

## The Blackfoot Language Resources and Digital Dictionary project: Creating integrated web resources for language documentation and revitalization

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This paper describes ongoing work to create a suite of integrated web resources in support of Blackfoot language documentation, maintenance, and revitalization efforts. Built around a digital dictionary, the website also contains grammar sketches, a library of other language-related resources, and a story archive.<sup>1</sup> The project began its life as advocacy research (i.e., a digital repatriation project) but developed into empowerment research through community participation. The first phase consisted of back-digitization of an existing print dictionary. The second phase, which is ongoing, works toward making the dictionary user-friendly for speakers, learners, and teachers, and embedding it in a website that contains supporting content. Key features are developed collaboratively with Blackfoot community members. In order to create an environment in which all participants are equally empowered to help shape the project, a Participatory Action Research approach was adopted for the second phase of teamwork. This resulted in important new priorities for presentation, content, and enhancement of features. It has also had impact on the participants themselves, who developed awareness and new relationships as well as acquiring new skills and knowledge, which for some contributed to new jobs and academic directions. Finally, the project is producing new material to address existing research questions and generating new questions for future research projects.

**1. Introduction** Over the past few decades, linguists have become increasingly concerned about language endangerment and loss, and many have shifted part of their professional efforts to attempts at mitigation of the ongoing large-scale destruction of linguistic diversity. As part of this development, linguistic work on endangered languages has become increasingly multi-disciplinary and collaborative, as stemming the tide of language loss requires an understanding of what causes it and what motivates the speakers of the endangered language community. Much has been written recently about the ethics of linguistic work in endangered language communities, about best practice in collaborating with communities and individuals interested in working toward language maintenance and revitalization, and about what does and doesn't

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<sup>1</sup><https://blackfoot.atlas-ling.ca>.

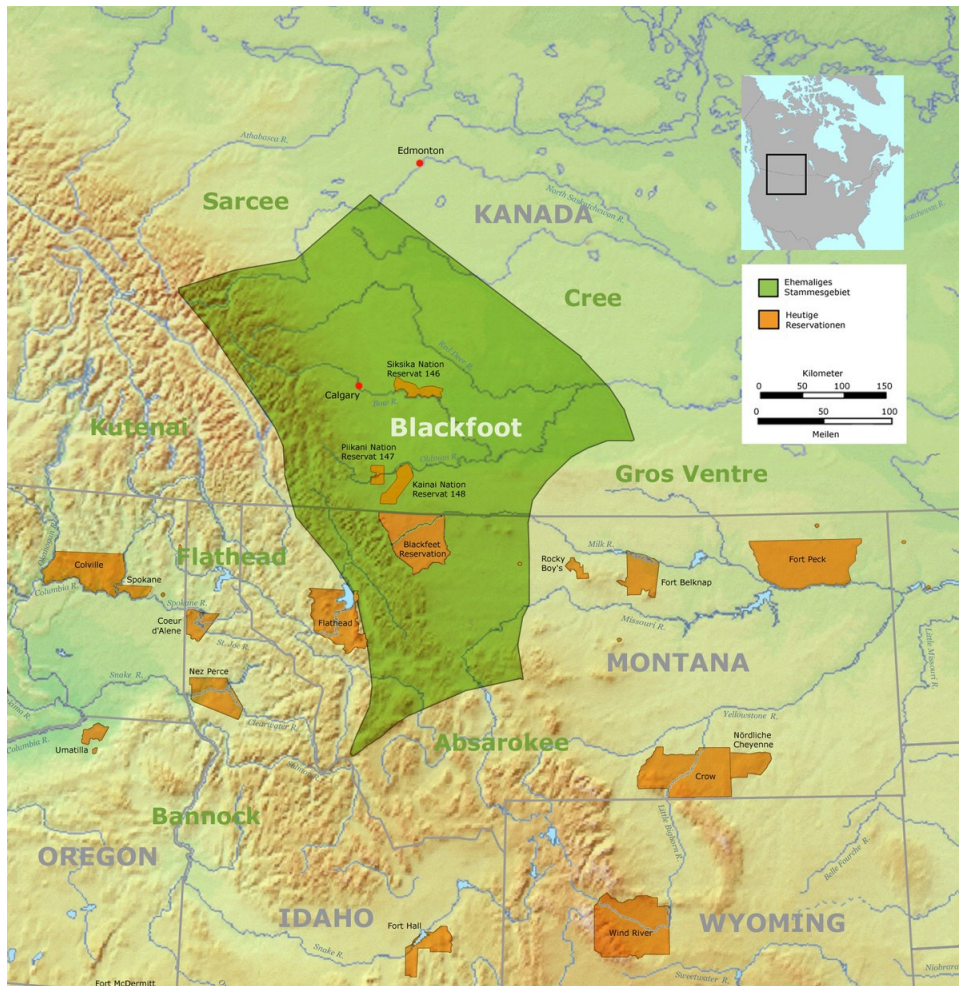
work to create new fluent speakers. New methods have been developed, such as language nests, immersion programs, and Master/Mentor-Apprentice models. Most linguists now take seriously the importance of making their materials available to the community or individuals that helped produce them, and many go beyond simply returning material to the community and work at presenting material in a form that promotes accessibility and benefits maintenance and revitalization efforts. Others take this even further and, in collaboration with communities and individuals, develop research questions and entire projects aimed at supporting language reclamation efforts.

The linguist who in this way becomes more and more involved in language revitalization becomes ever more concerned with people as speakers, and ever less with language as an independent object of study. Many linguists have not been trained in community-based and collaborative research methods, and they may struggle with the loss of control inherent in these new ways of working. Working with Indigenous communities and individuals adds yet another layer of complications as (usually non-Indigenous) linguists and speakers work to break through the long-term effects of colonialism, which affect all relationships between scholars and Indigenous communities. Thankfully, other social scientists have developed research frameworks and methods that can be fruitfully applied to linguistic work in Indigenous endangered language communities as well.

This article describes how a project aimed at creating web-based resources to support Blackfoot language documentation and revitalization efforts began as what could be called “advocacy research” and developed into “empowerment research” through the application of ideas and concepts from the Participatory Action Research (PAR) framework.

We will first introduce the Blackfoot language and its speakers (§2) and provide some background on the first phase of the project, which is already completed (§3). In §4 we discuss ethical frameworks for language revitalization work, with particular focus on the Canadian context, and explain why the PAR approach is appropriate for the next phase of our project. §5 through §7 then take up each of the key principles of PAR, and discuss how they have guided the research process and resulted in new directions for the project. §5 discusses participation/collaboration, §6 focuses on action/impact, and §7 gives examples of research questions addressed or raised by the project. §8 provides some concluding comments.

**2. The Blackfoot language and its speakers** The pre-contact Blackfoot territory encompassed a large area of the Western prairies in what is now Canada and the United States. It would have ranged as far north as Central and Northern Alberta and Saskatchewan, south into Montana and Idaho, west into the Rocky Mountains, and east into the Cypress Hills and Southern Saskatchewan (see Figure 1; Dwyer & Stout 2012:10–11; Hungry Wolf & Hungry Wolf 1989).



**Figure 1.** Estimation of original Blackfoot territory (green) with current reserves in Alberta and Montana (orange). Source: Wikipedia <https://upload.wikimedia.org/wikipedia/commons/thumb/5/57/Blackfoot01.png/1200px-Blackfoot01.png>.

By the mid-nineteenth century, this area on both sides of the U.S.-Canada border was being colonized by an increasing stream of European and American settlers. Around 1880, the bison were extinct and the Blackfoot were forced to sign treaties that confined them to reserves. A tribal territory for the Montana Blackfeet<sup>2</sup> was established as early as 1855 by the Lame Bull Treaty (Hungry Wolf & Hungry Wolf 1989:11–13; Still Smoking 1997:11–12). In Canada, Treaty 7 was signed in 1877, designating three separate Blackfoot reserves: the Siksika (Blackfoot) reserve east of Calgary, the

<sup>2</sup>The term “Blackfoot” is generally used in Canada for the people and the language, in both singular and plural and as noun and adjective. The term “Blackfeet” is generally used in the United States. In this article we will use the term “Blackfoot” when speaking about the language and people in general or when referring to the Canadian communities; we will occasionally use the form “Blackfeet” when specifically referring to the people and/or language in the United States.

Kainai (Blood) reserve southwest of Lethbridge, and the Piikani (Peigan) reserve west of Fort Macleod (see Figure 2). The linguistically unrelated Tsuu T'ina (Sarcee) and Stoney (Nakota) nations also received reserve lands under the same treaty (Dickason & Newbigging 2010:196). See Rosen et al. (under review) for more details.



**Figure 2.** Blackfoot reserves: A. = Siksika, B. = Piikani (Peigan), C. = Kainai (Blood), D. = Aamsskaapikani (Piegan Blackfeet, Montana). Map courtesy Kevin McManigal, University of Montana.

Present-day Blackfoot speakers mainly live in these four reserve<sup>3</sup> communities in Southern Alberta and Montana, although many individuals also live off-reserve. According to Indigenous and Northern Affairs Canada (INAC 2017), 23,456 individuals were registered members of one of the three Blackfoot reserves in Alberta in January 2017. 14,749 of these, or 63%, indicated that they live on their own reserve, while the remainder live away from their own reserve (mostly off-reserve, with a small number of individuals indicating that they live on other reserves). In Montana, according to the US Census Bureau (2015), 10,938 people lived on the Blackfeet Reservation in the 2011–2015 time period.<sup>4</sup> While the data are not fully comparable, it seems reasonable to estimate that there are at least about 35,000 individuals who would identify as Blackfoot/Blackfeet on both sides of the Canada-U.S. border.

