly negatively associated with labour force participation, but is positively associated with income and employment rate. Compared to communities in which zero percent of Aboriginal people use an Aboriginal language, individuals in communities whose entire Aboriginal populations use an Aboriginal language are predicted to receive $1,539 more total income, $3,040 more employment income, and to be employed at a rate four percentage points higher, but to participate in the labour force at a rate nine percentage points lower. These differences are difficult to reconcile. Disregarding labour force participation, momentarily, as the most nebulous indicator of well-being, the discrepancy in the effect of community level Aboriginal language use on education and the three other outcomes is perhaps explicable. It may be that Aboriginal language use occurs in more "traditional" communities, and that it bolsters cohesion in those communities, encouraging residents to strive for economic success. In such traditional communities, however, formal education may be a less relevant component of economic success if employment is focused around traditional industries. These remarks are highly speculative, of course. They seem plausible, however, when discussed with reference to Portes's work on immigrant enclaves in

America. As discussed in previous chapters, Portes and various colleagues found many examples of prosperous immigrant enclaves (see Portes & Rumbaut, 2001). Participants in such enclaves tended to maintain strong ethnic identities that – often more than formal education – facilitated their service of niche ethnic markets[1].

Research Question 7: Do changes in Aboriginal language use at the community level affect individuals' well-being, and does this effect differ across language use categories?

Chapter 2 suggests that negative associations previously discovered between Aboriginal language use and well-being at the community level were actually demonstrating the negative impact of Aboriginal language *decline* on well-being[2]. Aboriginal language use is declining in most communities and, necessarily, cannot decline in communities in which Aboriginal languages are not spoken. A spurious relationship between Aboriginal language use and well-being, therefore, was possible. Chapter 2 also suggests that reviving an Aboriginal language could both reflect and generate ethnic pride and its alleged concomitant motivation to succeed economically. Accordingly, chapter 2 suggests that increases in Aboriginal language use might be associated

[1] Portes' work also seems relevant to the similarly contradictory effects of the interaction between Aboriginal language use and ancestry. As indicated earlier, however, those effects are too small to warrant express consideration.

[2] Well-being might be adversely affected by the demoralization individuals feel as they actively experience the decline of their language. In addition, as Portes and colleagues suggest, swift language loss may impede intergenerational communication which may generate social disorder.

with higher levels of well-being, especially for Aboriginal language users. The models described in chapter 3 do not support the first supposition. Even when changes in Aboriginal language use are accounted for, some marked negative associations between Aboriginal language use and well-being exist. Nonetheless, the models of educational attainment and employment income offer very limited support for the second supposition. As more members of a community begin to acquire an Aboriginal second language (i.e. as language change increases), predicted educational attainment increases for the YN, NN and YY groups. This pattern suggests that, as discussed in chapter 2, the increasing reverence for Aboriginal languages implied by increasing language change is bolstering users' esteem and drive to achieve. The effect is too small to be of much practical interest, however. The effect of language change on employment income is also positive and similarly small, but does not depend on Aboriginal language use. It is also worthwhile to acknowledge that communities able to fund Aboriginal language programs that increase language change levels are probably relatively wealthy. That wealth could also account for higher levels of education and employment income.

Research Question 8: Does one's well-being depend on the isolation of the community in which one resides, and does this effect differ across language use categories?

Chapter 2 suggests that Aboriginal language use may be taken for granted in isolated areas, detracting from its ability to bolster well-being. The ghettoization hypothesis, moreover, implies that Aboriginal language use should be more detrimental in isolated communities, where the "backwardness" promoted by Aboriginal language use would not be ameliorated by proximate mainstream influences. The educational attainment model provides support for both the ghettoization and cohesion perspectives. Aboriginal language users living in isolated communities are disadvantaged relative to non-speakers, but those in the most populous areas are not. In fact, Aboriginal language users living in very populous *Aboriginal* communities have higher predicted levels of educational attainment than their non-speaking counterparts.

Again, however, the models of income and labour force activity exhibit inconsistent patterns. Proximate population has no apparent effect on employment income. Proximate population is negatively related to total income, but only for the YN and YY language groups, and even these effects are of borderline statistical significance. Proximate population also has a small negative effect on labour force participation, across Aboriginal language use groups. The mild positive effect of proximate population on non-speakers' predicted employment rate is even milder for the YN, NN and YY groups. In summary, physical integration is associated with higher educational attainment levels, especially for Aboriginal language users,

lower total incomes, especially for the YN and YY groups, reduced labour force participation, and an employment rate increase that is larger for non-speakers than for three of the four groups of Aboriginal language users. The intriguing educational attainment model notwithstanding, it is difficult to make any definitive claims respecting the relationships between isolation, Aboriginal language use, and well-being.

Research Question 3: Do different "types" of Aboriginal language use impact well-being differently?

Chapter 2 introduced the possibility that having an Aboriginal second language may be a boon to socioeconomic well-being even if having an Aboriginal first language is detrimental. While those with an Aboriginal first language may take their language and culture for granted, having an Aboriginal second language seems to presuppose high regard for that language and culture. Such regard might generate the motivational ethnic pride that Aboriginal language use is supposed by some to produce. The models described in chapter 3 do not support this notion.

There are certainly differences in predicted outcomes across the four groups of Aboriginal language users. These differences are often as large or larger than those between a given Aboriginal language use group and non-speakers. This is definitely the case in Aboriginal communities, but it is even true in non-Aboriginal communities, where non-speakers tend to exhibit distinctly higher levels of well-being than Aboriginal

language users. Differences in well-being among the four groups of Aboriginal language users, however, are inconsistent across outcomes. Differences are also inconsistent within outcomes, owing to varying interaction effects. For example, the YY category has the lowest expected educational attainment in the most isolated areas, but not in the most populous. At middle age, the NY group has the highest expected total income in non-Aboriginal communities, while the YN group has the highest expected total income in legal reserves. In non-Aboriginal communities the YN and YY groups are predicted to have similar employment incomes until about age 44, when the former gains a considerable advantage. The NN group has a markedly higher predicted employment rate in non-Aboriginal communities, but not in Aboriginal communities. It is tempting to attach theoretical explanations to these differences on a case-by-case basis. As noted earlier, however, these effects are inconsistent and attempts to explain or reconcile them would be purely speculative.

What do bear consideration are the deficiencies in predicted outcomes of the NY and, especially, the NN group. The theory underpinning research question 3 does not anticipate these deficiencies. Rather, research question 3 is predicated on the notion that having an Aboriginal second language might be a boon to well-being even if having an Aboriginal first language is detrimental. Several explanations for the observed patterns exist, however. First, chapter 1 discusses the possibility

that bilingualism and bilingual education particularly reduce proficiency in the dominant tongue. There appears to be considerable consensus among academics that this notion has been debunked, despite widespread public belief in it. Reduced proficiency in a dominant language, however, could account for the lower predicted outcomes of those with an Aboriginal second language.

Low predicted outcomes for the NY and NN group may also follow from Aboriginal language use functioning as a proxy for parental well-being. The model for educational attainment is probably the most convincing model of the considerable degree to which older Aboriginal language users were (and, thus, likely continue to be) excluded from the socioeconomic mainstream. The association of indicators of well-being across generations is well-established. If, indeed, Aboriginal language use is associated with lower levels of well-being for older generations, the children of parents who use an Aboriginal language should have lower levels of well-being than the children of parents who do not. Having an Aboriginal first language is an obvious proxy for parental well-being, since those with an Aboriginal mother tongue almost certainly learned it from their parents[1]. Having an Aboriginal second language may also be a proxy, however, since the motivation to learn an Aboriginal second language is probably greater among those who have an elder with whom

[1]"Parents" may be understood to include legal guardians.

they wish to communicate in that language. It is also possible that having an Aboriginal language, whether it is a first or second language, is a proxy for traditionalism, and that the latter is sometimes associated with reduced well-being.

The unexpected occurrence of low predicted outcomes for users of an Aboriginal second language also seem explicable with reference to Portes and colleagues' work on immigrants to America. Chapter 2 describes the NY and NN groups as "cultural revivalists" motivated to learn an Aboriginal language. Following from the literature review in chapter 1, they are envisioned as more assimilated than those with an Aboriginal mother tongue, and perhaps as socioeconomically successful enough to allow them the luxury of reconnecting with their "roots" via Aboriginal language use. The frequent occurrence of low outcomes among users of a second Aboriginal language casts doubt on this image. As discussed in previous chapters, Portes and Rumbaut (2001) found that disruptions in intergenerational communication often lead to social pathologies in immigrant groups. Such disruptions result when immigrants fail to gain fluency in the dominant tongue of their host country while their children fail to gain or maintain fluency in their ancestral language. It seems plausible that some members of the NN group may have

experienced this sort of intergenerational communication breakdown[1]. That is, perhaps they grew up with one or more Aboriginal language using parents, but were so strongly influenced by the dominant culture that they regard the dominant language as their mother tongue. Their Aboriginal second language is not a deliberate attempt at cultural revival, but the remnants of what they learned though limited interactions with their parents.

This explanation is less plausible for the NY group. A quick analysis of the 2001 *Census Public Use Microdata File* (Statistics Canada, 2006b), reveals that only about eight percent of members 18 years of age and over live with their parents. Mandatory use of an Aboriginal language in the home, therefore, seems uncommon. Analysis of the marital patterns of the two second language groups might be revealing, however. Perhaps members of the NY group have a similarly dysfunctional history as that conjectured for the NN group and use an Aboriginal language at home simply because Aboriginal language speaking spouses demand it.

[1]As the tables of descriptive statistics provided in chapter 3 indicate, the inability to use either English or French is uncommon among Canadian Aboriginal people. Consequently, it is unlikely that Aboriginal parents and children were completely unable to communicate. However, Portes and Rumbault's work implies that it is not merely the inability to transmit information that follows from a lack of a shared language, but a lack of respect and understanding across generations. Similarly, Hallett et al. (2007) cite the maintenance of "cultural continuity" as the means by which Aboriginal language use protects against suicide.

4.3 Additional Findings

4.3.1 Gender

The associations between gender and the outcomes examined in this dissertation are inconsistent. Females are predicted to have approximately 0.4 more years of education than males, but to receive 74% and 76% of males' total and employment incomes, respectively. Females are predicted to participate in the labour force at a rate about 7.5 percentage points lower than men, but to be employed at a rate about six percentage points higher than men. These inconsistent results echo some previous research. Cooke (2007b) found that Registered Indian males had higher income but lower educational attainment than Registered Indian females. Ciceri and Scott note that Aboriginal women were less likely to be labour force participants in 2001 (2006, p. 13).

4.3.2 Knowledge of an Official Language

As hypothesized in chapter 2, predicted values of most outcomes are markedly lower for those who do not know an official language. Indeed, the most dramatic effects are associated with this predictor. Those who do not know an official language are predicted to have completed three and a half fewer years of school than those who do. Those without knowledge of an official language are predicted to receive 68% of the total income and 57% of the employment income received by non-speakers and to have less than half their odds of labour force participation. Notably,

controlling for educational attainment reduced the effects of knowing an official language on employment income, and completely eliminated its effects on total income and labour force participation. Apparently, those without knowledge of an official language have lower levels of well-being largely because they tend to obtain less education. Rather inexplicably, knowledge of an official language has little impact on employment rate and controlling for educational attainment produces a small positive association between employment rate and lack of knowledge of an official language.

4.3.3 Aboriginal Group

As indicated earlier, this dissertation compares the well-being of Registered Indians to that of non-Registered North American Indians, Métis and Inuit people. The Métis tend to have mildly higher levels of well-being. They are predicted to have about 0.2 more years of education than Registered Indians, to receive 116% of their total income and 113% of their employment income and to have 1.3 times their odds of labour force participation and employment. In practical terms, these differences are quite small. Non-Registered North American Indians are predicted to have about 0.14 fewer years of education than Registered Indians, to receive 96% of their employment income, and to have 1.1 times their odds of employment. Again, these effects are so small as to be of little practical import. The Inuit are predicted to have about 0.35 fewer years of

education than Registered Indians but to have 1.2 times their odds of labour force participation. Once again, these differences are very small.

4.4 Limitations of this Study

4.4.1 Variable Definitions

An important limitation of this study relates to the conceptualizations and operationalizations of the variables employed[1]. Given their centrality to this dissertation, the sections below will focus on "well-being" and "Aboriginal language use."

4.4.1.1 "Well-Being"

"Well-being" is the outcome of interest in this dissertation. It is defined here in terms of educational attainment, income and labour force activity. These are conventional means of defining such concepts as quality of life, well-being, development, etc[2]. They do not constitute, however, a complete list of the factors that constitute well-being. Such things as physical and mental health are arguably as or more important[3]. Moreover, even the outcome variables that are examined are imperfect operationalizations of the concepts they are meant to represent. As indicated earlier, income is only a rough approximation of financial well-

[1] For the most part, model constituents were necessarily limited by what information is available from the 2001 Census of Canada.
[2] Cooke (2005) provides an overview of means of quantifying well-being.
[3] Since 2001, my work with INAC has involved attempts to quantify Aboriginal well-being in the form of composite indices. In consultations, Aboriginal people often insist that measures of Aboriginal well-being must include measures of cultural maintenance – particularly Aboriginal language maintenance. This insistence highlights the need to understand the relationship between Aboriginal language use and more conventional measures of well-being.

being. This is especially true for the old, whose incomes are often supplemented by accumulated wealth, as well as for the young, many of whom receive financial support from their parents. Indeed, higher levels of income may be suggestive of lower well-being for these individuals since lack of support from parents or lack of savings may necessitate more hours of paid employment. Income may be an even less appropriate measure of financial well-being for Aboriginal people, since many remain involved in traditional pursuits (such as hunting) that generate tangible non-monetary benefits. The issue of non-monetary rewards is particularly salient to this dissertation. After all, if Aboriginal language use is linked with Aboriginal culture and tradition, it is plausible that Aboriginal language users are more likely to supplement their incomes via traditional pursuits. Even if the rewards accrued from such pursuits more than offset any deficiencies in monetary income and paid employment, the methods employed in this dissertation would identify them as having lower levels of well-being.