<sup>3</sup>The tribal lands set aside specifically for the Indigenous populations are usually called “reserves” in Canada and “reservations” in the United States. In this article we will use the term “reserve” when speaking about such lands in general or in the Canadian context; we will occasionally use the term “reservation” when specifically referring to such lands in the United States context.

<sup>4</sup>This data does not include people living off the reservation.

Not all people who identify as Blackfoot speak the Blackfoot language. According to the latest available long-form census data (2011 census), in Canada, 3,250 people speak Blackfoot as their mother tongue; of these, 64.1% speak the language most often (28.9%) or regularly (35.2%) at home (Statistics Canada 2011; see Statistics Canada 2017 for slightly updated numbers from the 2016 short-form census, which do not show as much detail as the 2011 numbers but confirm the trend towards decreasing number of mother tongue speakers in an increasing ethnic population). U.S. statistics are not quite comparable, since they do not distinguish between mother tongue, home language use, etc. In Montana, 1,450 people reportedly know Blackfeet (U.S. Census Bureau 2015). There are very few monolingual speakers left in any community and home transmission is limited (Frantz 2009:viii), although there are anecdotal reports that home transmission may be on the rise in some families who are aware of the impending risks of language loss. Note that in addition to the U.S. and Canadian census data not being comparable, there is also no way to assess degrees of fluency among these self-reported speakers. Anecdotal evidence suggests that both under-reporting and over-reporting may be taking place: on the one hand, people with significant passive knowledge of the language (sometimes called “fluent listeners”) may indicate that they don’t know the language; on the other hand, people with limited conversational skills may indicate that they do speak the language. After all these caveats, if we take the numbers at face value, and simply add up the Canadian “mother tongue speakers” and the US “knowers”, we have perhaps something around 4,700 speakers, whatever is meant by “speaker”. As a very rough estimate, assuming around 35,000 Blackfoot individuals, this means the speaker population is perhaps 13–14%, not including second language learners. While this may appear to be a reasonable number, more detailed statistics on language use available from the Canadian census paint a more worrisome picture: for instance, while, as we saw, 3,250 people in Canada report speaking Blackfoot as their mother tongue, only 805 of these report speaking Blackfoot most often at home, and of those, only twenty-five are reported as being under the age of five (Statistics Canada 2012). This points to high rates of generational language shift and low rates of intergenerational home transmission.

While the Blackfoot language is clearly a linguistic unit, there is geographical, individual, social, and generational variation, as is to be expected in any language. In terms of geographical variation, there are four mutually intelligible dialects, roughly equivalent with the four reserve areas. Speakers sometimes prefer to refer to their language with a term that is more specific than just “Blackfoot” or “Blackfeet”, using names like “Kainai Blackfoot”, “Piikani Blackfoot”, etc. Some speakers also report being able to detect linguistic differences between specific localities within one reserve, in particular on the Kainai/Blood reserve; this is sometimes also referred to as a “family dialect”. Dialect variation has not been systematically documented, and these smaller variations have not been investigated at all as far as we know (see also Miyashita & Chatsis 2013:320–322). Frantz & Russell’s dictionary (1995; 2017) marks quite a few lexical items as belonging to a particular dialect, and others as

“variant” without indicating the nature of the variation. Frantz’s grammar (2009; 2017) also includes some comments on grammatical variation.

Issues around variation require some kind of decision on the part of the dictionary or grammar writer. Variation exists at the phonetic, phonological, lexical, and grammatical levels. For instance, the word for ‘apple’ is listed in the print dictionary (Frantz & Russell 1995; 2017) in two forms: *áipasstaamiinaamm* (with initial /ɛ/) and *ápasstaamiinaamm* (with initial /a/). While Frantz & Russell include these forms as separate entries, the /ɛ/ ~ /a/ variation is found in other contexts as well, and is probably better interpreted as phonetic variation. Bliss & Glougie (2010) describe phonetic variation in word-final obviation morphology between two speakers. Frantz (n.d.) distinguishes three different ways in which speakers from the Kainai community pronounce the underlying sequence <ih> [iç]: some speakers always pronounce this as [s], others pronounce it as [s] only when preceded or followed by [s] (resulting in [ss] sequences), and yet others retain [iç] everywhere except when followed by [s]; speakers who pronounce more [s]-for-[iç] are often considered by speakers who do this less to have a “lisp” or “speech impediment”. A frequently mentioned grammatical difference is the verbal marker *na-*, which is only used in the Siksika dialect (analyzed as a past tense marker in Frantz 2009:37; analyzed as an evidential marker in Bliss & Ritter 2007). Lexical variation is frequent, especially in words for more recently introduced concepts and items. An example is the noun *áipakkohtamm*, lit. ‘it makes a chugging sound’, which can be used to refer to both tractors and motorcycles, depending on the dialect. Many comparable examples can be found.

It is not always clear which variation is geographical and which is generational. What is clear is that speakers recognize differences between the speech of older and younger speakers. This is often called Old Blackfoot and New Blackfoot; the latter is sometimes referred to as either “slang”, or “broken” or “low” Blackfoot, and often regarded negatively (Chatsis et al. 2013; Kaneko 1999; Miyashita & Chatsis 2013; 2015). The standard descriptions of Blackfoot (Uhlenbeck 1938; Frantz 2009; 2017; Taylor 1969) generally reflect Old Blackfoot.

One difference between Old and New Blackfoot appears to be that New Blackfoot is less morphologically (in particular inflectionally) complex. Miyashita & Chatsis (2013:321) give the example of the third person singular question for English ‘Is he good?’. The Old Blackfoot form would be *Iiksoka’pssiwaatsiksi?*. The New Blackfoot form would be shorter: *Iiksoka’pssiwaats?* or even *Iiksoka’pssiwa?*. In our own work we found shortened forms of some possessed nouns. When asked to produce forms with both plural possessor and possessed, the forms we elicited differed from those given in Frantz (2009:70–76). In canonical Blackfoot, such nouns are inflected for plural possessed and plural possessor with suffixes. Only one of our speakers, a very traditional person who is also an important elder, although not much older than the other speakers in age, easily produced such forms as *nitómitaaminnaaniksi* ‘our dogs’, containing the two plural markers *-innaan* (‘our’) and *-iksi* (animate plural ‘dogs’). The others gave *nitómitaamiksi*, with only the plural marker for ‘dogs’, for both ‘my dogs’ and ‘our dogs’. As mentioned above, all these types of variation require some sort of decision on the part of the dictionary maker, as every choice

represents a judgement regarding what should and should not be included. While we do not wish to make such judgements, they are sometimes unavoidable.

### 3. The Blackfoot Language Resources and Digital Dictionary project: Background

The original goal of the Blackfoot Language Resources and Digital Dictionary project was a form of what is now often called “digital repatriation” (Bell et al. 2013). The impetus for the project was the observation that the most complete available print dictionary, *Blackfoot dictionary of stems, roots and affixes* (Frantz & Russell 1995; 2017), is not easy to use for members of the Blackfoot community (see also Miyashita & Chatsis 2013:310). As the title of the dictionary indicates, it contains “stems, roots and affixes”, rather than words, at least at the headword entry level. From a linguistic point of view, this is an entirely appropriate way of organizing and presenting lexical material, since lexical items in polysynthetic languages such as Blackfoot (and all other Algonquian languages) are typically not words. For example, see (1):

- (1) *Nimohtohkanaitsitsinikookinnaana*  
 n-imoht-ohkana-it-itsiniko-ok-innaan  
 1-about-all-then-tell.a.story.to(TA)-INV-1PL  
 ‘then they told us the whole story about it’

This word contains at least four lexical items: *imoht-* ‘about’ (a so-called ‘relative root’ that functions somewhat like a preposition); *ohkana-* ‘all’ (a quantifier); *it-* ‘then’ (a kind of adverb); and *itsiniki* ‘to tell a story to someone’ (the verb stem). Even if the three optional lexical elements preceding the stem were not there, the verb would still not be the first part of the word, since most verb forms begin with a prefixed person marker (here *n-*, first person). From a linguistic point of view, the four lexical items contained in this word must be listed as separate items in a dictionary. However, it requires fairly sophisticated knowledge of the morphological structure of Blackfoot words to know, for instance, that the verb meaning ‘tell a story to someone’ must be found under the letter I in an alphabetically organized dictionary.

There is a body of work on lexicography of non-word-based polysynthetic languages that discusses these issues. Montgomery-Anderson (2008:57) criticizes Feeling’s (1975) Cherokee dictionary for using “natural citation forms” (i.e., words) rather than verb stems (i.e., lexical items) as headwords. He argues for a dictionary “organized by unprefixed verb stems” (73) instead, in effect having lexical items as headwords (see also Pulte & Feeling 2002). He assumes that such an approach creates a morphological transparency which will lead learners to productively create new forms based on the chunks they are learning from the dictionary. However, this type of “productivity” would require knowledge of the grammatical and morphological structure of the language, which is not the case for most learners of Blackfoot. Blackfoot speakers often object to the way in which traditional linguistic analysis splits words up into morphemes; they prefer a more holistic way of looking at language and stress the importance of learning fully meaningful phrases. On the other hand, an equally frequently expressed interest in the “underlying meaning” or the “roots”

of words indicates an interest in morphology, stemming from a fascination with the worldview inherent in the different ways in which the Blackfoot language expresses actions, objects, and concepts. Ideally, therefore, a dictionary would incorporate both types of information.