For similar reasons, the relevance of labour force activity and employment to understanding well-being is also limited. It is worth pointing out that these two indicators are rendered even more dubious by the fact that Aboriginal people are disproportionately reliant on social assistance (Roberts et al., 2008, p.250) and that social assistance regulations often require recipients to – at least apparently – participate in the labour force.

A number of issues undermine the validity of educational attainment as a measure of well-being. Some would argue that higher education is only relevant insofar as one can use it in one's local job market. This is not the case for many more isolated Aboriginal groups. Of course, others contend that education is an end in itself. This notion underpins, for example, the inclusion of education in the United Nations' Development Project's (UNDP) Human Development Index (HDI) (see Cooke, 2007a). Even so, only formal education is addressed in this dissertation. Informal education in traditional knowledge and practices is ignored.

The notion that the quality of education can be quantified in terms of years attended or credentials earned is also problematic. Educations of the same duration in different fields or obtained from different institutions are only roughly equivalent. This point may be especially relevant to Aboriginal research. Many Registered Indian children attend band schools, the quality of which some view as substandard. Evidence in support of this view is largely anecdotal. Some studies have produced corroborating results, however. A study conducted by the province of Alberta, for example, found that First Nations children who attended band schools achieved markedly lower scores on standardized tests (see White et al., 2009). This issue may be particularly relevant to studies of Aboriginal language use. Recall that, in non-Aboriginal communities at

least, young Aboriginal language users have lower predicted levels of every outcome save educational attainment. By virtue of their concentration on reserves, Aboriginal language users are more likely to have attended band schools. If attending band schools artificially inflates educational attainment (by providing students with levels of educational attainment incommensurate with their skills), the analyses of education included in this dissertation are undermined[1].

4.4.1.2 "Aboriginal Language Use"

This variable distinguishes Aboriginal language users from non-speakers, those with from those without an Aboriginal home language, and those with an Aboriginal first language from those with an Aboriginal second language. It does so imperfectly, however. First, the Census allows respondents to list only one mother tongue[2]. Individuals who learned an Aboriginal "first language" simultaneously with another language might not identify themselves as having an Aboriginal mother tongue. Further, while its relevance has been highlighted throughout this dissertation, this variable includes no direct measure of fluency in an

[1] Notably, non-speakers begin to outstrip Aboriginal language users in the mid-to-late twenties, when post-secondary credentials would become more relevant. Band schools, of course, do not operate beyond the secondary level.

[2] The Census does allow individuals to list a second mother tongue in addition to English or French. Respondents are instructed to do so, however, only if both languages were used equally often in early childhood. Moreover, this instruction was likely to have been overlooked as it was provided in the 2001 *Census Guide* rather than on the questionnaire.

Aboriginal language[1]. As stated in chapter 1, some speculate that level of fluency in a minority language is directly related to identification with the minority culture. Such identification, in turn, is supposed to (positively or negatively) affect well-being. Portes' work suggests that social pathology follows from the intergenerational communication disruption that results when children cannot speak their immigrant parents' language. It is plausible that such disruption lies on a continuum that is inversely related to fluency: the less fluency, the more disruption. Some claim that time devoted to minority languages detracts from time devoted to majority languages and that facility in the latter, consequently, suffers. Degree of fluency in a minority language, therefore, should be inversely related to fluency in a dominant tongue which, in turn, should be positively related to well-being. None of these speculated relationships can be tested without a reliable measure of fluency in an Aboriginal language.

4.4.2 Lack of Key Control Variables

In addition to a measure of fluency in an Aboriginal language, the question of whether Aboriginal language use hinders socioeconomic success by reducing dominant language proficiency cannot be addressed without a measure of the latter. In fact, since Aboriginal and dominant

[1] Degree of fluency is implied by common sense understandings of language use (e.g. those with an Aboriginal mother tongue and home language are probably more fluent than those with knowledge of an Aboriginal language but a non-Aboriginal mother tongue and home language). The accuracy of such understandings is unknown, however.

language proficiency are inherently related[1], a measure of the latter should be included in analyses of the relationship between Aboriginal language use and well-being. Unfortunately, only the inability to speak a dominant language is captured by the Census.

The Census also lacks information on parental well-being[2]. The possibility that Aboriginal language use serves as a proxy for parental well-being was discussed earlier. Indeed, it is unfortunate to have to ignore parental traits when modeling the relationship between any two variables supposed to be related to those traits.

4.5 Opportunities for Future Research: The Aboriginal Peoples Survey

The Aboriginal Peoples Survey (APS) is a post-censal survey that was conducted in 1991, 2001 and 2006. These surveys were conducted on very limited cross-sections of the Canadian Aboriginal population[3]. Consequently, they were not ideal for examining the broader research questions addressed in this dissertation. However, given their greater depth of information on Aboriginal well-being and Aboriginal language use, they are a natural choice for additional research on the relationship between those two variables.

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[1] This does not imply that the former causes a reduction in the latter. Rather, since most people are fluent in at least one language, if they are not fluent in a dominant tongue, it follows that they will be fluent in a minority tongue.

[2] Except for the few adult individuals who happen to reside with their parents.

[3] Particularly the 2001 survey, and the 2006 survey which excluded reserves entirely

First, the APS contains direct measures of fluency. Respondents are asked to rank, on a four-point scale, their ability to understand, speak and read an Aboriginal language. The APS also contains information on the contexts in which one uses an Aboriginal language (work, home, school, with relatives, etc.) from which one could construct a composite index of fluency. As discussed above, it is possible that Aboriginal language use is better conceived of as a continuum than a dichotomy, and that fluent use of an Aboriginal language might have a different impact on well-being than less fluent use. Relatedly, the APS contains information on the contexts in which one uses an Aboriginal language. This information could be used to produce a more nuanced examination of the effects of "predominance." Recall that, in this dissertation, predominance is defined as the extensiveness of one's Aboriginal language use, and is measured in terms of having an Aboriginal home language.

The APS might also offer some insight into the apparently unresolved question of whether bilingual education reduces dominant language proficiency. Respondents indicate whether any of their formal education has been conducted in an Aboriginal language. The measure is quite coarse. However, if those with an Aboriginal second language were found to fare worse if they appeared to have been in an Aboriginal language immersion program, the lower outcomes (relative to non-speakers) measured for the NY and NN groups would be more

understandable. The Children and Youth module of the APS also contains information on who one's Aboriginal language instructors are (i.e. parents, elders, school teachers, etc.). This additional information could further unpack the issue of whether users of a second Aboriginal language sometimes fare worse than non-speakers because they receive less exposure to a dominant tongue in the classroom[1]. Finally, the APS asks respondents whether acquisition or maintenance of an Aboriginal language is important to them. While extremely subjective, such information could help determine whether attachment to Aboriginal language use mediates its effect on well-being.

In addition to more nuanced measures of Aboriginal language use, the APS contains a broader and more detailed range of information on well-being. It contains extensive information on health, for example, as well as on subjective states such as mood and happiness. Chapter 1 introduced the notion that Aboriginal well-being should not be measured by non-Aboriginal (i.e. economic) criteria. Chapter 1 also described a study that found a negative relationship between Aboriginal language use and suicide. It may be that Aboriginal language use is positively related to non-economic aspects of well-being even as it is negatively related to economic aspects. Relatedly, the APS also includes information on

[1] I.e. Individuals who are fluent but received instruction solely from schoolteachers could reasonably be assumed to have received a large amount of formal education on or in an Aboriginal language.

traditional pursuits such as hunting. Information on resulting non-monetary resources could be used to construct more valid measures of Aboriginal "income" and "employment."

Relatedly, while the APS contains no information on wealth per se, it does indicate whether or not one's income includes funds from social assistance. The measure is coarse, but it could be used to assess the possibility, mentioned earlier, that higher incomes among older Aboriginal language users follow from a deficiency in accumulated wealth.

Finally, the Children and Youth module of the APS contains measures of educational success among Aboriginal children. The variables pertaining to educational success are highly subjective[1]. Nonetheless, they contain information on attitude towards school and school-related behavioral problems that could add subtlety to an analysis of the relationship between Aboriginal language use and educational attainment.

Unfortunately, neither the APS nor any other source of data includes information on respondents' parents. Consequently, the possibility that Aboriginal language use is a proxy for parental socioeconomic status cannot be examined. The idea that Aboriginal language use by one's parents mediates the impact of Aboriginal

[1] For example, respondents use a five point scale to rate a child's overall scholastic achievement in the current year. This measure is also vulnerable to the grade inflation alleged to occur in band schools.

language use on well-being is also untestable. This idea was discussed earlier in relation to the notion of social cohesion. Chapter 1 describes how past academics and policy makers regarded Aboriginal social pathologies as "cycles" in need of breaking, as habits handed down from elders to children by way of a shared culture. Chapter 1 also describes how this perception is echoed in contemporary academia, though social cohesion is seen as capable of perpetuating functional as well as dysfunctional traits. This dissertation addresses the notion of cohesion with reference to community-level traits. The extent to which they are overridden by parental traits, however, is unclear. For example, educational attainment is negatively associated with community level Aboriginal language use for Aboriginal language users. It would be useful to know if this relationship holds whether or not one's parents use an Aboriginal language. Such knowledge would improve understand of whether and how language-based social cohesion affects well-being[1]. Similarly, information on parental language use would also facilitate tests of Portes' assertions about the ill effects of parent-child communication breakdowns.

[1] For example, if most community members have an Aboriginal second language that their parents do not speak, its use may distance them culturally and psychologically from their parents, to ill effect. Conversely, if Aboriginal language users' parents also use an Aboriginal language that bonds them to a functional or dysfunctional Aboriginal community, those individuals may find their own cultural bonds enhanced via their particularly intimate connection to their parents. The opposite may hold true for non-speakers, whose disconnection from their culture is rendered more salient by their disconnection from their parents.

4.6 Conclusions

Had this dissertation examined educational attainment alone, it would have concluded with qualified support for the cohesion hypothesis. More specifically, it would have provided an intuitively appealing vision of a beneficial "integrated and modern" Aboriginal language use even as it acknowledged the reality of a detrimental "insular and traditional" Aboriginal language use. Modern users are young and possibly of mixed ancestry. They live in highly populated areas while benefiting from the cohesive effects of life in an Aboriginal community. Those communities, however, are also integrated: there are few Aboriginal language users. Nonetheless, Aboriginal language and culture is regarded highly, as indicated by increases in residents with an Aboriginal second language. The traditional users are elderly residents of isolated, traditional communities (i.e. where Aboriginal language use is common but taken for granted and declining).

Of course, this vision is shattered by the models of the other four outcomes. In non-Aboriginal communities, Aboriginal language use is still associated with somewhat lower levels of well-being among young adults. Effects of ancestry, community level Aboriginal language use, community type and language change are inconsistent. This dissertation does provide strong support, however, for a very important claim. It seems apparent that the consistently negative associations between Aboriginal language

use and well-being that appear in basic descriptive statistics are misleading. Aboriginal language appears to be associated with importantly lower levels of well-being primarily in non-Aboriginal communities. For the most part, Aboriginal language users do as well as (and, under some circumstances, better than) non-speakers in legal reserves and other Aboriginal communities. This dissertation set out to discover which of the cohesion and ghettoization hypotheses concerning Aboriginal language use is correct. Neither of these hypotheses, as they are outlined in chapter 2, is exactly correct. Both, however, have merit, as the relationship between Aboriginal language use and well-being depends highly on context and on how well-being is defined.

Fortunately, the Aboriginal Peoples Survey contains a wealth of information of both Aboriginal language use and well-being. This information can provide insight into some of the questions left unresolved by this dissertation. Additional questions – particularly those related to the mediating effects of parental language use and well-being – cannot be addressed with existing data.

Given the apparent complexity of the relationship between Aboriginal well-being and Aboriginal language use and the unresolved questions about that relationship, the policy implications of this dissertation are ambiguous. One should remember that policy may be developed following from a variety of motives: legal (fulfilling obligations,

e.g., under treaties), moral and ethical, or utilitarian (seeking actions that will cause a desired effect).

As discussed in chapter 1, debate continues over whether the Canadian government is legally obligated to promote Aboriginal language use (through support of Aboriginal language instruction, provision of translated government documents, etc.). Moreover, given the self-government agreements that exist between the federal government and many Aboriginal groups, the former often has no say in whether its funds will be used to support Aboriginal language use.

Moral or ethical considerations may compel governments to promote Aboriginal language use. Even an unambiguous negative relationship between Aboriginal language use and well-being would not in itself justify complicity in the decline of Aboriginal languages. Little empirical evidence exists of the degree to which the Canadian public feels responsible for the wrongs inflicted on Aboriginal people in the past, and the degree of pressure the public is likely to apply to the government to redress those wrongs is unknown. Nonetheless, recent court decisions favouring Aboriginal rights, the affirmation of Aboriginal and treaty rights in the Constitution Act of 1982 and the establishment of such bodies as the Royal Commission on Aboriginal Peoples and Indian Residential School Resolution Canada suggest that the Canadian government is eager to atone for colonialist and assimilationist policies of the past. To the extent

that Aboriginal people demand it, therefore, the Canadian government may feel obliged to help reconstitute the languages that those ill-conceived policies sought to destroy.

To those tasked with the development of Aboriginal language policy, however, several points should be emphasized. First, while the models described above predict that, under very specific circumstances, Aboriginal language users have better outcomes than non-speakers, this dissertation generally provides little evidence that using an Aboriginal language has a positive impact on Aboriginal well-being. There is some evidence that income and likelihood of employment improve as Aboriginal language use in one's community increases, but it is countered by evidence of lower labour force participation and educational attainment in communities with higher levels of Aboriginal language use. Policy makers, therefore, should not expect investments in Aboriginal language programs to improve the socioeconomic outcomes of Aboriginal people.

Second, Aboriginal language use seems to have little impact on the well-being of those who live in legal reserves. Increasing Aboriginal language use on-reserve, therefore, should not have a significant impact on the large disparities in well-being that exist between reserves and other Canadian communities (see O'Sullivan and McHardy, 2007). In other words, policy makers should not be concerned that increasing Aboriginal language use will worsen conditions on reserve appreciably.