In a print dictionary, consistency standards will generally force a choice for one or the other approach. Not doing so results in a confusing presentation format in which headword entries can be morphemes, stems, or fully inflected words. This is the case with Uhlenbeck & van Gulik's (1934) Blackfoot-English dictionary. Entries in this dictionary range from inflectional morphemes such as *a-lai-* 'in the act of', through noun stems such as *áatsista* 'rabbit' and verb stems such as *aiakaʒkumi-* 'to be going to shoot, to aim' (with aspect prefix *aiak-* [*ayaak-*] 'immediate future' included in stem), to fully inflected forms such as *áiaikopotostuyimiu* 'he is sixteen years old' (all examples from Uhlenbeck & van Gulik 1934:1).

In the print format this "everything goes" approach to what may count as a headword is confusing, but many of the problems associated with having to make presentational and organizational choices either completely resolve themselves in the digital environment, or are more easily amenable to solutions with relatively little additional work (Corris et al. 2004; Montgomery-Anderson 2008; Begay 2013). For example, the verb form in (1) above, once split up into its constituent morphemes, can be used as an example linked to four different headwords. The user can find it both by looking for the whole word in the examples database, by looking for any of its four lexical elements, or by looking for any of the words that occur in the English translation. A verb stem like *aiakaʒkumi-* 'to be going to shoot, to aim' would be analyzed as containing two elements, *aiak-* [*ayaak-*] 'immediate future' + *aʒkumi-* [*waahkomi*] 'shoot, aim', both of which are headwords in the dictionary. A fully inflected form like *áiaikopotostuyimiu* 'he is sixteen years old' would occur as an example linked to the entries for *áiaikopoto* [(*n*)*áaikopoto*] 'sixteen' and *stuyimi* [*sstoyiimi*] 'have years (winters), be aged'.

In addition, digitization allows for the addition of other features to the dictionary more user-friendly for speakers, learners and teachers, and more attractive for use in teaching contexts, such as audio, video, and other features. These are described in more detail below.

The project, which was initially simply called "Blackfoot Digital Dictionary", therefore began with the digitization of the database for the third edition of Frantz & Russell's dictionary (Frantz & Russell 2017). The digitization took place in the environment created by the Algonquian Languages Dictionaries and Linguistic Atlas project (<https://www.atlas-ling.ca>). This project has already produced several digital dictionaries of Algonquian languages, with the preferred natural citation forms discussed above, some of which are born digital (Junker et al. 2012; MacKenzie & Jancewicz 2015; Junker & MacKenzie 2016; Naokwegijig-Corbiere & Valentine 2017), and some of which are based on back-digitization of print dictionaries (Ellis 2012; Hewson 2017). The structure of these dictionaries is specifically tailored to Algonquian languages, and it was relatively easy to fit the Blackfoot data with some minor adaptations. While the structure of the database itself was an easy fit, the docu-

ment from which we were working needed a lot of work before it could be imported. The basic digitization was completed in May 2016. The dictionary can be viewed at <https://dictionary.blackfoot.atlas-ling.ca>.

The rest of this paper describes the next steps toward developing what essentially started out as a digital dictionary into a website with integrated resources for the Blackfoot language, which can be used by speakers, learners, and teachers. This project is now called “Blackfoot Language Resources and Digital Dictionary” and can be viewed at <https://blackfoot.atlas-ling.ca>. We focus in particular on how we are working with a team of Blackfoot and non-Blackfoot students and research assistants on all aspects of this work in a way that is as democratic as possible and provides opportunities for everyone to contribute, learn, and be acknowledged. As described below, the adoption of a Participatory Action Research model for this teamwork resulted in some unexpected ways of moving the project forward.

In the next section, we first discuss some of the most important recent literature on ethical approaches to linguistic documentation and revitalization work with endangered Indigenous languages.

**4. Linguistics for language revitalization: on > for > with > by** There is by now a significant body of work on ethical considerations in linguistic research, much of which has appeared in the pages of this journal (see Rice 2011a; 2011b; 2012 for recent overviews). In fact, some linguists are beginning to feel the pendulum has swung too far the other way and that ethical concerns, in particular those framed from within the North American context, are preventing linguists from doing important research or, worse, from being able to respond in appropriate ways to local customs and concerns in other parts of the world (Robinson 2010; Crippen & Robinson 2013; Van Driem 2016). What is clear from these opposing voices is that considerations for doing ethical research are not universal: while there is probably a core of principles that can be reduced to “basic decent human behavior (don’t lie, don’t work without necessary permissions, treat consultants with respect, compensate them in locally appropriate ways, etc.)”, other things depend on local circumstances to such an extent that what is considered ethical conduct in one context can be unethical in another (for instance, offering cash payment when gifts are required or vice versa, or requiring illiterate consultants to sign written consent forms). For this reason, we will mainly focus this discussion of ethics in linguistic work on indigenous languages to work by authors who write from the Canadian context.<sup>5</sup>

Rice (2006) stresses the need for the linguist to be responsible towards individuals, communities, and knowledge systems (see also Dorian 2010). Based on work by Cameron et al. (1992; 1997) she distinguishes three kinds of ethical frameworks for the field linguist, each of which is seen as a development of, and usually an improvement over, the previous one. We use the prepositions *on*, *for*, *with*, and *by* as mnemonics:

<sup>5</sup>While this article was in the proofing stage, an important new publication (Bischoff & Jany 2018) became available, which we were unfortunately not able to fully take into account, with the exception of the contributions by Junker (2018) and Miyashita et al (2018).

1. “ON”: ETHICAL RESEARCH. This is traditional linguistic research on the language with individuals as subjects. The researcher is the expert who sets the research agenda and works with informants. Knowledge is created by the researcher who interprets the data. The primary ethical concern is to treat the individual with respect, ensure proper compensation and remuneration, and do no harm.
  
2. “ON AND FOR”: ADVOCACY RESEARCH. This is research on the language in which individuals and communities are both subjects and beneficiaries of the research. The primary ethical concern is to return benefits from the research to the individuals and communities with which the researcher works. Examples are a researcher who returns collected materials to the community and works on resources that benefit the community, such as thematic dictionaries, spelling systems, and teaching materials. The researcher remains the one who designs and plans the research, but the subjects become consultants rather than informants. Knowledge is mainly created by the researcher, but input from consultants is included. Rice sees such consultants as “teachers”.
  
3. “ON, FOR, AND WITH”: EMPOWERMENT RESEARCH. This is research on the language that is designed and carried out for and with individuals and communities. Crucially, this implies collaboration and consultation at all stages of the research process. When executed properly, this kind of research has no subjects in the traditional sense: all participants are consultants and collaborators. Knowledge is co-created by all participants.

Rice summarizes the main differences between the three approaches as follows: “While, in linguistic fieldwork, an ethical model refers to work on a language and an advocacy framework to work on a language and for the speakers, the empowerment framework encompasses one further step: the work is on the language, for the speakers, and with the speakers, taking into account the knowledge that the speakers bring and their goals and aspirations in the work” (2006:132). Adopting an empowerment framework can include different aspects, depending on the context. It may include an emphasis on working with research questions and methods arising from the community, efforts to train community members to become researchers, and nontraditional or nonacademic ways of validating, preserving, and communicating results.

True empowerment research may require the academic(s) to relinquish control in exactly the areas in which they have spent their entire careers becoming “experts”. Rice describes the case of an orthography project in which she realized that clinging to the idea that there had to be a standard spelling for every word was not working, given the dialect variation in the community, and resulted in a dictionary that was good for linguists but not for the community (Rice & Saxon 2002). A second example illustrates that even well-intentioned training of community members in order

to “empower” them to continue the work themselves can backfire: teachers who received linguistic training designed on the basis of the types of grammatical analysis that western linguists are typically interested in ended up creating teaching materials that were contributing to students’ understanding of the structure of the language, but not to them gaining conversational fluency (Rice 2006:147–148). Sometimes, therefore, the linguist may even have to let go of her theoretical framework: “We thus must question whether it is ethical to assume that the descriptive and theoretical models that linguists have developed for looking at language are the only models, and whether they are the most appropriate models. They may be, but if they are not, to be truly engaged in participatory research with a community means, at an abstract level, working to understand the intellectual tradition of that community and, at a more concrete level, working to develop materials that are primarily useful to that community rather than to the linguistic community” (Rice 2006:149).

Czaykowska-Higgins (2009) takes this last point one step further in her programmatic description of Community-Based Linguistic Research (CBLR), which she defines as follows:

Community-Based Language Research involves training members of the language-using community to do the research themselves, *and can have as one of its goals the aim of making redundant the presence in the community of academic linguists who are not from the community*. [...] [W]hat crucially distinguishes CBLR from all other models is that CBLR explicitly acknowledges and welcomes the extent to which linguists are trained by and learn from community-members in issues related to language, linguistics, and culture, as well as about how to conduct research and themselves appropriately within the community. Thus, CBLR is based on the recognition that community members have expertise and can be experts. Because it recognizes that linguists are neither the sole researchers nor the only experts and that their role is to be partners in a collaborative relationship in which all partners learn from each other, the Community-Based Language Research model goes further than the Advocacy and Empowering research models in *breaking down the boundary between researchers and language-users and/or community members*.

(Czaykowska-Higgins 2009:25; emphasis added)

We can therefore add a fourth ethical framework, as follows:

4. “ON, FOR, WITH, AND BY”: COMMUNITY-BASED LANGUAGE RESEARCH. This is research on the language that is designed and carried out by communities. Crucially, this requires not only collaboration and consultation at all stages of the research process, but research questions, methods, and knowledge mobilization being primarily determined by the community. Ideally the research project itself is initiated, controlled, and carried out by the community without any outside involvement. Knowledge is co-created by all participants, which may or may not include academics. The

ultimate goal is to make the professional non-Indigenous linguist superfluous (either because professional linguists are not needed for the work, or because the professional linguists are themselves community members).