Third, Aboriginal language is associated with poorer outcomes among young and middle-aged adults in non-Aboriginal communities. It would be extremely premature to assert that Aboriginal language use causes poorer outcomes. Nonetheless, policy makers and program administrators should be aware of this possibility and have ameliorative strategies prepared should they find Aboriginal language users struggling inordinately to achieve desired socioeconomic outcomes. For example, perhaps Aboriginal language users seeking employment in non-Aboriginal communities experience discrimination. Elimination of such discrimination is ideal, of course, but in the shorter term, steps could be taken to direct Aboriginal language users to workplaces that welcome ethnic diversity. This is but one very speculative example, the point of which is to encourage policy makers and program administrators to consider the possibility that Aboriginal language use can impede socioeconomic success in non-Aboriginal communities, or at least identify those for whom success may be more elusive.

Ultimately, this dissertation offers no easy solution to the question of whether to promote Aboriginal languages. These results are perhaps most valuable insofar as they demonstrate that there probably is no single simple solution. Chapter 1 describes how minority language communities vary in terms of language vitality, interest in language preservation, and opinions on the means and ends of language preservation. Chapter 1 also

includes claims that language programming efforts (or lack thereof) should be tailored to suit the desires and potentials of individual language communities. This dissertation supports that position. Aboriginal language use cannot be promoted as a means of increasing well-being in Aboriginal communities. Owing to legal and ethical considerations, however, Aboriginal language use also cannot be discouraged. By addressing Aboriginal language use and loss on a community-by-community basis, groups that put other priorities ahead of language preservation can invest their resources elsewhere. Groups that are intent on language preservation, on the other hand, can at least be forewarned of the possible disadvantages Aboriginal language users may face, and can take steps to ameliorate those disadvantages.

Moreover, when addressed on a case-by-case basis, the idiosyncratic relationships uncovered in this dissertation may be relevant. After all, under some circumstances, Aboriginal language users are predicted to have better outcomes than non-speakers. Policy makers may be able to manipulate some of those circumstances to maximize the potential positive effects of Aboriginal language use. For example, the model of educational attainment suggests that Aboriginal language use may be a beneficial part of a modern multicultural identity. Policy makers could endeavor to incorporate language programs into broader efforts to cultivate this type of identity.

In sum, Aboriginal language use is not a panacea for the troubles facing Aboriginal peoples in Canada. Nonetheless, Aboriginal language groups who wish to use their ancestral languages demand support for their efforts at Aboriginal language maintenance or revival. This dissertation can forewarn of the difficulties Aboriginal language users may encounter while allowing policy makers to take advantage of the specific circumstances under which Aboriginal language use can be a boon to socioeconomic well-being.

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Appendix 1: Tables of Coefficients with Tests of Significance

Table 1: The Full Model of Educational Attainment (Model 1)

	Variable	Regressor	Coefficient	Standard Error	Wald Statistic	P-value	Joint Wald Statistic	P-value
		Intercept	12.4774	0.04695				
Individual Level Main Effects	Aboriginal Language Use	Aboriginal Mother Tongue, Non-Aboriginal Home Language (YN)	-0.67151	0.1	45.09	<0.00001		
		Non-Aboriginal Mother Tongue, Aboriginal Home Language (NY)	-0.59893	0.13107	20.88	<0.00001		
		Non-Aboriginal Mother Tongue, Non-Aboriginal Home Language (NN)	-0.51022	0.09133	31.21	<0.00001		
		Aboriginal Mother Tongue, Aboriginal Home Language (YY)	-0.84489	0.10956	59.47	<0.00001		
		Age	-0.03218	0.00061	2782.99	<0.00001		
		Age Squared	-0.00259	0.00003	7453.44	<0.00001		
		Knowledge of an Official Language: No	-3.45283	0.04303	6438.84	<0.00001		
		Gender: Male	-0.40908	0.01102	1378.01	<0.00001		
		Ancestry: Homogeneous	-0.64323	0.01925	1116.53	<0.00001		
	Ethnic Group	Métis	0.14946	0.02138	48.87	<0.00001	146.41	<0.00001
		Inuit	-0.35004	0.06367	30.22	<0.00001		
		Non-Registered	-0.14428	0.02864	25.38	<0.00001		
Individual Level Interaction Effects	Age* Aboriginal Language Use	YN.Age	-0.02166	0.00203	113.85	<0.00001	2642.95	<0.00001
		NY.Age	-0.02067	0.00267	59.93	<0.00001		
		NN.Age	-0.01302	0.00208	39.18	<0.00001		
		YY.Age	-0.05175	0.00105	2429.08	<0.00001		
		YN.Age Squared	-0.00022	0.00008	7.56	0.00596		
		NY.Age Squared	-0.00032	0.00013	6.06	0.01383		
		NN.Age Squared	-0.00022	0.00009	5.98	0.01451		
		YY.Age Squared	0.00054	0.00004	182.25	<0.00001		
	Ancestry* Aboriginal Language Use	YN.Ancestry: Homogeneous	0.04166	0.07553	0.30	0.58124	35.01	<0.00001
		NY.Ancestry: Homogeneous	-0.20781	0.10329	4.05	0.04423		

Table 1: The Full Model of Educational Attainment (Model 1)								
	Variable	**Regressor**	**Coefficient**	**Standard Error**	**Wald Statistic**	**P-value**	**Joint Wald Statistic**	**P-value**
		NN.Ancestry: Homogeneous	0.10423	0.07375	2.00	0.15757		
		YY.Ancestry: Homogeneous	-0.26047	0.04991	27.24	<0.00001		
Community Level Main Effects	Community Type	Legal Reserve	-0.25342	0.05048	25.20	<0.00001	26.05	0.00005
		Other Aboriginal Community	-0.08498	0.01664	26.08	<0.00001		
		Proximate Population	0.35142	0.02552	189.62	<0.00001		
		Community Level Aboriginal Language Use	0.00078	0.00166	0.22	0.63844		
		Language Change	0.00102	0.00301	0.11	0.73471		
Cross-Level Interaction Effects	Community Level Aboriginal Language Use* Aboriginal Language Use	YN.Community Level Aboriginal Language Use	-0.01405	0.00167	70.78	<0.00001	128.38	<0.00001
		NY.Community Level Aboriginal Language Use	-0.01177	0.00202	33.95	<0.00001		
		NN.Community Level Aboriginal Language Use	-0.01047	0.00172	37.05	<0.00001		
		YY.Community Level Aboriginal Language Use	-0.02033	0.00193	110.96	<0.00001		
	Language Change* Aboriginal Language Use	YN.Language Change	0.01024	0.00404	6.42	0.01126	11.5735	0.02085
		NY.Language Change	-0.00003	0.00581	0.00	0.99588		
		NN.Language Change	0.00696	0.00529	1.73	0.18828		
		YY.Language Change	0.01539	0.00549	7.86	0.00506		
	Proximate Population* Aboriginal Language Use	YN.Proximate Population	0.24494	0.04649	27.76	<0.00001	53.33	<0.00001
		NY.Proximate Population	0.24623	0.05963	17.05	0.00004		
		NN.Proximate Population	0.18299	0.04515	16.43	0.00005		
		YY.Proximate Population	0.37484	0.0594	39.82	<0.00001		
	Community Type* Aboriginal Language Use	YN.Legal Reserve	0.60757	0.09072	44.85	<0.00001	67.26	<0.00001
		NY.Legal Reserve	0.61101	0.12216	25.02	<0.00001		
		NN.Legal Reserve	0.2978	0.08766	11.54	0.00068		
		YY.Legal Reserve	0.64662	0.11744	30.32	<0.00001		

Table 1: The Full Model of Educational Attainment (Model 1)								
	Variable	**Regressor**	**Coefficient**	**Standard Error**	**Wald Statistic**	**P-value**	**Joint Wald Statistic**	**P-value**
		YN.Other Aboriginal Community	0.43102	0.14656	8.65	0.00327		
		NY.Other Aboriginal Community	0.67934	0.16832	16.29	0.00005		
		NN.Other Aboriginal Community	0.33278	0.14	5.65	0.01745		
		YY.Other Aboriginal Community	0.49254	0.1789	7.58	0.00590		
Random Effects	Variances	Intercept	0.50029	0.02412	430.22	<0.00001		
		Aboriginal Mother Tongue, Non-Aboriginal Home Language	0.45376	0.04817	88.74	<0.00001		
		Non-Aboriginal Mother Tongue, Aboriginal Home Language	0.25355	0.0515	24.24	<0.00001		
		Non-Aboriginal Mother Tongue, Non-Aboriginal Home Language	0.22887	0.03949	33.59	<0.00001		
		Aboriginal Mother Tongue, Aboriginal Home Language	1.01285	0.07699	173.07	<0.00001		
	Covariances	Intercept/YN	0.10349	0.02732	14.35	<0.00001		
		Intercept/NY	0.027	0.03182	0.72	0.39614		
		YN/NY	0.25957	0.04013	41.84	<0.00001	277.23	<0.00001
		Intercept/NN	0.06942	0.02593	7.17	0.00741		
		NN/YN	0.21052	0.03428	37.71	<0.00001		
		NN/NY	0.19827	0.03583	30.62	<0.00001		
		Intercept/YY	0.00695	0.0353	0.04	0.84148		
		YY/YN	0.50655	0.05052	100.54	<0.00001		
		YY/NY	0.37205	0.05221	50.78	<0.00001		
		YY/NN	0.18091	0.04329	17.46	<0.00001		
	$e_{ij} \sim N(0, \sigma_e^2)$	σ_e^2	8.22827	0.02240				

Table 2: The Full Model of Total Income (Model 2)

	Variable	Regressor	Coefficient	Standard Error	Wald Statistic	P-value	Joint Wald Statistic	P-value
		Intercept	4.10108	0.01205				
Individual Level Main Effects	Aboriginal Language Use	Aboriginal Mother Tongue, Non-Aboriginal Home Language (YN)	-0.15358	0.02423	40.18	<0.00001		
		Non-Aboriginal Mother Tongue, Aboriginal Home Language (NY)	-0.13471	0.03355	16.12	0.00006		
		Non-Aboriginal Mother Tongue, Non-Aboriginal Home Language (NN)	-0.14768	0.02354	39.36	<0.00001		
		Aboriginal Mother Tongue, Aboriginal Home Language (YY)	-0.13381	0.0214	39.10	<0.00001		
		Age	0.00889	0.00019	2189.25	<0.00001		
		Age Squared	-0.00081	0.00001	6561.00	<0.00001		
		Knowledge of an Official Language: No	-0.16919	0.01285	173.36	<0.00001		
		Gender: Male	0.13072	0.00301	1886.04	<0.00001		
		Ancestry: Homogeneous	-0.11853	0.00523	513.63	<0.00001		
	Ethnic Group	Métis	0.06555	0.00577	129.06	<0.00001	161.27	<0.00001
		Inuit	0.01753	0.01587	1.22	0.26933		
		Non-Registered	-0.01283	0.00776	2.73	0.09826		
Individual Level Interaction Effects	Age* Aboriginal Language Use	YN.Age	0.00075	0.00061	1.51	0.21888	333.12	<0.00001
		NY.Age	0.00072	0.00081	0.79	0.37406		
		NN.Age	0.0005	0.00062	0.65	0.41998		
		YY.Age	0.00227	0.00032	50.32	<0.00001		
		YN.Age Squared	0.00027	0.00003	81.00	<0.00001		
		NY.Age Squared	0.00009	0.00005	3.24	0.07186		
		NN.Age Squared	0.00024	0.00004	36.00	<0.00001		
		YY.Age Squared	0.00024	0.00002	144.00	<0.00001		
	Ancestry* Aboriginal Language Use	YN.Ancestry: Homogeneous	0.04922	0.02013	5.98	0.01448	8.48	0.07540
		NY.Ancestry: Homogeneous	0.03937	0.02824	1.94	0.16328		

Table 2: The Full Model of Total Income (Model 2)								
	Variable	**Regressor**	**Coefficient**	**Standard Error**	**Wald Statistic**	**P-value**	**Joint Wald Statistic**	**P-value**
		NN.Ancestry: Homogeneous	0.014	0.01991	0.49	0.48195		
		YY.Ancestry: Homogeneous	-0.00528	0.01348	0.15	0.69529		
Community Level Main Effects	Community Type	Legal Reserve	-0.05445	0.01278	18.15	0.00002	50.86	<0.00001
		Other Aboriginal Community	0.10504	0.02652	15.69	0.00007		
		Proximate Population	0.00229	0.00644	0.13	0.72215		
		Community Level Aboriginal Language Use	0.00045	0.00029	2.41	0.12073		
		Language Change	-0.00059	0.00079	0.56	0.45516		
Cross-Level Interaction Effects	Community Level Aboriginal Language Use* Aboriginal Language Use	YN.Community Level Aboriginal Language Use	0.00007	0.00038	0.03	0.85385	3.61	0.46135
		NY.Community Level Aboriginal Language Use	-0.00043	0.0005	0.74	0.38979		
		NN.Community Level Aboriginal Language Use	-0.0002	0.00043	0.22	0.64185		
		YY.Community Level Aboriginal Language Use	0.00036	0.00035	1.06	0.30368		
	Language Change* Aboriginal Language Use	YN.Language Change	0.00232	0.00097	5.72	0.01677	10.22	0.03688
		NY.Language Change	-0.00202	0.0014	2.08	0.14906		
		NN.Language Change	-0.00044	0.0013	0.11	0.73502		
		YY.Language Change	0.00085	0.00099	0.74	0.39057		
	Proximate Population* Aboriginal Language Use	YN.Proximate Population	-0.03844	0.01005	14.63	0.00013	21.17	0.00029
		NY.Proximate Population	-0.01718	0.0132	1.69	0.19308		
		NN.Proximate Population	0.00799	0.01087	0.54	0.46231		
		YY.Proximate Population	-0.02414	0.00963	6.28	0.01218		
	Community Type* Aboriginal Language Use	YN.Legal Reserve	0.11939	0.02037	34.35	<0.00001	67.75	<0.00001
		NY.Legal Reserve	0.08514	0.02791	9.31	0.00228		
		NN.Legal Reserve	0.10028	0.02166	21.43	<0.00001		
		YY.Legal Reserve	0.07199	0.02067	12.13	0.00050		

Table 2: The Full Model of Total Income (Model 2)								
	Variable	**Regressor**	**Coefficient**	**Standard Error**	**Wald Statistic**	**P-value**	**Joint Wald Statistic**	**P-value**
		YN.Other Aboriginal Community	0.024	0.0315	0.58	0.44612		
		NY.Other Aboriginal Community	0.00973	0.03947	0.06	0.80528		
		NN.Other Aboriginal Community	0.09427	0.03353	7.90	0.00493		
		YY.Other Aboriginal Community	-0.03006	0.02945	1.04	0.30739		
Random Effects	Variances	Intercept	0.02865	0.00149	369.72	<0.00001		
		Aboriginal Mother Tongue, Non-Aboriginal Home Language	0.01168	0.00179	42.58	<0.00001	7043.06	<0.00001
		Non-Aboriginal Mother Tongue, Aboriginal Home Language	0.0103	0.00198	27.06	<0.00001		
		Non-Aboriginal Mother Tongue, Non-Aboriginal Home Language	0.00564	0.0018	9.82	0.00173		
		Aboriginal Mother Tongue, Aboriginal Home Language	0.00698	0.00197	12.55	0.00040		
	Covariances	Intercept/YN	-0.00835	0.00148	31.83	<0.00001		
		Intercept/NY	-0.00278	0.00149	3.48	0.06211		
		YN/NY	0.00203	0.00137	2.20	0.13801		
		Intercept/NN	-0.00085	0.00149	0.33	0.56565		
		NN/YN	0.00335	0.00149	5.05	0.02463		
		NN/NY	0.00709	0.00167	18.02	0.00002		
		Intercept/YY	-0.00841	0.0014	36.09	<0.00001		
		YY/YN	0.00957	0.00156	37.63	<0.00001		
		YY/NY	0.0055	0.00148	13.81	0.00002		
		YY/NN	0.00313	0.00141	4.93	0.02639		
	$e_{ij} \sim N(0, \sigma_e^2)$	σ_e^2	0.54653	0.00157				

Table 3: Model for Total Income Excluding Non-significant Interactions (Model 3)

	Variable	Regressor	Coefficient	Standard Error	Wald Statistic	P-value	Joint Wald Statistic	P-value
		Intercept	4.10283	0.01065				
Individual Level Main Effects	Aboriginal Language Use	Aboriginal Mother Tongue, Non-Aboriginal Home Language (YN)	-0.12995	0.01702	58.30	<0.00001		
		Non-Aboriginal Mother Tongue, Aboriginal Home Language (NY)	-0.10035	0.02613	14.75	0.00012		
		Non-Aboriginal Mother Tongue, Non-Aboriginal Home Language (NN)	-0.13501	0.01773	57.98	<0.00001		
		Aboriginal Mother Tongue, Aboriginal Home Language (YY)	-0.14764	0.01745	71.58	<0.00001		
		Age	0.00889	0.00019	2189.25	<0.00001		
		Age Squared	-0.00081	0.00001	6561.00	<0.00001		
		Knowledge of an Official Language: No	-0.16767	0.0128	171.59	<0.00001		
		Gender: Male	0.13068	0.00301	1884.89	<0.00001		
		Ancestry: Homogeneous	-0.11483	0.00452	645.41	<0.00001		
	Ethnic Group	Métis	0.06603	0.00575	131.87	<0.00001		
		Inuit	0.01797	0.01587	1.28	0.25750	163.11	<0.00001
		Non-Registered	-0.01234	0.00775	2.54	0.11133		
Individual Level Interaction Effects	Age* Aboriginal Language Use	YN.Age	0.00074	0.00059	1.57	0.20976		
		NY.Age	0.00094	0.0008	1.38	0.23999		
		NN.Age	0.00056	0.00061	0.84	0.35860		
		YY.Age	0.00221	0.00032	47.70	<0.00001		
		YN.Age Squared	0.00027	0.00003	81.00	<0.00001	330.46	<0.00001
		NY.Age Squared	0.00009	0.00005	3.24	0.07186		
		NN.Age Squared	0.00024	0.00004	36.00	<0.00001		
		YY.Age Squared	0.00024	0.00002	144.00	<0.00001		

Table 3: Model for Total Income Excluding Non-significant Interactions (Model 3)								
	Variable	**Regressor**	**Coefficient**	**Standard Error**	**Wald Statistic**	**P-value**	**Joint Wald Statistic**	**P-value**
Community Level Main Effects	Community Type	Legal Reserve	-0.05472	0.01225	19.95	0.00001	51.77	<0.00001
		Other Aboriginal Community	0.10304	0.02634	15.30	0.00009		
		Proximate Population	0.00233	0.00632	0.14	0.71237		
		Community Level Aboriginal Language Use	0.00052	0.00023	5.11	0.02377		
		Language Change	0.00026	0.00058	0.20	0.65395		
Cross-Level Interaction Effects	Proximate Population* Aboriginal Language Use	YN.Proximate Population	-0.03841	0.00922	17.36	0.00003	25.02	0.00005
		NY.Proximate Population	-0.0046	0.01238	0.14	0.71022		
		NN.Proximate Population	0.00905	0.00998	0.82	0.36451		
		YY.Proximate Population	-0.02993	0.00865	11.97	0.00054		
	Community Type* Aboriginal Language Use	YN.Legal Reserve	0.12605	0.01846	46.63	<0.00001	82.93	<0.00001
		NY.Legal Reserve	0.0811	0.02754	8.67	0.00323		
		NN.Legal Reserve	0.10323	0.01924	28.79	<0.00001		
		YY.Legal Reserve	0.08137	0.01901	18.32	0.00002		
		YN.Other Aboriginal Community	0.00848	0.03976	0.05	0.83111		
		NY.Other Aboriginal Community	0.03702	0.0309	1.44	0.23089		
		NN.Other Aboriginal Community	0.00848	0.03976	0.05	0.83111		
		YY.Other Aboriginal Community	-0.02218	0.02894	0.59	0.44343		

Table 3: Model for Total Income Excluding Non-significant Interactions (Model 3)								
	Variable	**Regressor**	**Coefficient**	**Standard Error**	**Wald Statistic**	**P-value**	**Joint Wald Statistic**	**P-value**
Random Effects	Variances	Intercept	0.02873	0.00149	371.79	<0.00001		
		Aboriginal Mother Tongue, Non-Aboriginal Home Language	0.01177	0.00181	42.29	<0.00001	93.55	<0.00001
		Non-Aboriginal Mother Tongue, Aboriginal Home Language	0.01006	0.00198	25.81	<0.00001		
		Non-Aboriginal Mother Tongue, Non-Aboriginal Home Language	0.00595	0.00241	6.10	0.01355		
		Aboriginal Mother Tongue, Aboriginal Home Language	0.00682	0.00204	11.18	0.00083		
	Covariances	Intercept/YN	-0.00836	0.00141	35.15	<0.00001		
		Intercept/NY	-0.00328	0.00184	3.18	0.07454		
		YN/NY	0.00247	0.00167	2.19	0.13891		
		Intercept/NN	-0.00072	0.00153	0.22	0.63904		
		NN/YN	0.00302	0.00151	4.00	0.04550		
		NN/NY	0.00698	0.0018	15.04	0.00011		
		Intercept/YY	-0.00836	0.00141	35.15	<0.00001		
		YY/YN	0.00931	0.00155	36.08	<0.00001		
		YY/NY	0.0057	0.00169	11.38	0.00074		
		YY/NN	0.00311	0.00146	4.54	0.03311		
	$e_{ij} \sim N(0, \sigma_e^2)$	σ_e^2	0.54655	0.00157				

Table 4: Model for Total Income Excluding Non-significant Interactions and Controlling for Educational Attainment (Model 4)

	Variable	Regressor	Coefficient	Standard Error	Wald Statistic	P-value	Joint Wald Statistic	P-value
		Intercept	4.035548	0.010407				
Individual Level Main Effects	Aboriginal Language Use	Aboriginal Mother Tongue, Non-Aboriginal Home Language (YN)	-0.12394	0.016611	55.67	<0.00001		
		Non-Aboriginal Mother Tongue, Aboriginal Home Language (NY)	-0.08444	0.02589	10.64	0.00111		
		Non-Aboriginal Mother Tongue, Non-Aboriginal Home Language (NN)	-0.129	0.017204	56.22	<0.00001		
		Aboriginal Mother Tongue, Aboriginal Home Language (YY)	-0.13261	0.017104	60.11	<0.00001		
		Age	0.01044	0.000185	3184.62	<0.00001		
		Age Squared	-0.00069	0.000013	2776.48	<0.00001		
		Knowledge of an Official Language: No	-0.00714	0.012761	0.31	0.57768		
		Gender: Male	0.148759	0.002971	2507.04	<0.00001		
		Ancestry: Homogeneous	-0.08488	0.004472	360.24	<0.00001		
	Ethnic Group	Métis	0.060246	0.005669	112.94	<0.00001	131.35	<0.00001
		Inuit	0.030562	0.01562	3.83	0.05034		
		Non-Registered	-0.00422	0.007639	0.31	0.57768		
		Educational Attainment	0.042917	0.000509	7109.24	<0.00001		
Individual Level Interaction Effects	Age* Aboriginal Language Use	YN.Age	0.000906	0.000582	2.42	0.11979	629.92	<0.00001
		NY.Age	0.001583	0.000786	4.06	0.04391		
		NN.Age	0.000944	0.000602	2.46	0.11678		
		YY.Age	0.003897	0.000314	154.03	<0.00001		
		YN.Age Squared	0.000332	0.000034	95.35	<0.00001		
		NY.Age Squared	0.000126	0.000054	5.44	0.01968		
		NN.Age Squared	0.000269	0.0004	0.45	0.50233		
		YY.Age Squared	0.000285	0.00002	203.06	<0.00001		

Table 4: Model for Total Income Excluding Non-significant Interactions and Controlling for Educational Attainment (Model 4)

	Variable	Regressor	Coefficient	Standard Error	Wald Statistic	P-value	Joint Wald Statistic	P-value
Community Level Main Effects	Community Type	Legal Reserve	-0.05395	0.011857	20.70	0.00001	49.95	<0.00001
		Other Aboriginal Community	0.093124	0.025411	13.43	0.00025		
		Proximate Population	-0.00944	0.006115	2.38	0.12290		
		Community Level Aboriginal Language Use	0.000954	0.000223	18.30	0.00002		
		Language Change	0.000032	0.000571	0.00	1.00000		
Cross-Level Interaction Effects	Proximate Population* Aboriginal Language Use	YN.Proximate Population	-0.05105	0.008994	32.21	<0.00001	55.86	<0.00001
		NY.Proximate Population	-0.01628	0.012478	1.70	0.19229		
		NN.Proximate Population	-0.00363	0.00974	0.14	0.70828		
		YY.Proximate Population	-0.05646	0.008483	44.29	<0.00001		
	Community Type* Aboriginal Language Use	YN.Legal Reserve	0.115508	0.017998	41.19	<0.00001	78.81	<0.00001
		NY.Legal Reserve	0.067789	0.027306	6.16	0.01307		
		NN.Legal Reserve	0.099525	0.018646	28.49	<0.00001		
		YY.Legal Reserve	-0.08011	0.018631	18.49	0.00002		
		YN.Other Aboriginal Community	0.03744	0.030014	1.56	0.21167		
		NY.Other Aboriginal Community	0.004137	0.039121	0.01	0.92034		
		NN.Other Aboriginal Community	0.088891	0.031912	7.76	0.00534		
		YY.Other Aboriginal Community	-0.02386	0.028345	0.71	0.39944		

Table 4: Model for Total Income Excluding Non-significant Interactions and Controlling for Educational Attainment (Model 4)								
	Variable	**Regressor**	**Coefficient**	**Standard Error**	**Wald Statistic**	**P-value**	**Joint Wald Statistic**	**P-value**
Random Effects	Variances	Intercept	0.026197	0.001384	358.29	<0.00001		
		Aboriginal Mother Tongue, Non-Aboriginal Home Language	0.008946	0.001851	23.36	<0.00001	92.43	<0.00001
		Non-Aboriginal Mother Tongue, Aboriginal Home Language	0.00467	0.002343	3.97	0.04632		
		Non-Aboriginal Mother Tongue, Non-Aboriginal Home Language	0.005435	0.001879	8.37	0.00381		
		Aboriginal Mother Tongue, Aboriginal Home Language	0.011265	0.001735	42.16	<0.00001		
	Covariances	Intercept/YN	-0.00697	0.001381	25.47	<0.00001		
		Intercept/NY	-0.00218	0.001753	1.55	0.21314		
		YN/NY	0.002054	0.001597	1.65	0.19896		
		Intercept/NN	-0.00078	0.00142	0.30	0.58388		
		NN/YN	0.002604	0.001396	3.48	0.06211		
		NN/NY	0.005078	0.001664	9.31	0.00228		
		Intercept/YY	-0.00728	0.001321	30.35	<0.00001		
		YY/YN	0.008821	0.001475	35.76	<0.00001		
		YY/NY	0.005631	0.001644	11.73	0.00062		
		YY/NN	0.004138	0.001407	8.65	0.00327		
	$e_{ij} \sim N(0, \sigma_e^2)$	σ_e^2	0.53135	0.001530				

Table 5: The Full Model of Employment Income (Model 5)

	Variable	Regressor	Coefficient	Standard Error	Wald Statistic	P-value	Joint Wald Statistic	P-value
		Intercept	4.21209	0.01047				
Individual Level Main Effects	Aboriginal Language Use	Aboriginal Mother Tongue, Non-Aboriginal Home Language (YN)	-0.13478	0.02276	35.07	<0.00001		
		Non-Aboriginal Mother Tongue, Aboriginal Home Language (NY)	-0.13528	0.03416	15.68	0.00008		
		Non-Aboriginal Mother Tongue, Non-Aboriginal Home Language (NN)	-0.06452	0.02181	8.75	0.00310		
		Aboriginal Mother Tongue, Aboriginal Home Language (YY)	-0.12264	0.01966	38.91	<0.00001		
		Age	0.01302	0.00018	5232.11	<0.00001		
		Age Squared	-0.00075	0.00001	5625.00	<0.00001		
		Knowledge of an Official Language: No	-0.24147	0.0152	252.37	<0.00001		
		Gender: Male	0.11693	0.00274	1821.17	<0.00001		
		Ancestry: Homogeneous	-0.08019	0.00454	311.98	<0.00001		
	Ethnic Group	Métis	0.05335	0.00505	111.61	<0.00001	121.42	<0.00001
		Inuit	-0.02106	0.01375	2.35	0.12528		
		Non-Registered	0.01732	0.00688	6.34	0.01180		
Individual Level Interaction Effects	Age* Aboriginal Language Use	YN.Age	0.00367	0.00063	33.94	<0.00001	107.22	<0.00001
		NY.Age	0.00061	0.00084	0.53	0.46661		
		NN.Age	0.00102	0.00064	2.54	0.11099		
		YY.Age	0.0012	0.00033	13.22	0.00028		
		YN.Age Squared	0.00013	0.00004	10.56	0.00116		
		NY.Age Squared	0.00016	0.00006	7.11	0.00767		
		NN.Age Squared	0.0001	0.00005	4.00	0.04550		
		YY.Age Squared	0.00002	0.00002	1.00	0.31731		
	Ancestry* Aboriginal Language Use	YN.Ancestry: Homogeneous	0.05395	0.01829	8.70	0.00318	11.08	0.02567
		NY.Ancestry: Homogeneous	0.03396	0.02564	1.75	0.18588		