Of course the reality is often much more complex than these neat categories suggest, and it is perhaps better to treat them as a continuum along which we can place individual projects. Many linguists have personally and professionally moved along this continuum in the general direction of more community-involved research (e.g., Baldwin et al. 2016), or may continue to move back and forth between different types of research or even do several kinds of work at the same time, often with the same participants. There is no contradiction in this; in long-standing trusting relationships between linguists and speakers, there is space for everyone's questions (Leonard & Haynes 2010). In addition to collaborative work prompted by community priorities (such as organizing language camps, making teaching materials or digitizing cassette tapes), it is perfectly okay for the linguist to sit down with some fluent speakers and elicit evidential markers or compound nouns for a theoretical paper, especially if the elicited material can also be used for a dictionary or other community resources.

The Blackfoot Digital Dictionary project started its life as advocacy research, motivated by the wish to return valuable vocabulary resources to the community of Blackfoot speakers, learners, and teachers in a format that would increase its usability in language revitalization efforts being developed within the communities. As mentioned above, the main impetus for this project was the observation that the print dictionary proved difficult to use for many speakers. What made the project timely were the changed circumstances in terms of language use and awareness. The Blackfoot communities are now very aware of the fact that the number of fluent speakers is in decline and that most young people are learning the language as a second language, if they are learning it at all. This makes the need for flexible teaching and learning resources more pressing than it was when the print dictionary was first published in the late 1980s.

Once the basic digitization was complete, the next step was to enhance the resource in ways that would improve its usefulness in the community. The digitization process had been handled at the University of Lethbridge by author Genee and two non-Indigenous undergraduate linguistics students, in collaboration with Junker and the technical director of her various digital projects, Delasie Torkornoo, at Carleton University. It was at this second point in the process that the project began to follow more of an empowerment model, in line with the Participatory Action Research (PAR) approach taken by Junker for her previous work on various dictionaries and integrated web resources for Algonquian languages since about 2000 (Junker 2018). We were able to assemble a team of research assistants which included Indigenous and non-Indigenous individuals with a variety of different interests, skills, and knowledge. While there still were several technical and linguistic tasks that needed to be done, it was important that the next phase to be as democratic as possible, with a view to responding as closely as possible to community needs. In order to create a work environment in which everyone felt comfortable to contribute freely to the best of their abilities, we adopted the PAR approach for this phase of the project.

The term Participatory Action Research (PAR) is used for a loosely connected set of approaches to research involving people, which have in common a desire to do research that meaningfully involves and benefits individuals, communities, and society (Chevalier & Buckles 2013; Kemmis & McTaggart 2005; McTaggart 1997; Morris & Muzychka 2002; Reason & Bradbury 2008; Wikipedia Contributors 2017). It is participatory in that it is crucially based in democratic collaborative participation of all stakeholders as equals in the process; it is action-oriented in that it seeks not just to understand society but to change it; and it is research-based in that it is both grounded in and also produces research and research questions. In the Canadian context, Junker & Luchian (2007) show that PAR is an appropriate approach for Indigenous language documentation and preservation work (see also Junker 2002; 2012; 2013; 2018). In describing the work they have done since the early 2000s in collaboration with East Cree-speaking communities in Northern Quebec, they emphasize the following three key principles of the PAR approach as applied in their work:<sup>6</sup>

1. Collaboration: Goals and methods are determined in collaboration with partners. Rice defines collaborative research or community research as “research in which participants are partners and collaborators in research of mutual interest and of usefulness to the community” (2011a:191). This is the Participation piece in PAR.
2. Success is impact: The success of the research project depends “on the positive impact [...] on language and speakers” (Junker & Luchian 2007:188). This is the Action piece in PAR. In the case of the East Cree project, collaborators included speakers, curriculum designers, and teachers, and an important component of the project was also to train interested native speakers in skills such as online database management, archiving, and sound editing.
3. Process over results: The focus is on the research process rather than on the research results. Czaykowska-Higgins goes even further in her discussion of Community-Based Language Research by equating the two: “in community-based research it is often the case that the process itself is a result” (2009:43). This is the Research piece in PAR.

In the next sections, we will describe the way the teamwork for the Blackfoot Language Resources and Digital Dictionary Project is carried out by addressing the following themes: participation/collaboration (§5), action/impact (§6), and research (§7). Each section will highlight the aspects of the current state of the project that are the result of its application.

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<sup>6</sup>We present the three pieces in reverse order to what Junker & Luchian (2007:187–188) do, in order to have them line up with the aspects of PAR that they correspond to.

**5. Participation/collaboration** The most important question here is probably: Who participates? This was not a project in which all parties had equal power from the beginning: we were the grant-holders and the other participants would be project employees on temporary or part-time contracts, who would be hired by us. In forming this team, several factors affected who would be able to participate. The most important limitation was, and is, not surprisingly, financial. Since the project is funded by a Social Sciences and Humanities Research Council of Canada Insight grant, a portion of the grant funds was earmarked for hiring students; available additional funding in the form of grants awarded to individuals and a provincial government wage subsidy program was also limited to students. By hiring mainly students, we were able to leverage the limited funds from the grant and attract significant matching funding, which allowed us to assemble two small teams in Lethbridge to work on the project for four months in the summers of 2016 and 2017; we were able to hire seven people in 2016, and four in 2017. Most, but not all, were current students. Some had already worked on the project before, and some continue to be involved in various ways.

Within these significant limitations we attempted to be as inclusive as possible. In particular, since the goal of the project is to make a resource that is useful not just for fluent speakers but also for less fluent speakers, learners, and teachers, participants were not selected on the basis of their self-reported or reputed fluency in Blackfoot. And since the resource needs to be usable for people with a range of different educational backgrounds, current students were not selected on the basis of educational achievement as expressed in standard measures such as GPA. Instead, participants were selected on the basis of their interest in and commitment to Blackfoot language revitalization.

In order to gauge, develop, and tap into such interest among students, Genee volunteered to teach a special topics course on “Indigenous language endangerment and revitalization” in spring 2016. She hoped this would bring the issue of endangered languages and language revitalization to the attention of a larger group of individuals, and that as a side effect the course could serve as a recruitment tool for the project. Genee also spoke to students in several other classes, and gave presentations in the community, on campus, and at the Treaty 7 Education Conference. All this effort together produced more interest than we were able to accommodate given financial constraints. In deciding who to hire, we first prioritized Blackfoot students over non-Blackfoot students, and second prioritized Indigenous students over non-Indigenous students. Among the non-Indigenous students who remained, we chose those with the most relevant expertise. With the remaining funds we were then able to hire two more Blackfoot speakers who were not current students. In addition to the full-time team members, there were also several volunteers and two graduate students who worked part-time on the project as part of their studies. Volunteers were not recruited: they found their own way to the project because we have work space in a building downtown, away from the main campus, that is shared with Volunteer Lethbridge, a local volunteer organization that matches volunteers with projects and

does extensive recruitment at the University of Lethbridge as well as in the general community.

As the project progressed, the Blackfoot participants recruited additional contributors whenever they felt their own knowledge of the language was not strong enough for a particular task, when they were unable to provide the needed data, or when they felt that additional validation was necessary. These additional experts were usually invited for specific tasks and were paid an honorarium and travel expenses. This additional recruitment happened entirely at the Blackfoot participants' initiative. As a result, eight additional consultants helped with the project. Short portraits of most of the team members can be viewed on the site at <https://blackfoot.atlas-ling.ca/contributors/>.

It soon became clear that there was a very wide range of backgrounds, interests, skills, and knowledge amongst the team members, and that it would require some effort to turn a group of individuals into a collaborative team and to match their skills and interests with suitable tasks. We were lucky that the project had just been assigned some dedicated space off campus in a recently renovated heritage building downtown. The space includes two individual offices for the project managers, a large lab which we furnished with six work stations, and a resource area with a printer/copier, coffee- and tea-making facilities, and a microwave, which also functioned as a break room and was kept stocked with snacks. The building, which is shared with other users, also contains meeting rooms which we were able to book for team meetings, workshops, and recording sessions. This physical setup allowed the team to work in the same space while providing break-out opportunities when needed, and its location downtown proved very convenient for the additional consultants to visit. (All consultants preferred to come to the lab rather than us visiting them in their own home.)

Two activities in the beginning of the project functioned as team-building and skills-development opportunities in the first summer: First, we organized a three-day workshop for all participants and interested individuals, led by Junker and the technical director Delasie Torkornoo. They came to Lethbridge and introduced everyone to the general project and provided training in the use of the database, techniques for audio and video recording, editing, archiving, and processing, and the use of the WordPress site. Junker also shared about her work with other language groups (East Cree and Innu) she had been working with using a PAR approach. The oral stories databases from East Cree and Innu<sup>7</sup> were found particularly inspiring, and the design for a Blackfoot one started right away at the workshop. Second, Genee took a group of people to the Saving Indigenous Languages Symposium (SILS) in Billings, Montana. None of the group members had ever been to an academic conference, and this one proved to be a very good choice. The organization was deeply embedded in local Indigenous practice, which allowed the Blackfoot members to feel at home in familiar customs and the non-Blackfoot members to learn about protocol and culture. We presented the project at the conference and learned about language activism in the U.S. This was very inspiring for all participants, and allowed everyone to acquire

<sup>7</sup><https://histoires.tshakapesh.ca> and <https://stories.eastcree.org/stories>.

a broader perspective on language revitalization. We were also able to meet with some Blackfoot language activists from Montana, who later ended up sharing some materials with us.