Table 5: The Full Model of Employment Income (Model 5)								
	Variable	**Regressor**	**Coefficient**	**Standard Error**	**Wald Statistic**	**P-value**	**Joint Wald Statistic**	**P-value**
		NN.Ancestry: Homogeneous	-0.00445	0.01793	0.06	0.80650		
		YY.Ancestry: Homogeneous	0.01384	0.01195	1.34	0.24703		
Community Level Main Effects	Community Type	Legal Reserve	-0.12149	0.01164	108.94	<0.00001	122.45	<0.00001
		Other Aboriginal Community	-0.00398	0.02383	0.03	0.86249		
		Proximate Population	0.00719	0.00581	1.53	0.21611		
		Community Level Aboriginal Language Use	0.00079	0.00027	8.56	0.00344		
		Language Change	0.00112	0.00071	2.49	0.11457		
Cross-Level Interaction Effects	Community Level Aboriginal Language Use* Aboriginal Language Use	YN.Community Level Aboriginal Language Use	0.00038	0.00036	1.11	0.29208	4.33	0.36310
		NY.Community Level Aboriginal Language Use	-0.00071	0.00051	1.94	0.16367		
		NN.Community Level Aboriginal Language Use	0.00006	0.00041	0.02	0.88754		
		YY.Community Level Aboriginal Language Use	-0.00014	0.00032	0.19	0.66292		
	Language Change* Aboriginal Language Use	YN.Language Change	0.0002	0.00092	0.05	0.82306	4.33	0.36310
		NY.Language Change	-0.00215	0.00151	2.03	0.15422		
		NN.Language Change	-0.0004	0.00127	0.10	0.75183		
		YY.Language Change	0.00088	0.00091	0.94	0.33228		
	Proximate Population* Aboriginal Language Use	YN.Proximate Population	-0.01572	0.00978	2.58	0.10822	4.55	0.33660
		NY.Proximate Population	-0.0029	0.01567	0.03	0.86249		
		NN.Proximate Population	0.01246	0.01058	1.39	0.23841		
		YY.Proximate Population	0.00021	0.00897	0.00	1.00000		
	Community Type* Aboriginal Language Use	YN.Legal Reserve	0.07089	0.02011	12.43	0.00042	45.78	<0.00001
		NY.Legal Reserve	0.05611	0.03243	2.99	0.08378		
		NN.Legal Reserve	0.04715	0.02105	5.02	0.02506		
		YY.Legal Reserve	0.10178	0.01959	26.99	<0.00001		

Table 5: The Full Model of Employment Income (Model 5)								
	Variable	**Regressor**	**Coefficient**	**Standard Error**	**Wald Statistic**	**P-value**	**Joint Wald Statistic**	**P-value**
		YN.Other Aboriginal Community	0.01166	0.02978	0.15	0.69854		
		NY.Other Aboriginal Community	0.00994	0.04333	0.05	0.82306		
		NN.Other Aboriginal Community	-0.01766	0.03199	0.30	0.58388		
		YY.Other Aboriginal Community	0.00898	0.0262	0.12	0.72903		
Random Effects	Variances	Intercept	0.02457	0.00123	399.02	<0.00001		
		Aboriginal Mother Tongue, Non-Aboriginal Home Language	0.09965	0.00184	2933.05	<0.00001	87.25	<0.00001
		Non-Aboriginal Mother Tongue, Aboriginal Home Language	0.01237	0.00322	14.76	0.00012		
		Non-Aboriginal Mother Tongue, Non-Aboriginal Home Language	0.00834	0.00202	17.05	0.00004		
		Aboriginal Mother Tongue, Aboriginal Home Language	0.00677	0.00139	23.72	<0.00001		
	Covariances	Intercept/YN	-0.0053	0.00131	16.37	<0.00001		
		Intercept/NY	-0.0014	0.00187	0.56	0.45426		
		YN/NY	0.00003	0.00184	0.00	1.00000		
		Intercept/NN	<0.00001	0.00137	0.00	1.00000		
		NN/YN	-0.00113	0.00141	0.64	0.42371		
		NN/NY	0.00623	0.00201	9.61	0.00194		
		Intercept/YY	-0.00349	0.00114	9.37	0.00221		
		YY/YN	0.00425	0.00124	11.75	0.00061		
		YY/NY	0.00407	0.00162	6.31	0.01201		
		YY/NN	0.00202	0.00128	2.49	0.11457		
	$e_{ij} \sim N(0, \sigma_e^2)$	σ_e^2	0.29439	0.00105				

Table 6: Model for Employment Income Excluding Non-significant Interactions (Model 6)								
	Variable	**Regressor**	**Coefficient**	**Standard Error**	**Wald Statistic**	**P-value**	**Joint Wald Statistic**	**P-value**
		Intercept	4.209395	0.009277				
Individual Level Main Effects	Aboriginal Language Use	Aboriginal Mother Tongue, Non-Aboriginal Home Language (YN)	-0.102641	0.016898	36.90	<0.00001		
		Non-Aboriginal Mother Tongue, Aboriginal Home Language (NY)	-0.098796	0.027836	12.60	0.00039		
		Non-Aboriginal Mother Tongue, Non-Aboriginal Home Language (NN)	-0.065226	0.01703	14.67	0.00013		
		Aboriginal Mother Tongue, Aboriginal Home Language (YY)	-0.11714	0.016544	50.13	<0.00001		
		Age	0.013019	0.000176	5471.80	<0.00001		
		Age Squared	-0.000749	0.000014	2862.25	<0.00001		
		Knowledge of an Official Language: No	-0.242655	0.015139	256.91	<0.00001		
		Gender: Male	0.116868	0.002744	1813.94	<0.00001		
		Ancestry: Homogeneous	-0.075265	0.003958	361.61	<0.00001		
	Ethnic Group	Métis	0.054144	0.005042	115.32	<0.00001	125.48	<0.00001
		Inuit	-0.021511	0.013736	2.45	0.11752		
		Non-Registered	0.018127	0.006871	6.96	0.00834		
Individual Level Interaction Effects	Age* Aboriginal Language Use	YN.Age	0.00334	0.000616	29.40	<0.00001	102.09	<0.00001
		NY.Age	0.000923	0.000825	1.25	0.26355		
		NN.Age	0.00101	0.000626	2.60	0.10686		
		YY.Age	0.001237	0.000324	14.58	0.00013		
		YN.Age Squared	0.000129	0.000039	10.94	0.00094		
		NY.Age Squared	0.000161	0.000063	6.53	0.01061		
		NN.Age Squared	0.0001	0.000046	4.73	0.02964		
		YY.Age Squared	0.000019	0.000023	0.68	0.40959		

Table 6: Model for Employment Income Excluding Non-significant Interactions (Model 6)								
	Variable	**Regressor**	**Coefficient**	**Standard Error**	**Wald Statistic**	**P-value**	**Joint Wald Statistic**	**P-value**
Community Level Main Effects	Community Type	Legal Reserve	-0.124389	0.011257	122.10	<0.00001	134.07	<0.00001
		Other Aboriginal Community	0.008486	0.023279	0.13	0.71843		
		Proximate Population	0.006054	0.005504	1.21	0.27133		
		Community Level Aboriginal Language Use	0.000795	0.000216	13.55	0.00023		
		Language Change	0.001178	0.000564	4.36	0.03679		
Cross-Level Interaction Effects	Community Type* Aboriginal Language Use	YN.Legal Reserve	0.093777	0.018495	25.71	<0.00001	67.45	<0.00001
		NY.Legal Reserve	0.045447	0.029936	2.30	0.12937		
		NN.Legal Reserve	0.046666	0.018913	6.09	0.01359		
		YY.Legal Reserve	0.100479	0.018043	31.01	<0.00001		
		YN.Other Aboriginal Community	0.056553	0.026056	4.71	0.02999		
		NY.Other Aboriginal Community	-0.018306	0.037174	0.24	0.62421		
		NN.Other Aboriginal Community	-0.038463	0.027428	1.97	0.16045		
		YY.Other Aboriginal Community	0.009386	0.023124	0.16	0.68916		

Table 6: Model for Employment Income Excluding Non-significant Interactions (Model 6)								
	Variable	**Regressor**	**Coefficient**	**Standard Error**	**Wald Statistic**	**P-value**	**Joint Wald Statistic**	**P-value**
Random Effects	Variances	Intercept	0.024581	0.001231	398.73	<0.00001		
		Aboriginal Mother Tongue, Non-Aboriginal Home Language	0.01009	0.001883	28.71	<0.00001	90.28	<0.00001
		Non-Aboriginal Mother Tongue, Aboriginal Home Language	0.012699	0.003241	15.35	0.00009		
		Non-Aboriginal Mother Tongue, Non-Aboriginal Home Language	0.008662	0.002049	17.87	0.00002		
		Aboriginal Mother Tongue, Aboriginal Home Language	0.006783	0.001394	23.68	<0.00001		
	Covariances	Intercept/YN	-0.005129	0.001318	15.14	0.00010		
		Intercept/NY	-0.001771	0.001877	0.89	0.34548		
		YN/NY	-0.000129	0.001865	0.00	1.00000		
		Intercept/NN	-0.000058	0.001379	0.00	1.00000		
		NN/YN	-0.001457	0.00143	1.04	0.30782		
		NN/NY	0.006698	0.002029	10.90	0.00096		
		Intercept/YY	-0.003477	0.00114	9.30	0.00229		
		YY/YN	0.003972	0.001244	10.19	0.00141		
		YY/NY	0.004288	0.001632	6.90	0.00862		
		YY/NN	0.002072	0.001287	2.59	0.10754		
	$e_{ij} \sim N(0, \sigma_e^2)$	σ_e^2	0.294407	0.001054				

Table 7: Model for Employment Income Excluding Non-significant Interactions and Controlling for Educational Attainment (Model 7)

	Variable	Regressor	Coefficient	Standard Error	Wald Statistic	P-value	Joint Wald Statistic	P-value
		Intercept	4.159776	0.0091				
Individual Level Main Effects	Aboriginal Language Use	Aboriginal Mother Tongue, Non-Aboriginal Home Language (YN)	-0.108259	0.016726	41.89	<0.00001		
		Non-Aboriginal Mother Tongue, Aboriginal Home Language (NY)	-0.099652	0.027225	13.40	0.00025		
		Non-Aboriginal Mother Tongue, Non-Aboriginal Home Language (NN)	-0.072364	0.01639	19.49	0.00001		
		Aboriginal Mother Tongue, Aboriginal Home Language (YY)	-0.121011	0.015485	61.07	<0.00001		
		Age	0.013919	0.000173	6473.27	<0.00001		
		Age Squared	-0.000656	0.000013	2546.37	<0.00001		
		Knowledge of an Official Language: No	-0.08614	0.014945	33.22	<0.00001		
		Gender: Male	0.144883	0.00271	2858.22	<0.00001		
		Ancestry: Homogeneous	-0.051853	0.003888	177.87	<0.00001		
	Ethnic Group	Métis	0.052105	0.004939	111.30	<0.00001	115.50	<0.00001
		Inuit	-0.007304	0.013481	0.29	0.59022		
		Non-Registered	0.02635	0.006732	15.32	0.00009		
		Educational Attainment	0.03889	0.000475	6703.30	<0.00001		
Individual Level Interaction Effects	Age* Aboriginal Language Use	YN.Age	0.003189	0.000603	27.97	<0.00001	172.57	<0.00001
		NY.Age	0.001388	0.000809	2.94	0.08641		
		NN.Age	0.001175	0.000612	3.69	0.05474		
		YY.Age	0.002498	0.000317	62.10	<0.00001		
		YN.Age Squared	0.000172	0.000038	20.49	0.00001		
		NY.Age Squared	0.000162	0.000062	6.83	0.00896		
		NN.Age Squared	0.00013	0.000045	8.35	0.00386		
		YY.Age Squared	0.000063	0.000023	7.50	0.00617		

Table 7: Model for Employment Income Excluding Non-significant Interactions and Controlling for Educational Attainment (Model 7)								
	Variable	**Regressor**	**Coefficient**	**Standard Error**	**Wald Statistic**	**P-value**	**Joint Wald Statistic**	**P-value**
Community Level Main Effects	Community Type	Legal Reserve	-0.121351	0.01099	121.92	<0.00001	130.47	<0.00001
		Other Aboriginal Community	-0.020453	0.02266	0.81	0.36812		
		Proximate Population	-0.010908	0.005391	4.09	0.04314		
		Community Level Aboriginal Language Use	0.00111	0.000212	27.41	<0.00001		
		Language Change	0.00114	0.000554	4.23	0.03972		
Cross-Level Interaction Effects	Community Type* Aboriginal Language Use	YN.Legal Reserve	0.095058	0.018329	26.90	<0.00001	69.96	<0.00001
		NY.Legal Reserve	0.047994	0.029274	2.69	0.10098		
		NN.Legal Reserve	0.051422	0.018171	8.01	0.00465		
		YY.Legal Reserve	0.114825	0.016915	46.08	<0.00001		
		YN.Other Aboriginal Community	0.083935	0.025896	10.51	0.00119		
		NY.Other Aboriginal Community	0.005884	0.036316	0.03	0.86249		
		NN.Other Aboriginal Community	-0.016335	0.026233	0.39	0.53230		
		YY.Other Aboriginal Community	0.05529	0.021722	6.48	0.01091		

Table 7: Model for Employment Income Excluding Non-significant Interactions and Controlling for Educational Attainment (Model 7)

	Variable	Regressor	Coefficient	Standard Error	Wald Statistic	P-value	Joint Wald Statistic	P-value
Random Effects	Variances	Intercept	0.023249	0.001168	396.21	<0.00001		
		Aboriginal Mother Tongue, Non-Aboriginal Home Language	0.010738	0.001879	32.66	<0.00001	81.51	<0.00001
		Non-Aboriginal Mother Tongue, Aboriginal Home Language	0.011953	0.003083	15.03	0.00011		
		Non-Aboriginal Mother Tongue, Non-Aboriginal Home Language	0.007231	0.001858	15.15	0.00010		
		Aboriginal Mother Tongue, Aboriginal Home Language	0.005279	0.001216	18.85	0.00001		
	Covariances	Intercept/YN	-0.004923	0.001275	14.91	0.00011		
		Intercept/NY	-0.001131	0.001782	0.40	0.52709		
		YN/NY	-0.000248	0.001819	0.02	0.88754		
		Intercept/NN	-0.000061	0.001286	0.00	1.00000		
		NN/YN	-0.001994	0.001359	2.15	0.14257		
		NN/NY	0.00628	0.001888	11.06	0.00088		
		Intercept/YY	-0.002347	0.001034	5.15	0.02325		
		YY/YN	0.004911	0.001195	16.89	<0.00001		
		YY/NY	0.003563	0.001485	5.76	0.01639		
		YY/NN	0.001667	0.001141	2.13	0.14444		
	$e_{ij} \sim N(0, \sigma_e^2)$	σ_e^2	0.282696	0.001012				

Table 8: The Full Model of Labour Force Participation (Model 8)								
	Variable	**Regressor**	**Coefficient**	**Standard Error**	**Wald Statistic**	**P-value**	**Joint Wald**	**P-value**
		Intercept	1.31186	0.03570				
Individual Level Main Effects	Aboriginal Language Use	Aboriginal Mother Tongue, Non-Aboriginal Home Language (YN)	-0.42754	0.07424	33.16	<0.00001		
		Non-Aboriginal Mother Tongue, Aboriginal Home Language (NY)	-0.41539	0.10722	15.01	0.00011		
		Non-Aboriginal Mother Tongue, Non-Aboriginal Home Language (NN)	-0.39901	0.07205	30.67	<0.00001		
		Aboriginal Mother Tongue, Aboriginal Home Language (YY)	-0.46939	0.06770	48.07	<0.00001		
		Age	0.00248	0.00051	23.65	<0.00001		
		Age Squared	-0.00357	0.00004	7965.56	<0.00001		
		Knowledge of an Official Language: No	-0.73210	0.04019	331.82	<0.00001		
		Gender: Male	0.54759	0.00899	3710.15	<0.00001		
		Ancestry: Homogeneous	-0.44202	0.01607	756.58	<0.00001		
	Ethnic Group	Métis	0.26141	0.01785	214.47	<0.00001	234.26	<0.00001
		Inuit	0.14235	0.05018	8.05	0.00456		
		Non-Registered	0.00945	0.02372	0.16	0.69034		
Individual Level Interaction Effects	Age* Aboriginal Language Use	YN.Age	0.02012	0.00171	138.44	<0.00001	602.78	<0.00001
		NY.Age	0.01056	0.00222	22.63	<0.00001		
		NN.Age	0.01080	0.00170	40.36	<0.00001		
		YY.Age	0.01993	0.00089	501.46	<0.00001		
		YN.Age Squared	-0.00039	0.00010	15.21	0.00010		
		NY.Age Squared	-0.00029	0.00015	3.74	0.05320		
		NN.Age Squared	-0.00005	0.00012	0.17	0.67692		
		YY.Age Squared	-0.00017	0.00006	8.03	0.00461		
	Ancestry* Aboriginal Language Use	YN.Ancestry: Homogeneous	0.22466	0.06415	12.26	0.00046	19.04	0.00008
		NY.Ancestry: Homogeneous	0.16813	0.08535	3.88	0.04885		

Table 8: The Full Model of Labour Force Participation (Model 8)								
	Variable	**Regressor**	**Coefficient**	**Standard Error**	**Wald Statistic**	**P-value**	**Joint Wald**	**P-value**
		NN.Ancestry: Homogeneous	0.11290	0.05973	3.57	0.05873		
		YY.Ancestry: Homogeneous	0.01402	0.04098	0.12	0.73226		
Community Level Main Effects	Community Type	Legal Reserve	-0.06672	0.03734	3.19	0.07397	15.54	0.00042
		Other Aboriginal Community	0.21079	0.07759	7.38	0.00659		
		Proximate Population	-0.07762	0.01907	16.57	0.00005		
		Community Level Aboriginal Language Use	-0.00664	0.00086	59.61	<0.00001		
		Language Change	-0.00282	0.00230	1.50	0.22017		
Cross-Level Interaction Effects	Community Level Aboriginal Language Use* Aboriginal Language Use	YN.Community Level Aboriginal Language Use	0.00288	0.00115	6.27	0.01227	8.03	0.09049
		NY.Community Level Aboriginal Language Use	0.00024	0.00160	0.02	0.88076		
		NN.Community Level Aboriginal Language Use	0.00078	0.00128	0.37	0.54228		
		YY.Community Level Aboriginal Language Use	0.00210	0.00109	3.71	0.05403		
	Language Change* Aboriginal Language Use	YN.Language Change	0.00321	0.00289	1.23	0.26669	3.46	0.48399
		NY.Language Change	-0.00386	0.00454	0.72	0.39520		
		NN.Language Change	-0.00182	0.00394	0.21	0.64413		
		YY.Language Change	0.00189	0.00312	0.37	0.54467		
	Proximate Population* Aboriginal Language Use	YN.Proximate Population	-0.03424	0.03082	1.23	0.26658	4.71	0.31837
		NY.Proximate Population	-0.05807	0.04728	1.51	0.21937		
		NN.Proximate Population	0.02293	0.03350	0.47	0.49367		
		YY.Proximate Population	-0.03342	0.03126	1.14	0.28503		
	Community Type* Aboriginal Language Use	YN.Legal Reserve	0.39947	0.06187	41.69	<0.00001	86.64	<0.00001
		NY.Legal Reserve	0.43521	0.09801	19.72	0.00001		
		NN.Legal Reserve	0.37532	0.06568	32.65	<0.00001		
		YY.Legal Reserve	0.39947	0.06635	36.25	<0.00001		

Table 8: The Full Model of Labour Force Participation (Model 8)								
	Variable	**Regressor**	**Coefficient**	**Standard Error**	**Wald Statistic**	**P-value**	**Joint Wald**	**P-value**
		YN.Other Aboriginal Community	0.24030	0.09964	5.82	0.01588		
		NY.Other Aboriginal Community	0.33156	0.13311	6.20	0.01274		
		NN.Other Aboriginal Community	0.37096	0.10438	12.63	0.00038		
		YY.Other Aboriginal Community	0.27818	0.09401	8.76	0.00309		
Random Effects		Intercept	0.232339	0.012653	337.18	<0.00001		
	Variances	Aboriginal Mother Tongue, Non-Aboriginal Home Language	0.107083	0.028759	13.86	0.00020	93.903	<0.00001
		Non-Aboriginal Mother Tongue, Aboriginal Home Language	0.088872	0.019903	19.94	0.00001		
		Non-Aboriginal Mother Tongue, Non-Aboriginal Home Language	0.130073	0.018028	52.06	<0.00001		
		Aboriginal Mother Tongue, Aboriginal Home Language	0.093672	0.018019	27.02	<0.00001		
	Covariances	Intercept/YN	-0.051943	0.012944	16.10	0.00006		
		Intercept/NY	-0.032713	0.017669	3.43	0.06402		
		YN/NY	0.057896	0.017977	10.37	0.00128		
		Intercept/NN	-0.040069	0.013799	8.43	0.00369		
		NN/YN	0.072579	0.015196	22.81	<0.00001		
		NN/NY	0.086723	0.019528	19.72	0.00001		
		Intercept/YY	-0.04893	0.012763	14.70	0.00013		
		YY/YN	0.074761	0.01449	26.62	<0.00001		
		YY/NY	0.074158	0.018148	16.70	0.00004		
		YY/NN	0.06416	0.015187	17.85	0.00002		

Table 9: Model for Labour Force Participation Excluding Non-significant Interactions (Model 9)								
	Variable	**Regressor**	**Coefficient**	**Standard Error**	**Wald Statistic**	**P-value**	**Joint Wald**	**P-value**
		Intercept	1.36032	0.03149				
Individual Level Main Effects	Aboriginal Language Use	Aboriginal Mother Tongue, Non-Aboriginal Home Language (YN)	-0.50791	0.07024	52.29	<0.00001		
		Non-Aboriginal Mother Tongue, Aboriginal Home Language (NY)	-0.44996	0.10483	18.42	0.00002		
		Non-Aboriginal Mother Tongue, Non-Aboriginal Home Language (NN)	-0.41286	0.069	35.80	<0.00001		
		Aboriginal Mother Tongue, Aboriginal Home Language (YY)	-0.52673	0.06407	67.59	<0.00001		
		Age	0.00257	0.00051	25.39	<0.00001		
		Age Squared	-0.00357	0.00004	7965.56	<0.00001		
		Knowledge of an Official Language: No	-0.72603	0.04004	328.79	<0.00001		
		Gender: Male	0.54762	0.00899	3710.56	<0.00001		
		Ancestry: Homogeneous	-0.44224	0.01607	757.33	<0.00001		
	Ethnic Group	Métis	0.26151	0.01786	214.39	<0.00001	233.92	<0.00001
		Inuit	0.14569	0.05027	8.40	0.00375		
		Non-Registered	0.01104	0.02371	0.22	0.64148		
Individual Level Interaction Effects	Age* Aboriginal Language Use	YN.Age	0.01897	0.00165	132.18	<0.00001	590.86	<0.00001
		NY.Age	0.01068	0.00215	24.68	<0.00001		
		NN.Age	0.01113	0.00167	44.42	<0.00001		
		YY.Age	0.01968	0.00088	500.13	<0.00001		
		YN.Age Squared	-0.00039	0.0001	15.21	0.00010		
		NY.Age Squared	-0.00028	0.00015	3.48	0.06195		
		NN.Age Squared	-0.00006	0.00012	0.25	0.61708		
		YY.Age Squared	-0.00017	0.00006	8.03	0.00461		

Table 9: Model for Labour Force Participation Excluding Non-significant Interactions (Model 9)								
	Variable	**Regressor**	**Coefficient**	**Standard Error**	**Wald Statistic**	**P-value**	**Joint Wald**	**P-value**
	Ancestry* Aboriginal Language Use	YN.Ancestry: Homogeneous	0.22782	0.06149	13.73	0.00021	19.77	0.00055
		NY.Ancestry: Homogeneous	0.17552	0.08522	4.24	0.03944		
		NN.Ancestry: Homogeneous	0.11433	0.05978	3.66	0.05581		
		YY.Ancestry: Homogeneous	0.01536	0.04098	0.14	0.70780		
Community Level Main Effects	Community Type	Legal Reserve	-0.08864	0.03609	6.03	0.01405	15.69	<0.00001
		Other Aboriginal Community	0.16518	0.07599	4.73	0.02973		
		Proximate Population	-0.08355	0.01777	22.11	<0.00001		
		Community Level Aboriginal Language Use	-0.00534	0.00068	61.67	<0.00001		
		Language Change	-0.00152	0.00174	0.76	0.38236		
Cross-Level Interaction Effects	Community Type* Aboriginal Language Use	YN.Legal Reserve	0.44218	0.06094	52.65	<0.00001	107.08	<0.00001
		NY.Legal Reserve	0.44478	0.09067	24.06	<0.00001		
		NN.Legal Reserve	0.38587	0.06077	40.32	<0.00001		
		YY.Legal Reserve	0.4538	0.06094	55.45	<0.00001		
		YN.Other Aboriginal Community	0.38839	0.08547	20.65	0.00001		
		NY.Other Aboriginal Community	0.40099	0.1167	11.81	0.00059		
		NN.Other Aboriginal Community	0.35934	0.09206	15.24	0.00009		
		YY.Other Aboriginal Community	0.4041	0.08272	23.86	<0.00001		

Table 9: Model for Labour Force Participation Excluding Non-significant Interactions (Model 9)								
	Variable	**Regressor**	**Coefficient**	**Standard Error**	**Wald Statistic**	**P-value**	**Joint Wald Statistic**	**P-value**
Random Effects	Variances	Intercept	0.234441	0.012736	338.84	<0.00001		
		Aboriginal Mother Tongue, Non-Aboriginal Home Language	0.130707	0.01812	52.03	<0.00001	96.23	<0.00001
		Non-Aboriginal Mother Tongue, Aboriginal Home Language	0.097472	0.01839	28.09	<0.00001		
		Non-Aboriginal Mother Tongue, Non-Aboriginal Home Language	0.110777	0.0293	14.29	0.00016		
		Aboriginal Mother Tongue, Aboriginal Home Language	0.09424	0.020544	21.04	<0.00001		
	Covariances	Intercept/YN	-0.052224	0.012785	16.69	0.00004		
		Intercept/NY	-0.031643	0.017462	3.28	0.07013		
		YN/NY	0.056909	0.017637	10.41	0.00125		
		Intercept/NN	-0.036865	0.013558	7.39	0.00656		
		NN/YN	0.073343	0.014898	24.24	<0.00001		
		NN/NY	0.086582	0.019903	18.92	0.00001		
		Intercept/YY	-0.050445	0.012696	15.79	0.00007		
		YY/YN	0.07231	0.014277	25.65	<0.00001		
		YY/NY	0.074987	0.017996	17.36	0.00003		
		YY/NN	0.064958	0.014969	18.83	0.00001		

Table 10: Model for Labour Force Participation Controlling for Educational Attainment (Model 10)