Once these activities were done, we needed to set the goals for the project. In the spirit of the PAR approach, goals should be set and tasks assigned as collaboratively as possible. Our overall goal was to improve the user-friendliness and usability of the website. How we would do that would depend in large part on what the collaborators, as potential users of the site, felt would improve it. Limitations of time and money meant that only a fraction of the necessary or possible work would be able to be done, and with a few exceptions of things that were absolutely necessary, it didn't matter much where we started.<sup>8</sup>

Several sets of interrelated goals emerged in the course of the summers of 2016 and 2017 and the intervening academic year. Not all were formulated initially; several came up as the work progressed, and as the Blackfoot participants in particular spoke and consulted with family and community members outside of work time. We conducted weekly team meetings, but many of these goals emerged in private conversations.

**5.1 Goals for presentation** The participants expressed as an important priority ensuring that the website was pleasant to look at and easy to use. In particular, this meant optimizing the viewing experience and the search experience.<sup>9</sup> In terms of the viewing experience, we discussed everything from color scheme, images, and font sizes, colors, and types, to placement of elements on the page and decisions about which information appears immediately and which information only emerges on mouse-over or clicking on links to additional information. Pictures were considered very important for making it look pleasant, so significant time and energy was spent collecting and adding pictures. As the year progressed, several non-Indigenous community volunteers spontaneously approached us with a request to help with the project, and many of the images were contributed by these volunteers.

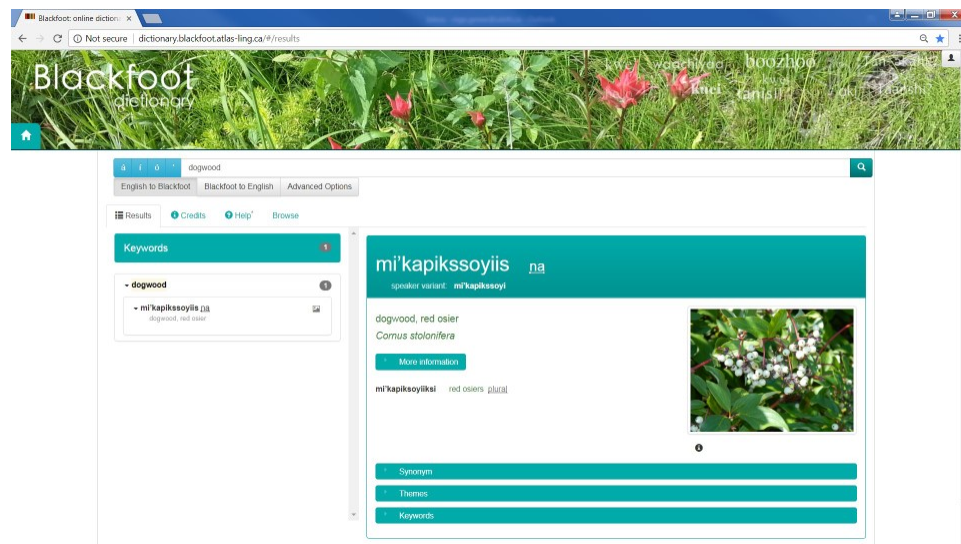
As an example, see Figure 3, which presents the entry for the noun *mi'kapikssoyiis* 'dogwood'. This entry appears after a search for 'dogwood' in the English-to-Blackfoot search bar, but will also appear on searching for 'dog' or 'wood'. The entry itself appears in a wide bar at the top, immediately followed by an acronym (na) indicating its part-of-speech; mouse-over expands this acronym to 'noun-animate'. Other information felt to be crucial is also included in the wide entry bar. In particular,

<sup>8</sup>Initially participants were quite hesitant to express their thoughts explicitly, and preferred having tasks determined and assigned to them. Given the context this was not surprising: I (Genee) was the professor/employer and they were the students/employees. That several of them were of the same age as me and had much better knowledge of the Blackfoot language and culture and/or other important skills did not factor into this relationship in the beginning. With few exceptions, they only had experience with paid work of a hierarchical type where tasks were entirely set, assigned, and assessed by a supervisor. In the course of the summer this changed, and participants began to be much more vocal about what they felt should happen, how it should happen, and who should help them do it.

<sup>9</sup>It is important to note that while the general database structure is based on the Algonquian Linguistic Atlas dictionaries, output formats are individually optimized for each language, resulting in a very different look and feel for the different dictionaries. See the dictionaries available at <https://resources.atlas-ling.ca/>.

participants felt that dialect and individual variation is very important and should be presented at the top of the entry; in this case, a speaker variant *mi'kapikssoyi* is included – further research will have to determine the nature of this variation: is it dialectal, generational, idiolectal, or other?

A photo is included as an illustration. A small icon under the picture brings up a box with metadata. As we will see below, metadata information on audio and video files is much more detailed. To the left of the image is a thinner clickable bar that reads “More information”. The participants determined early on in the process that many entries did not provide enough semantic or contextual information. The digitized database generally only contains simple translations. It was decided that encyclopedic information should be included where relevant, and it was also decided that plants were an important place to start. In particular, for medicinal and ceremonial plants, information was added regarding their use and significance. However, in order not to overwhelm the user with too much information at once, it was decided to put this information behind the clickable bar. Under this bar the user finds the diagnostic forms (inflected entries) from the original database, in this case the plural form, followed by up to five additional clickable bars with Examples, Themes, Keywords, Morphemes, and Related stems.



**Figure 3.** Screenshot for keyword *mi'kapikssoyiis* ‘dogwood’; <https://dictionary.blackfoot.atlas-ling.ca>.

Searchability was also considered high priority. As mentioned above, the original impetus for the project was what has recently been called “digital repatriation” in anthropology and museum studies (Bell et al. 2013); easy searchability is obviously required if this repatriation is to be at all successful in making the material accessible to its community of origin. Simply by digitizing the database, accessibility already improved significantly over the print dictionary. For instance, the print dictionary contains a full Blackfoot-to-English dictionary, but the English-to-Blackfoot part is

an index to the Blackfoot-to-English part. The reader finds the Blackfoot entry in the index and then has to navigate to the Blackfoot entry to get the full information. Since most users will use the dictionary to find Blackfoot translations of English words, this means there is always a two-step process. In the digital environment, this two-step process simply means clicking on any of the entries that come up in the search bar to get to the full entry.

When first opening the dictionary the landing page defaults to the Help function of the search screen (see Figure 4). An English-to-Blackfoot search can be performed immediately by typing into the search bar at the top. The Browse function gives full access to the databases that underlie the dictionary and allows for alphabetic browsing of Entries (corresponding to Blackfoot headwords in the print dictionary), Keywords (corresponding to English Index headwords in the print dictionary), and three additional databases: Themes (semantic fields), Morphemes, and Parts of Speech.

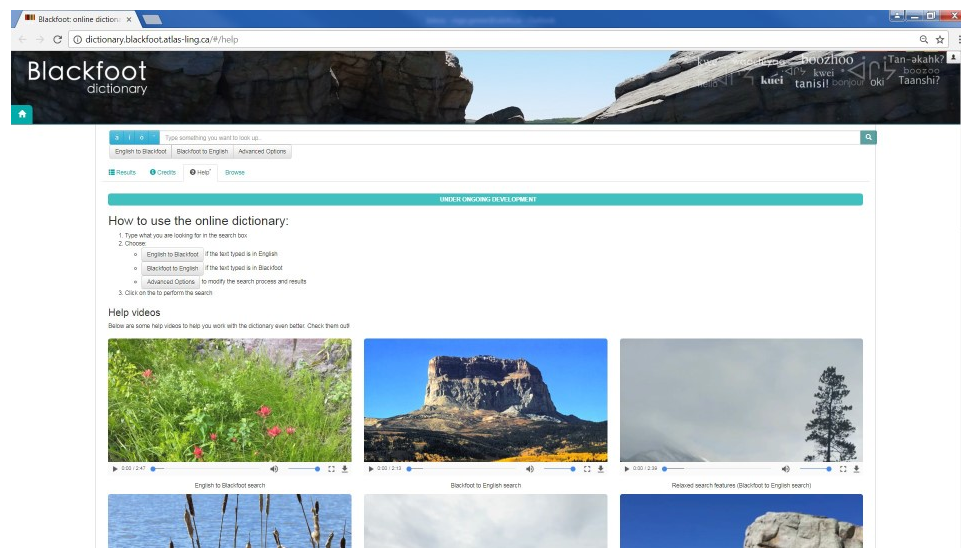


Figure 4. Screenshot for Blackfoot digital dictionary landing page; <https://dictionary.blackfoot.atlas-ling.ca>.

A simple search will, in addition to the content of the original entry in the print dictionary, also return relevant examples originally occurring in different entries. For example, one of the entries produced by a search for ‘horse’ is *óta’s* ‘horse of, mount, saddle horse’. The Blackfoot headword in the print dictionary gives two diagnostic forms as examples: *nóta’siksi* ‘my horses’ and *óta’si* ‘his horse’. Simply typing *óta’s* in the Blackfoot-to-English search bar in the online version generates fifteen additional example phrases; using the most broadly defined advanced search option generates six additional entries (headwords), eleven inflected forms, and twenty-eight examples. Frequently occurring lexical items return very large search results. For instance, a search for the element *omahk* ‘big’ returns eighty-two entries, 185 inflected forms, sixty-three examples, and seven morphemes. By using “Advanced Options”, the user can target searches by English, Blackfoot, or both by KEYWORD, DEFINITION, or PART OF SPEECH.

NITION, THEME, MORPHEME, EXAMPLE, or ALL on search strings BEGINNING WITH, CONTAINING, ENDING WITH, WHOLE WORD, and EXACT WORD. The team members in the second summer created a set of short Help videos to explain this for dictionary users.