	Variable	Regressor	Coefficient	Standard Error	Wald Statistic	P-value	Joint Wald	P-value
		Intercept	1.105496	0.030341				
Individual Level Main Effects	Aboriginal Language Use	Aboriginal Mother Tongue, Non-Aboriginal Home Language (YN)	-0.465567	0.071278	42.66	<0.00001		
		Non-Aboriginal Mother Tongue, Aboriginal Home Language (NY)	-0.402741	0.066415	36.77	<0.00001		
		Non-Aboriginal Mother Tongue, Non-Aboriginal Home Language (NN)	-0.514722	0.063956	64.77	<0.00001		
		Aboriginal Mother Tongue, Aboriginal Home Language (YY)	-0.438635	0.103845	17.84	0.00002		
		Age	0.006965	0.000515	182.91	<0.00001		
		Age Squared	-0.003049	0.000037	6790.65	<0.00001		
		Knowledge of an Official Language: No	-0.034575	0.041384	0.70	0.40345		
		Gender: Male	0.619135	0.009128	4600.65	<0.00001		
		Ancestry: Homogeneous	-0.333713	0.01621	423.82	<0.00001		
	Ethnic Group	Métis	0.238159	0.018128	172.60	<0.00001	185.28	<0.00001
		Inuit	0.201274	0.049715	16.39	0.00005		
		Non-Registered	0.042564	0.023995	3.15	0.07608		
Individual Level Interaction Effects	Age* Aboriginal Language Use	YN.Age	0.020516	0.001649	154.79	<0.00001	1060.83	<0.00001
		NY.Age	0.01337	0.002157	38.42	<0.00001		
		NN.Age	0.012787	0.00167	58.63	<0.00001		
		YY.Age	0.026705	0.000883	914.67	<0.00001		
		YN.Age Squared	-0.000262	0.000101	6.73	0.00949		
		NY.Age Squared	-0.000167	0.000154	1.18	0.27818		
		NN.Age Squared	0.000033	0.00016	0.04	0.83660		
		YY.Age Squared	-0.000032	0.000058	0.30	0.58114		

Table 10: Model for Labour Force Participation Controlling for Educational Attainment (Model 10)								
	Variable	**Regressor**	**Coefficient**	**Standard Error**	**Wald Statistic**	**P-value**	**Joint Wald**	**P-value**
	Ancestry* Aboriginal Language Use	YN.Ancestry: Homogeneous	0.209883	0.063257	11.01	0.00091	18.93	0.00081
		NY.Ancestry: Homogeneous	0.21234	0.085676	6.14	0.01320		
		NN.Ancestry: Homogeneous	0.096232	0.0607	2.51	0.11288		
		YY.Ancestry: Homogeneous	0.066493	0.041289	2.59	0.10730		
Community Level Main Effects	Community Type	Legal Reserve	-0.089404	0.034139	6.86	0.00882	10.61	0.00497
		Other Aboriginal Community	0.072238	0.071195	1.03	0.31027		
		Proximate Population	-0.148407	0.016765	78.36	<0.00001		
		Community Level Aboriginal Language Use	-0.003413	0.000648	27.74	<0.00001		
		Language Change	-0.001993	0.001689	1.39	0.23800		
Cross-Level Interaction Effects	Community Type* Aboriginal Language Use	YN.Legal Reserve	0.413802	0.057587	51.63	<0.00001	112.35	<0.00001
		NY.Legal Reserve	0.391612	0.088851	19.43	0.00001		
		NN.Legal Reserve	0.38552	0.059445	42.06	<0.00001		
		YY.Legal Reserve	0.455868	0.060634	56.53	<0.00001		
		YN.Other Aboriginal Community	0.496263	0.085391	33.78	<0.00001		
		NY.Other Aboriginal Community	0.4278	0.11361	14.18	0.00017		
		NN.Other Aboriginal Community	0.421896	0.089604	22.17	<0.00001		
		YY.Other Aboriginal Community	0.564544	0.081534	47.94	<0.00001		
		Educational Attainment	0.174403	0.001717	10317.33	<0.00001		

Table 10: Model for Labour Force Participation Controlling for Educational Attainment (Model 10)								
	Variable	**Regressor**	**Coefficient**	**Standard Error**	**Wald Statistic**	**P-value**	**Joint Wald Statistic**	**P-value**
Random Effects	Variances	Intercept	0.19174	0.011041	301.58	<0.00001		
		Aboriginal Mother Tongue, Non-Aboriginal Home Language	0.09004	0.018163	24.58	<0.00001	93.90	<0.00001
		Non-Aboriginal Mother Tongue, Aboriginal Home Language	0.086999	0.027212	10.22	0.00139		
		Non-Aboriginal Mother Tongue, Non-Aboriginal Home Language	0.072621	0.018847	14.85	0.00012		
		Aboriginal Mother Tongue, Aboriginal Home Language	0.118824	0.017371	46.79	<0.00001		
	Covariances	Intercept/YN	-0.039222	0.01888	4.32	0.03767		
		Intercept/NY	-0.03331	0.015929	4.37	0.03657		
		YN/NY	0.053143	0.017276	9.46	0.00210		
		Intercept/NN	-0.033853	0.012339	7.53	0.00607		
		NN/YN	0.064094	0.01447	19.62	<0.00001		
		NN/NY	0.07103	0.017958	15.64	0.00008		
		Intercept/YY	-0.037151	0.0116	10.26	0.00136		
		YY/YN	0.074241	0.014222	27.25	<0.00001		
		YY/NY	0.065901	0.017179	14.72	0.00013		
		YY/NN	0.053691	0.014249	14.20	0.00016		

Table 11: Full Model for Employment (Model 11)

	Variable	Regressor	Coefficient	Standard Error	Wald Statistic	P-value	Joint Wald Statistic	P-value
		Intercept	2.10011	0.04418				
Individual Level Main Effects	Aboriginal Language Use	Aboriginal Mother Tongue, Non-Aboriginal Home Language (YN)	-0.71839	0.09666	55.24	<0.00001		
		Non-Aboriginal Mother Tongue, Aboriginal Home Language (NY)	-0.73322	0.13112	31.27	<0.00001		
		Non-Aboriginal Mother Tongue, Non-Aboriginal Home Language (NN)	-0.36831	0.08743	17.75	0.00003		
		Aboriginal Mother Tongue, Aboriginal Home Language (YY)	-0.65423	0.08653	57.17	<0.00001		
		Age	2.40235	0.06264	1471.05	<0.00001		
		Knowledge of an Official Language: No	-0.17435	0.07616	5.24	0.02207		
		Gender: Male	-0.49200	0.01255	1536.67	<0.00001		
		Ancestry: Homogeneous	-0.35906	0.02147	279.76	<0.00001		
	Ethnic Group	Métis	0.24874	0.02473	101.18	<0.00001	456.31	<0.00001
		Inuit	0.02904	0.06472	0.20	0.65472		
		Non-Registered	0.10202	0.03401	9.00	0.00270		
Individual Level Interaction Effects	Age* Aboriginal Language Use	YN.Age	1.09823	0.19904	30.44	<0.00001	55.28	<0.00001
		NY.Age	0.81929	0.26491	9.56	0.00199		
		NN.Age	0.18903	0.20450	0.85	0.35655		
		YY.Age	0.59583	0.11020	29.24	<0.00001		
	Ancestry* Aboriginal Language Use	YN.Ancestry: Homogeneous	0.23176	0.08424	7.57	0.00593	11.40	0.02242
		NY.Ancestry: Homogeneous	0.05028	0.10867	0.21	0.64677		
		NN.Ancestry: Homogeneous	0.01598	0.08041	0.04	0.84148		
		YY.Ancestry: Homogeneous	0.12073	0.05444	4.92	0.02655		

Table 11: Full Model for Employment (Model 11)								
	Variable	**Regressor**	**Coefficient**	**Standard Error**	**Wald Statistic**	**P-value**	**Joint Wald**	**P-value**
Community Level Main Effects	Community Type	Legal Reserve	-0.47065	0.04840	94.58	<0.00001	93.32	<0.00001
		Other Aboriginal Community	-0.12529	0.09677	1.68	0.19492		
		Proximate Population	0.18303	0.02461	55.32	<0.00001		
		Community Level Aboriginal Language Use	0.00360	0.00110	10.65	0.00110		
		Language Change	0.00205	0.00299	0.47	0.49299		
Cross-Level Interaction Effects	Community Level Aboriginal Language Use* Aboriginal Language Use	YN.Community Level Aboriginal Language Use	0.00104	0.00147	0.50	0.47950	1.58	0.81238
		NY.Community Level Aboriginal Language Use	0.00082	0.00198	0.17	0.68011		
		NN.Community Level Aboriginal Language Use	0.00157	0.00159	0.98	0.32220		
		YY.Community Level Aboriginal Language Use	0.00145	0.00135	1.16	0.28147		
	Language Change* Aboriginal Language Use	YN.Language Change	-0.00239	0.00375	0.41	0.52197	0.83	0.93438
		NY.Language Change	-0.00016	0.00579	0.00	1.00000		
		NN.Language Change	0.00205	0.00474	0.19	0.66292		
		YY.Language Change	-0.00094	0.00389	0.06	0.80650		
	Proximate Population* Aboriginal Language Use	YN.Proximate Population	-0.10208	0.03995	6.53	0.01061	10.10	0.03878
		NY.Proximate Population	-0.02261	0.05900	0.15	0.69854		
		NN.Proximate Population	-0.07087	0.04080	3.02	0.08224		
		YY.Proximate Population	-0.09133	0.03877	5.55	0.01848		
	Community Type* Aboriginal Language Use	YN.Legal Reserve	0.45723	0.08211	31.01	<0.00001	66.38	<0.00001
		NY.Legal Reserve	0.53628	0.12149	19.49	0.00001		
		NN.Legal Reserve	0.33046	0.08227	16.13	0.00006		
		YY.Legal Reserve	0.37888	0.08580	19.50	0.00001		

Table 11: Full Model for Employment (Model 11)								
	Variable	**Regressor**	**Coefficient**	**Standard Error**	**Wald Statistic**	**P-value**	**Joint Wald**	**P-value**
		YN.Other Aboriginal Community	0.35259	0.11997	8.64	0.00329		
		NY.Other Aboriginal Community	0.66985	0.16184	17.13	0.00003		
		NN.Other Aboriginal Community	0.05948	0.12190	0.24	0.62421		
		YY.Other Aboriginal Community	0.20230	0.11500	3.09	0.07877		
Random Effects	Variances	Intercept	0.360826	0.020605	306.66	<0.00001		
		Aboriginal Mother Tongue, Non-Aboriginal Home Language	0.085924	0.026587	10.44	0.00123	40.71	0.00020
		Non-Aboriginal Mother Tongue, Aboriginal Home Language	0.081066	0.038915	4.34	0.03723		
		Non-Aboriginal Mother Tongue, Non-Aboriginal Home Language	0.04267	0.024706	2.98	0.08430		
		Aboriginal Mother Tongue, Aboriginal Home Language	0.141206	0.026055	29.37	<0.00001		
	Covariances	Intercept/YN	-0.048745	0.020112	5.87	0.01540		
		Intercept/NY	-0.035609	0.026763	1.77	0.18338		
		YN/NY	0.042225	0.024929	2.87	0.09024		
		Intercept/NN	-0.029162	0.020054	2.11	0.14634		
		NN/YN	0.022879	0.01924	1.41	0.23506		
		NN/NY	0.038015	0.023964	2.52	0.11241		
		Intercept/YY	-0.076953	0.019646	15.34	0.00009		
		YY/YN	0.088604	0.021071	17.68	0.00003		
		YY/NY	0.067111	0.025074	7.16	0.00745		
		YY/NN	0.043534	0.019989	4.74	0.02947		

Table 12: Model for Employment Excluding Non-Significant Interactions (Model 12)

	Variable	Regressor	Coefficient	Standard Error	Wald Statistic	P-value	Joint Wald Statistic	P-value
		Intercept	2.11943	0.04038				
Individual Level Main Effects	Aboriginal Language Use	Aboriginal Mother Tongue, Non-Aboriginal Home Language (YN)	-0.72760	0.09318	60.97	<0.00001		
		Non-Aboriginal Mother Tongue, Aboriginal Home Language (NY)	-0.75005	0.12921	33.70	<0.00001		
		Non-Aboriginal Mother Tongue, Non-Aboriginal Home Language (NN)	-0.40183	0.08298	23.45	<0.00001		
		Aboriginal Mother Tongue, Aboriginal Home Language (YY)	-0.67491	0.08300	66.12	<0.00001		
		Age	2.40619	0.06256	1479.33	<0.00001		
		Knowledge of an Official Language: No	-0.17204	0.07606	5.12	0.02365		
		Gender: Male	-0.49190	0.01255	1536.27	<0.00001		
		Ancestry: Homogeneous	-0.35987	0.02147	280.95	<0.00001		
	Ethnic Group	Métis	0.24902	0.02473	101.40	<0.00001	102.09	<0.00001
		Inuit	0.03213	0.06464	0.25	0.61708		
		Non-Registered	0.10219	0.03401	9.03	0.00266		
Individual Level Interaction Effects	Age* Aboriginal Language Use	YN.Age	1.08746	0.19284	31.80	<0.00001	55.32	<0.00001
		NY.Age	0.81662	0.26105	9.79	0.00175		
		NN.Age	0.15921	0.20118	0.63	0.42736		
		YY.Age	0.58271	0.10915	28.50	<0.00001		
	Ancestry* Aboriginal Language Use	YN.Ancestry: Homogeneous	0.23294	0.08424	7.65	0.00568	11.51	0.02139
		NY.Ancestry: Homogeneous	0.05101	0.10848	0.22	0.63904		
		NN.Ancestry: Homogeneous	0.01380	0.08032	0.03	0.86249		
		YY.Ancestry: Homogeneous	0.12113	0.05443	4.95	0.02609		

Table 12: Model for Employment Excluding Non-Significant Interactions (Model 12)								
	Variable	**Regressor**	**Coefficient**	**Standard Error**	**Wald Statistic**	**P-value**	**Joint Wald Statistic**	**P-value**
Community Level Main Effects	Community Type	Legal Reserve	-0.48527	0.04706	106.33	<0.00001	110.90	<0.00001
		Other Aboriginal Community	-0.13731	0.09650	2.02	0.15524		
		Proximate Population	0.18852	0.02427	60.34	<0.00001		
		Community Level Aboriginal Language Use	0.00438	0.00089	24.22	<0.00001		
		Language Change	0.00155	0.00235	0.44	0.50712		
Cross-Level Interaction Effects	Proximate Population* Aboriginal Language Use	YN.Proximate Population	-0.11202	0.03682	9.26	0.00234	15.92	0.00313
		NY.Proximate Population	-0.02876	0.05240	0.30	0.58388		
		NN.Proximate Population	-0.08600	0.03749	5.26	0.02182		
		YY.Proximate Population	-0.10925	0.03462	9.96	0.00160		
	Community Type* Aboriginal Language Use	YN.Legal Reserve	0.48078	0.07593	40.09	<0.00001	83.15	<0.00001
		NY.Legal Reserve	0.54976	0.11346	23.48	<0.00001		
		NN.Legal Reserve	0.35632	0.07586	22.06	<0.00001		
		YY.Legal Reserve	0.41174	0.07894	27.21	<0.00001		
		YN.Other Aboriginal Community	0.36293	0.11830	9.41	0.00216		
		NY.Other Aboriginal Community	0.68265	0.15904	18.42	0.00002		
		NN.Other Aboriginal Community	0.08364	0.12051	0.48	0.48842		
		YY.Other Aboriginal Community	0.22292	0.11298	3.89	0.04857		

Table 12: Model for Employment Excluding Non-Significant Interactions (Model 12)								
	Variable	**Regressor**	**Coefficient**	**Standard Error**	**Wald Statistic**	**P-value**	**Joint Wald Statistic**	**P-value**
Random Effects	Variances	Intercept	0.36216	0.02068	306.69	<0.00001		
		Aboriginal Mother Tongue, Non-Aboriginal Home Language	0.08841	0.02685	10.84	0.00099	41.86	0.00013
		Non-Aboriginal Mother Tongue, Aboriginal Home Language	0.08275	0.03914	4.47	0.03449		
		Non-Aboriginal Mother Tongue, Non-Aboriginal Home Language	0.04551	0.02501	3.31	0.06886		
		Aboriginal Mother Tongue, Aboriginal Home Language	0.14408	0.02633	29.94	<0.00001		
	Covariances	Intercept/YN	-0.05168	0.02025	6.51	0.01073		
		Intercept/NY	-0.03752	0.02687	1.95	0.16259		
		YN/NY	0.04404	0.02514	3.07	0.07975		
		Intercept/NN	-0.03385	0.02019	2.81	0.09368		
		NN/YN	0.02656	0.01948	1.86	0.17262		
		NN/NY	0.03935	0.02417	2.65	0.10355		
		Intercept/YY	-0.0805	0.01979	16.55	0.00005		
		YY/YN	0.09061	0.02129	18.11	0.00002		
		YY/NY	0.06965	0.02531	7.57	0.00593		
		YY/NN	0.04731	0.02024	5.46	0.01946		

Table 13: Model for Employment Excluding Non-significant Interactions and Controlling for Educational Attainment (Model 13)

	Variable	Regressor	Coefficient	Standard Error	Wald Statistic	P-value	Joint Wald Statistic	P-value
		Intercept	2.00284	0.04034				
Individual Level Main Effects	Aboriginal Language Use	Aboriginal Mother Tongue, Non-Aboriginal Home Language (YN)	-0.69961	0.09496	54.28	<0.00001		
		Non-Aboriginal Mother Tongue, Aboriginal Home Language (NY)	-0.75006	0.13082	32.87	<0.00001		
		Non-Aboriginal Mother Tongue, Non-Aboriginal Home Language (NN)	-0.36430	0.08283	19.34	0.00001		
		Aboriginal Mother Tongue, Aboriginal Home Language (YY)	-0.63708	0.08328	58.52	<0.00001		
		Age	2.55635	0.06238	1679.38	<0.00001		
		Knowledge of an Official Language: No	0.41699	0.07675	29.52	<0.00001		
		Gender: Male	-0.39719	0.01277	967.42	<0.00001		
		Ancestry: Homogeneous	-0.29381	0.02169	183.49	<0.00001		
	Ethnic Group	Métis	0.25303	0.02495	102.85	<0.00001	103.75	<0.00001
		Inuit	0.06418	0.06557	0.96	0.32719		
		Non-Registered	0.13146	0.03434	14.66	0.00013		
		Educational Attainment	0.13382	0.00238	3161.46	<0.00001		
Individual Level Interaction Effects	Age* Aboriginal Language Use	YN.Age	1.42122	0.19308	54.18	<0.00001	144.52	<0.00001
		NY.Age	1.03790	0.26146	15.76	0.00007		
		NN.Age	0.32377	0.20039	2.61	0.10619		
		YY.Age	1.14831	0.10947	110.03	<0.00001		
	Ancestry* Aboriginal Language Use	YN.Ancestry: Homogeneous	0.23543	0.08593	7.51	0.00614	13.00	0.01129
		NY.Ancestry: Homogeneous	0.08237	0.11004	0.56	0.45426		
		NN.Ancestry: Homogeneous	-0.00665	0.08107	0.01	0.92034		
		YY.Ancestry: Homogeneous	0.13932	0.05537	6.33	0.01187		

Table 13: Model for Employment Excluding Non-significant Interactions and Controlling for Educational Attainment (Model 13)

	Variable	Regressor	Coefficient	Standard Error	Wald Statistic	P-value	Joint Wald Statistic	P-value
Community Level Main Effects	Community Type	Legal Reserve	-0.46895	0.04674	100.66	<0.00001	105.72	<0.00001
		Other Aboriginal Community	-0.11670	0.09549	1.49	0.22222		
		Proximate Population	0.15502	0.02407	41.48	<0.00001		
		Community Level Aboriginal Language Use	0.00520	0.00089	34.14	<0.00001		
		Language Change	0.00097	0.00237	0.17	0.68011		
Cross-Level Interaction Effects	Proximate Population* Aboriginal Language Use	YN.Proximate Population	-0.15370	0.03755	16.75	0.00004	35.43	<0.00001
		NY.Proximate Population	-0.08252	0.05190	2.53	0.11170		
		NN.Proximate Population	-0.12946	0.03710	12.18	0.00048		
		YY.Proximate Population	-0.01804	0.03459	0.27	0.60333		
	Community Type* Aboriginal Language Use	YN.Legal Reserve	0.47812	0.07772	37.84	<0.00001	81.44	<0.00001
		NY.Legal Reserve	0.54534	0.11467	22.62	<0.00001		
		NN.Legal Reserve	0.35733	0.07524	22.55	<0.00001		
		YY.Legal Reserve	0.43032	0.07888	29.76	<0.00001		
		YN.Other Aboriginal Community	0.37058	0.12051	9.46	0.00210		
		NY.Other Aboriginal Community	0.65244	0.16034	16.56	0.00005		
		NN.Other Aboriginal Community	0.06886	0.11915	0.33	0.56566		
		YY.Other Aboriginal Community	0.22711	0.11202	4.11	0.04263		

Table 13: Model for Employment Excluding Non-significant Interactions and Controlling for Educational Attainment (Model 13)

	Variable	Regressor	Coefficient	Standard Error	Wald Statistic	P-value	Joint Wald Statistic	P-value
Random Effects	Variances	Intercept	0.34081	0.02016	285.79	<0.00001		
		Aboriginal Mother Tongue, Non-Aboriginal Home Language	0.0932	0.02791	11.15	0.00084	35.88	0.00109
		Non-Aboriginal Mother Tongue, Aboriginal Home Language	0.08412	0.03977	4.47	0.03449		
		Non-Aboriginal Mother Tongue, Non-Aboriginal Home Language	0.03509	0.02369	2.19	0.13891		
		Aboriginal Mother Tongue, Aboriginal Home Language	0.12849	0.0255	25.39	<0.00001		
	Covariances	Intercept/YN	-0.04561	0.0203	5.05	0.02463		
		Intercept/NY	-0.02659	0.02666	0.99	0.31974		
		YN/NY	0.05155	0.026	3.93	0.04743		
		Intercept/NN	-0.0287	0.01958	2.15	0.14257		
		NN/YN	0.02589	0.01941	1.78	0.18215		
		NN/NY	0.04382	0.02381	3.39	0.06559		
		Intercept/YY	-0.06189	0.01917	10.42	0.00125		
		YY/YN	0.08464	0.02124	15.88	0.00007		
		YY/NY	0.0684	0.02506	7.45	0.00634		
		YY/NN	0.05441	0.0197	7.63	0.00574		

Appendix 2: Notes on Model Interpretation

Owing to the complexity of the models described in chapter 3, some notes on their interpretation is in order. As indicated in chapter 2, educational attainment, total income and employment income are examined using linear models. When a predictor in a linear model is not involved in an interaction, interpreting its coefficient is straightforward. I will use the outcome "educational attainment" to illustrate. If the reference category of the factor variable gender is "female" and the coefficient associated with the regressor "male" is -0.40908, it is interpreted as follows: other things being equal, males are predicted, on average, to have completed about 0.41 fewer years of education than females. The educational attainment model does not happen to contain any continuous predictors that are not involved in interactions. Pretending for a moment that community level Aboriginal language use is not, its coefficient of 0.00078 can be interpreted as follows: other things being equal, as community level Aboriginal language use increases by one unit, predicted educational attainment increases by 0.00078 years. Since community level Aboriginal language use is involved in an interaction with individual level Aboriginal language use, however, that interpretation applies only where the latter is equal to zero. That is, predicted educational attainment increases by 0.00078 years for non-speakers, who comprise the reference category of individual level Aboriginal language use. Where an interaction with Aboriginal language use is present, then, the main effects of a predictor pertain to non-speakers, while the interaction effects pertain

to how that effect differs between the other Aboriginal language use categories and non-speakers. The coefficient associated with the interaction between community level Aboriginal language use and those with an Aboriginal mother tongue and home language is -0.02033. For this language use group, predicted educational attainment decreases by 0.01955 (0.00078 – 0.02033 = -0.01955) years as community level Aboriginal language use increases by one unit. Notably, the main effect of community level Aboriginal language use is not statistically significant, meaning that there is no evidence that community level Aboriginal language use affects educational attainment among non-speakers. The interaction term described above, however, is statistically significant, providing evidence that community level Aboriginal language use affects those with an Aboriginal mother tongue and home language differently than it does non-speakers.

It should also be emphasized that the coefficients associated with the Aboriginal language use regressors refer to the effect of Aboriginal language use on educational attainment where all of the variables with which it interacts equal zero. Since the continuous variables in these models have been grand-mean centered, those coefficients refer to the effect of Aboriginal language use on educational attainment where the variables with which it interacts are equal to their means[86] or reference categories.

[86] Language change is an exception. It is set to zero, a more easily interpretable value.

Interpreting the models of total and employment income are somewhat more complex, as these outcomes are transformed into their base-10 logarithms. In this chapter, relationships between variables are often discussed in terms of predicted values. These predicted values are derived by varying the predictors of interest while holding the other predictors in the model constant at their means or reference categories. Results are straightforward if one is interested in the log of income. They are not, however, if one is interested in income itself. When converted back into dollars, disparities in predicted income across Aboriginal language groups vary with the values assigned to the other predictors in the models. Consider the following fictional example in which the log of income is regressed on gender and Aboriginal language use. The intercept of the model is 4.5, corresponding to $31,623 dollars predicted income for members of the reference categories of the two predictors (female and non-speakers, respectively). The coefficient associated with gender is 0.2 while the coefficient associated with those with an Aboriginal mother tongue and home language is 0.15. The predicted total income in dollars for females in this language use category is $10^{(4.5 + 0.15)}$ = $44,668: $13,046 more than female non-speakers. The predicted total income for male non-speakers is $10^{(4.5+0.2)}$ = $50,119. The predicted total income for males with an Aboriginal mother tongue and home language is $10^{(4.5+0.2+0.15)}$ = $70,795. For males, the disparity between non-speakers and those with an Aboriginal mother tongue and home language is $7,630 larger than it is for females. Notably, the values of other predictors in the

model do not affect the magnitude of effects when expressed as percentages. For example, $31,623/$44,668 = 71%, meaning that non-speaking females are predicted to receive 71% of the income received by females who have an Aboriginal mother tongue and home language. The same percentage is calculated by dividing the predicted income of non-speaking males by that of males with an Aboriginal mother tongue and home language: $50,119/$70,795= 71%.

The coefficients in logit models have a somewhat different interpretation than those in linear models. It was discussed in chapter 2, so does not bear repetition here. It should be noted, however, that the disparities between Aboriginal language use groups, when measured in terms of odds or probabilities, are also dependent on the values of the other predictors in the model being considered. The multiplicative effects of a predictor or combination of predictors on the odds of a given outcome, however, are not. For example, the intercept of the model of labour force participation from which non-significant interactions are excluded is 1.36032. The coefficient associated with not knowing an official language is -0.72603 and the coefficient for gender is 0.54762. The exponentiated intercept is 3.897, and refers to the predicted odds of employment for members of the various reference categories with average values of the continuous predictors. That is, it refers to non-speaking female Registered Indians of average age with heterogeneous ancestry who live in non-Aboriginal communities with no language change and average levels of proximate

population and Aboriginal language use. The predicted odds of employment for females with no knowledge of an official language, leaving the other variables set at their means or reference categories, is exp(1.36032 – 0.72603) = 1.886. The difference in odds of employment for females who do and do not know an official language, is 3.897 – 1.886 = 2.01. The difference in probabilities is about 14 percentage points. The predicted odds of employment for males, leaving the other variables set at their means or reference categories, is exp(1.36032 + 0.54762) = 6.74. The predicted odds of employment for males who do not know an official language, leaving the other variables set at their means or reference categories, is exp(1.36032 + 0.54762 – 0.72603) = 3.26. The difference in probabilities is about 11 percentage points. This example illustrates that the disparity between those who do and do not know an official language is different for men and women when that disparity is defined in terms of odds or probabilities. However, the odds of labour force participation for males who do not know an official language is 3.26/6.74 = 0.48 times the odds for males who do. Likewise, the odds of labour force participation for females who do not know an official language is 1.886/3.897 = 0.48 times the odds for females who do. The exponentiated coefficient associated with having no knowledge of an official language is, of course, exp(-0.72603) = 0.48. This complexity is a consequence of dealing with models that are not strictly linear, and readers are reminded to be aware of it.