The development of all these features required regular interaction and active feedback between the Lethbridge team and the team designing the Algonquian dictionary digital infrastructure at Carleton. As a result, the Carleton team was able to further develop new features and creative solutions for all Algonquian Dictionaries. For example, the Blackfoot dictionary interface development that took place in 2016 directly influenced the admin interface design of the Nishnaabemwin dictionary, which was completed in 2017.<sup>10</sup>

One of the reasons why the print dictionary is difficult to use has to do with orthography. A standard spelling system was designed and officially accepted by the nations, but not many people are fully proficient in its use. The standard Blackfoot spelling system contains several features that can easily result in misspellings and therefore may impede the ability to search for an item if the user doesn't get the spelling exactly right. After some experimenting it was decided to implement a default "relaxed search" in the Blackfoot-to-English search bar. This feature ignores pitch accent marks on vowels (á, í, ó),<sup>11</sup> geminates (double vowels and consonants), and glottal stops (represented in the spelling as <'>). Thus, for example, the headword *óta's* will also be found by typing *ottaas*. A drawback of this approach is that, especially with very short words, sometimes the search produces a large number of irrelevant results; to avoid this, the search can be limited to a specific spelling with the use of the advanced search option EXACT WORD.

The discussions around spelling revealed that correct spelling is not a high priority for many Blackfoot speakers and learners. This is not surprising, given how much priority is usually given to the spoken language. Misspellings are not something that many people care much about. The training sessions on spelling did provide an important opportunity to talk about the sound system of Blackfoot and how it differs from English. Several participants brought in school materials that use different spelling systems that aim to provide a pronunciation guide for learners whose first language is English and who only know English spelling rules. Such materials often write voiceless stops /p, t, k/ as <b, d, g/gh> due to their unaspirated character, the vowel /a:/ as <ah> and /a/ as <u> depending on context, /i/ and /i:/ as <e> or <ee>, and may omit glottal stops (represented by <'> in the standard spelling) and velar/palatal fricatives (represented by <h> in the standard spelling) altogether. In addition, to facilitate pronunciation, the syllables are sometimes separated by spaces. To give an example, the word /pi:ta:ki:/ 'Eagle Woman' (a name) would be spelled as *piitaakii* (omitting accent marks) in the standard orthography but as *bee daa ghee* or something similar in alternative systems. Blackfoot language teachers sometimes have heated discussions about the best way to spell Blackfoot, but for our participants it was important to

<sup>10</sup><https://dictionary.nishnaabemwin.atlas-ling.ca>

<sup>11</sup>See Fish & Miyashita (2017) for an attempt to visualize pitch melodies on Blackfoot words for second language learners.

show respect for both sides, since both types of writing are considered to have been created by experts: the standard orthography by a well-respected linguist, and the other systems by highly respected fluent speakers and elders with a long track record of teaching the language with a focus on oral proficiency. We therefore decided to include both. The standard orthography is kept at the main level, since that is how the dictionary already works and it would be an impossible task to change existing spellings. In addition, a standardized orthography will facilitate the creation of materials that can be used across all communities. The default “relaxed search” feature de-emphasizes correct spelling and allows users to find words even when they are not entirely sure of the spelling. In addition, however, an extra field was created called “pronunciation guide”, in which alternative spellings can be added. Since most alternative spelling systems aim to aid the learner in correct pronunciation of new words, this seems an appropriate way to conceptualize it; it will also provide a place where pronunciation differences can be recorded. An example can be seen in Figure 7 in §5.3 below.

Another reason why the print dictionary is difficult to use has to do with the relationship between words and lexical items, as discussed in §3 above. In order to partially mitigate this, the default Blackfoot-English search will return not only entries, but also inflected forms, morphemes and examples. Thus, if a user doesn’t know how to break up a word into its component parts in order to look for a specific lexical item, they could simply start to type the whole word or expression; as long as this expression occurs as a full form anywhere in the database the search will return it, and the user can link back to the entry headword in this way. For instance, if a user doesn’t know that the noun stem meaning ‘daughter’ begins with *i-* and instead starts to type *nitana*, several results will be returned, some of which are irrelevant, but one of which is *nitána* ‘my daughter’; clicking on this will lead back to the headword *itán*. Again, the advanced search options offer several ways to limit the search parameters to reduce the number of irrelevant results.

**5.2 Goals for content** Several goals for the content of the site emerged from our discussions. In particular, participants expressed a need for changes and additions to the Themes, richer translations, cultural information, and foregrounding dialect differences and other kinds of language variation.

A database of Themes (semantic fields) had been extracted from the original digitized file. In this file many, but not all, Blackfoot headword entries were accompanied by up to three semantic codes that served to classify them thematically. This information is not represented at all in the print dictionary. Thematic dictionaries can be very useful for teaching purposes, and thematic dictionaries for Indigenous languages are particularly important, because, when done well, they can allow locally relevant semantic categories to emerge from the language itself, and in that way help to give a better insight into the way in which a particular language approaches the world (Mosel 2004; 2006; 2011; Visitor et al. 2013; see also the glossaries of specialized vocabulary at <http://www.innu-aimun.ca/english/specializedvocab/>). Well-chosen, culturally appropriate themes can also help with the collection of additional material in

fieldwork settings. The original themes were not explicitly based in ethnosemantics, but some of them were clearly Blackfoot-specific, such as a “clans/political groupings”, “hide preparation”, “hunting”, and “horses and tack”. Much work on themes in the dictionary remains to be done. The participants felt that it was very important, and proposed some changes and additions for immediate implementation. Here we mention the addition of the themes “names” and “traditional values”, and the splitting of the theme “plants” (renamed from “flora”) into several subthemes including “ceremonial plants”, “food plants”, and “medicinal plants”. In the second summer one of the participants decided to add a new Theme, “Two-Spirit”, and conducted interviews with several speakers around gender and sexuality terms; this material is not yet ready for publication. While we were only able to make a small beginning with this work, it is clear that it is important and should be prioritized in future work.

Participants also expressed a desire for “better translations”. It took a series of discussions to discover what that meant and how it could best be approached. We decided to prioritize two recurring themes: encyclopedic information and literal translations.

Encyclopedic information is included behind the “More Information” bar whenever it is felt to be necessary. As illustrated in Figure 3 in §5.1 above, this might include cultural information such as the use and preparation of medicinal plants, the creation and use of specific clothing items, preparation of traditional foods, etc. Some work in this area was begun depending on participants’ interest, but it is obviously a potentially endless project that will never be truly complete.

Literal translations reveal what speakers sometimes call the “root meaning” or “deeper / underlying meaning” of a word. For instance, the word *áipakkohtamm* refers to a tractor in the Kainai dialect, but to a motorcycle in the Piikani dialect. This makes sense once you know that the literal meaning of this word is ‘it makes a chugging sound’ (*á-ipakk-oht-amm* IMPF-break-sound-3). The original database already contains quite a few of these literal translations; we decided to make attempts to include such information more systematically where available and to present it prominently immediately following the translation, as can be seen in Figure 5.

Cultural information was also considered very important. In fact, the importance of culture informed all our discussions of other aspects of the website and dictionary, and it became clear that for the Blackfoot participants and their consultants, culture and language are inseparable. The addition of encyclopedic information and literal translations discussed above go some way towards including culture, but other desiderata were expressed as well, in particular stories. A separate story archive has now been added to the site and can be viewed at <http://stories.blackfoot.atlas-ling.ca/>. How to best link oral stories in this archive to dictionary items is a question for future work. One way to do this would be to use sentences as illustrations for particular entries in the dictionary. We did this with a set of written stories published in Russell & Genee (2014), which includes a Blackfoot-English glossary that was based on a full morphological analysis. An example can be seen in Figure 8 in §5.3 below.

Finally, dialect variation was considered very important. The Blackfoot participants on the team represented two different dialects, Kainai and Piikani. They would

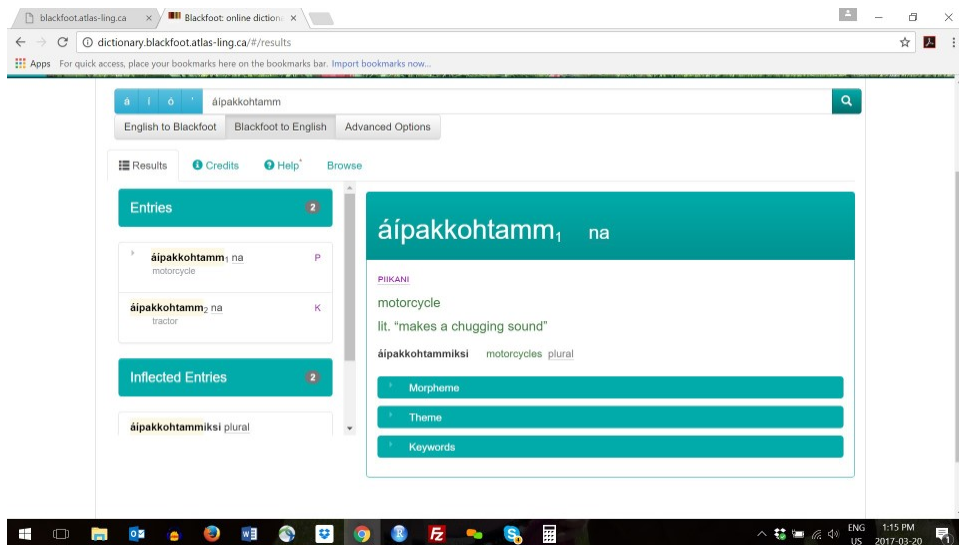


Figure 5. Screenshot for keyword *áipakkohtamm*<sub>1</sub> ‘motorcycle’ (Piikani dialect); <https://dictionary.blackfoot.atlas-ling.ca>.

often work on specific tasks together in a separate room, discussing similarities and differences in how they would translate or pronounce a specific word or phrase. The differences that emerged were generally small from a linguistic point of view, but richly meaningful for the participants. The print dictionary does mark dialect-specific lexical items or pronunciations where this information is available; items without dialect information are considered common to all dialects. The participants decided that dialect variation should be represented prominently. We began by seriously considering whether the dictionary should be split into four separate dictionaries, one for each dialect. We looked at examples of Algonquian dictionaries which have such splits along dialect lines, such as the Eastern James Bay Cree web dictionaries at <https://dictionary.eastcree.org/words>, which have separate dictionaries for the Northern and Southern dialects. The participants decided that this would go too far. They see the Blackfoot language as one language, which can be represented in one dictionary, as long as dialectal differences are clearly marked where relevant. It was decided to include, where relevant, a marker of dialect in a contrasting color (purple) directly under the entry bar above the English translation. In addition, a one-letter abbreviation would appear following entries returned by searches in the search bar on the left. Both these features can be seen in Figure 5 above. It was also decided that metadata for audio files would include an indication of the dialect of the speaker. This is discussed in more detail in §5.3 below.

In addition to dialect variation, it became clear over time that there was a need to be able to indicate several usage aspects of words that would affect when they would or would not be appropriate. The participants proposed six optional entry labels, which are now available to be added to any lexical item as needed: “archaic”, “taboo”, “slang”, “vulgar”, “name”, and “euphemism”. While we have not yet been

able to implement these labels, the proposed labels will form the starting point for work in this area.

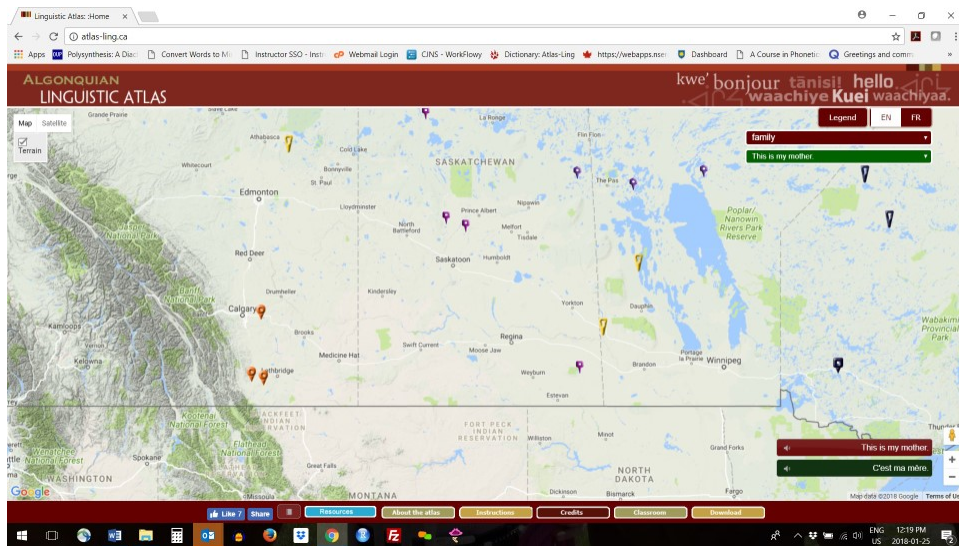
**5.3 Goals for enhancement** In addition to goals for presentation and content, several goals for enhancement were identified. All the goals that were identified by the participants as high priority had already emerged in previous discussions we had had with teachers, speakers and community members over a period of a few years as we were conceptualizing the project, and they were part of the original project proposal. These enhancements included audio, video, and images.

The highest priority was, not surprisingly, assigned to the addition of audio. There was broad agreement that the best dictionary would be a talking dictionary. Ideally, the user should be able to click on every word or phrase in the dictionary and hear it pronounced, preferably by several speakers representing different dialects, genders, and generations. The Blackfoot participants also decided that audio clips should be pronounceable words and phrases rather than the headword entries themselves, most of which, as explained in §3 above, are stems that do not form complete words without additional inflectional or derivational morphology. They also felt strongly that learning isolated words does not contribute to language learning and that it would be better to begin with the recording of simple but complete phrases. During the first training workshop we held in the spring of 2016, Junker had introduced the team to several online dictionaries of the Algonquian Dictionary project that contain audio and online oral stories databases (East Cree and Innu; see Junker et al. 2016). She had also introduced the Algonquian Linguistic Atlas project, on which a large number of Algonquian languages are represented and which includes audio clips of simple phrases in several semantic domains such as Family, Greetings, Feelings, Numbers, etc.<sup>12</sup> The Blackfoot team members were very keen to see their own dialect of Blackfoot represented on this map. A Siksika speaker had already been added earlier (work by Heather Bliss with speaker Noreen Breaker), and they wanted to have Kainai and Piikani represented as well. It was therefore decided to begin with the phrases for the Algonquian Linguistic Atlas. These would then do double duty as they could be added to the atlas as well as the dictionary. Three full sets of these phrases have been collected so far, one for Piikani and two for Kainai. The Piikani phrases and one of the Kainai sets have now been added to the Algonquian Linguistic Atlas, so that all Canadian dialects are now represented, as shown in Figure 6.

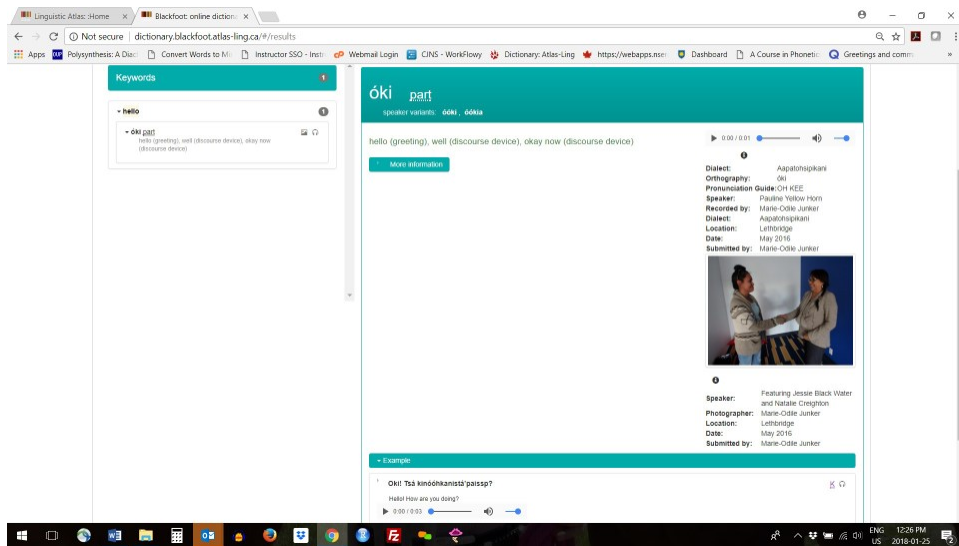
The process by which these phrases were recorded deserves some comment. The Blackfoot participants in the project, who, as mentioned, represented two dialects, began by translating the phrases into Blackfoot in a joint effort that served to highlight similarities and differences between their dialects. They also consulted informally with speakers in their home community, either in person or by phone. None of the participants were fully proficient in the standard orthography, so they wrote the phrases as they heard them. (We later provided standard spellings.) They then began to record the phrases. This resulted in the recruitment of additional consul-

<sup>12</sup>See <https://atlas-ling.ca>.

tants, as they felt better speakers were needed for all or part of the recordings. These consultants were invited as guests and paid an honorarium for their time.



**Figure 6.** Screenshot for part of Algonquian Linguistic Atlas home page; Blackfoot is represented by round red pins. Siksika Blackfoot is located to the east of Calgary. Kainai Blackfoot is located to the southwest of Lethbridge. Piikani Blackfoot is located to the west of Lethbridge (west of Fort Macleod, not marked on the map); <https://atlas-ling.ca>.



**Figure 7.** Screenshot for keyword *óki* ‘hello’ etc. with expanded metadata for audio and picture; <https://dictionary.blackfoot.atlas-ling.ca>.

Correct acknowledgement of all contributions was considered crucial, so we developed an extensive set of metadata forms (Bliss et al. 2017a; 2017b). An example can be seen in Figure 7, which includes the metadata for the audio clip attached to the entry *óki* ‘hello’ etc. The form allows for the separate acknowledgement of the speaker, recorder, and submitter of the data; it also includes fields for dialect, orthography, and pronunciation, as well as place and date of recording. These metadata forms are flexible and additional fields can easily be added whenever needed. Additional acknowledgement is provided on the main site, where each contributor has a small bio with a picture.<sup>13</sup>

As mentioned in §5.1, images were considered important in an effort to make the resource friendly for children (see Figures 3 and 7). Many photos have already been collected and added. Two special kinds of illustrations deserve additional mention. The first is a set of images created by local artist William Singer III Api’soomaahka to clarify kinship terms and family relations in graphic form (Mizumoto 2016; Mizumoto & Genee 2018). Blackfoot kinship terms notoriously do not map directly onto English terms, and alternative ways to clarify their meaning are needed as the English glosses given in the dictionary are sometimes too terse. In particular, for several terms the gender of ego needs to be specified rather than gender of the referent, and relative age of both is also included in the meaning. Figure 8 shows the entry for *ihsiss* ‘younger sibling of female’. The image allows the user to see how a female ego (*niistówa* ‘I/me’) would refer to a younger brother or sister (*nissíssa* ‘my younger sibling’).

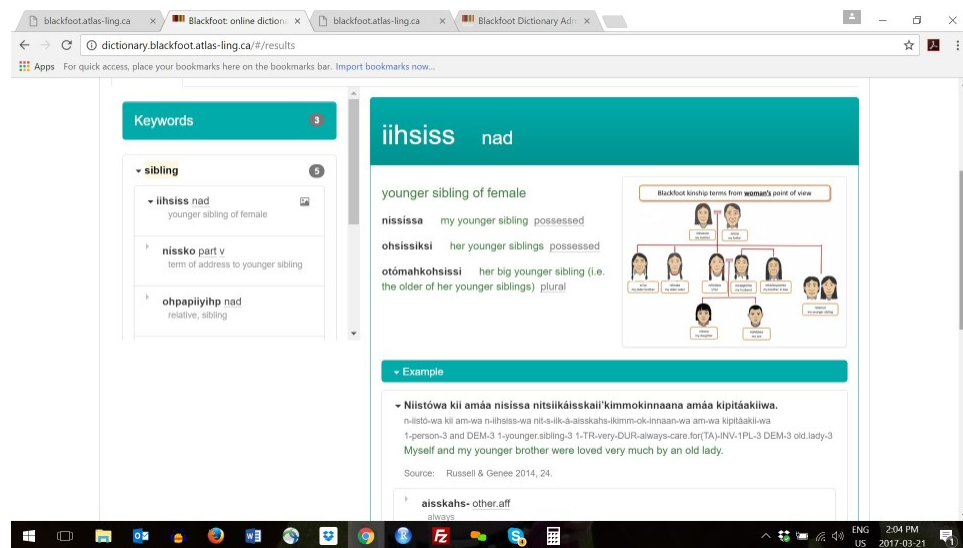


Figure 8. Screenshot for keyword *ihsiss* ‘younger sibling of female’ with family tree image; <https://dictionary.blackfoot.atlas-ling.ca>.

<sup>13</sup>See <https://blackfoot.atlas-ling.ca/contributors/>.

A second type of illustration resulted from discussions about how to represent the meaning of verbs visually. The participants suggested that we could make very short (2–3 seconds) video clips to illustrate basic verbs such as ‘walk’, ‘eat’, etc. Figure 9 shows the entry for the animate transitive verb *sonai’sskip* ‘kiss’, which includes a short video clip of one of our consultants kissing her grandson. In addition to being useful, the making of these micro video clips provided some much-needed fun in our work.

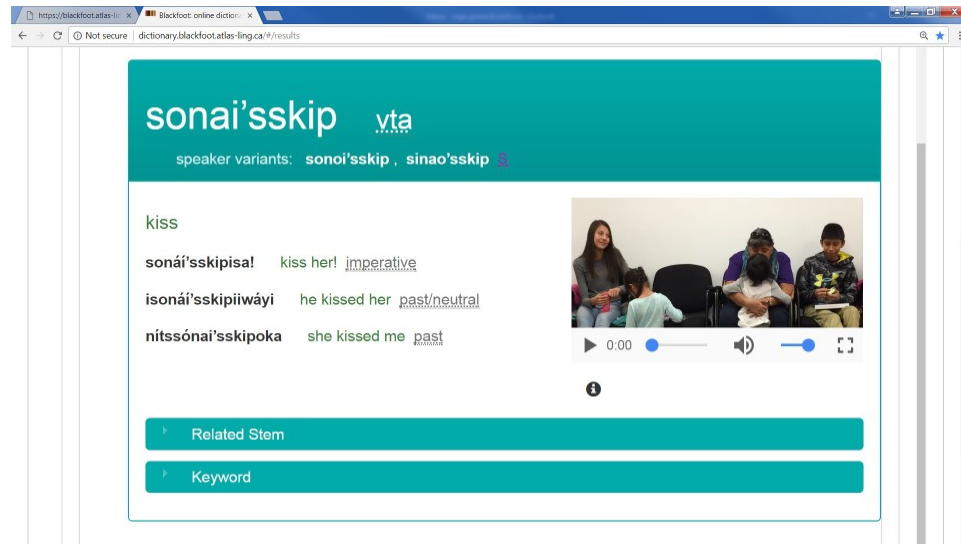


Figure 9. Screenshot for keyword *sonai’sskip* ‘kiss’ with micro video; <https://dictionary.blackfoot.atlas-ling.ca>.

Collecting and adding additional media files will be high priority for the next phase of the project.

Additional enhancements can be found outside of the dictionary proper on the main site and include Grammar pages, a Story archive, an archive of Resources related to the Blackfoot language, and a Blog.

**6. Action/impact** The action piece in PAR work can be interpreted as the extent to which “the process and results are useful to community members in making positive social change and promoting social equity” (Rice 2011a:190). In this respect a project can be considered successful to the extent that it does indeed have such an impact. Junker & Luchian (2007) measure the impact of their East Cree web databases by tracking such things as usage statistics (including page views and downloads), numbers of teachers trained to use the resource in the classroom, and information requests from the public. Their collaborators included speakers, curriculum designers, and teachers, and an important component of the project was to train interested native speakers in skills such as online database management, archiving, and sound editing.

Ultimately, the Blackfoot Language Resources and Digital Dictionary project will be successful insofar as it has a positive impact on the Blackfoot language and its speakers and learners. It is too early to be able to assess such impact in general terms, and it will always be difficult to measure. We do not yet have informative usage statistics available. In the past year the Piikani recordings for the Linguistic Atlas have been used for immersion camps at a local school in Brocket. The dictionary and the Atlas recordings are starting to be used in postsecondary courses at the University of Lethbridge and in spoken Blackfoot courses in the communities. A local teacher is using the resource in Blackfoot language and culture courses at a high school in Lethbridge.

Rather than discussing the impact of the project on society in general, or on the total community of Blackfoot speakers, we will mention a few small ways in which the project has had a positive effect on its participants. We will focus on awareness, respect, knowledge, and skills.

The existence of the project and the knowledge that money was being spent on developing resources for the Blackfoot language contributed to an awareness of the importance of the Blackfoot language not just to its own community but to the wider world. Participants learned about similar struggles and initiatives in other communities as well as success stories and possible ways forward. Some of them expressed a new commitment to try and speak more Blackfoot with their own children or grandchildren, and/or to expose their children and themselves to more fluent speakers to practice the language. As Jessie Black Water expresses it in her contributor profile on the website: “This project has reconnected me more to our language and has also inspired me to continue my journey with working with the Blackfoot language.” Rachel Hoof wrote on her profile: “One of the greatest learning opportunities was working with fluent Blackfoot speakers. They have ignited my motivation to re-learn my Blackfoot language.” After the summer work was over, Rachel continued to work on relearning her language by doing a Mentor-Apprentice style co-op project. For some people the project was the first opportunity they had had to learn that language loss “is a thing” that is worthy of discussion, study, and exploration of solutions; it became a place where they were able to express their thoughts on the effects of language loss on them as individuals and community members and to see it in its wider context beyond what is taking place in Blackfoot country. Awareness has to precede action, so in that sense the project was impactful in that it provided a safe space to talk about language loss for the people involved in it. This applied to the non-Blackfoot participants just as much as to the Blackfoot participants.

Respect was relevant in two ways: respect for dialect differences and respect for cultural differences. Respect for dialect differences was fostered by explicitly focusing on geographic and generational variation and emphasizing that our task was to record and describe this variation in as much detail as possible rather than judging it. We attempted to create a non-prescriptive atmosphere in which discussion of differences was encouraged. This was not always successful, as some Blackfoot speakers have very strong opinions on what is and isn’t “good Blackfoot” and who speaks it. (See also Chatsis et al. 2013, Miyashita & Chatsis 2015 and Miyashita et al. 2018 for

an experience handling dialect differences in a Blackfoot language classroom.) For example, one of our external consultants insisted that Christians could not be good Blackfoot speakers, because being a fluent speaker requires adherence to traditional Blackfoot spiritual ways. While this sometimes required negotiation, the core participants, who stayed with the project during the summers of 2016 and 2017, acquired a better understanding of the nature of variation within the language.

Respect for cultural and personal differences was also needed in order to enable the team to work collaboratively. Team members came from a variety of different cultural, educational, and personal backgrounds and ranged in age from early twenties to early fifties. Some had family or other commitments that sometimes kept them off campus. Some preferred to work regular 9-to-5 days, others were not early starters and would come in in the middle of the morning and leave later. Several preferred to work from home on some days. Some had strong skills in one area and weaker skills in another. Through having team meetings and encouraging team members to ask and offer help to others, they got to know each other better and developed an understanding of each other's backgrounds and work habits. Pauline Yellow Horn formulates this very beautifully in her contributor profile on the website: "I have learned and gained a huge amount of experience working on this project and have made some lifelong friends who have shared their knowledge and expertise with me that I will keep dear to my heart." Myles Shirakawa, a fourth-generation Japanese-Canadian who was involved with the project for two summers, expressed his appreciation for the opportunity to learn more about the people in whose territory he grew up through the project: "I am forever grateful for the experience to have worked on this project and to the other project members and speakers who have so willingly and patiently shared their language, culture, and knowledge with a *tsaapiniikoana* ['Japanese person'], like me."

Knowledge and skills were developed through both group and one-on-one training. The empowering effect of appropriate relevant training cannot be underestimated (Genetti & Siemens 2013). Training was focused on knowledge and skills needed for participants to work on the project, but also on those that would benefit them in the future. Speakers improved their knowledge of Blackfoot writing and a better understanding of the principles behind the standard orthography. Everyone acquired or improved general computer skills, skills in data archiving and processing, and skills in database management and editing. Depending on individual interest, team members also learned about doing fieldwork such as eliciting new words, about webpage editing, about audio and video recording and editing, and about various linguistic aspects of the Blackfoot language. Jessie Black Water explains in her profile that she has learned more about Blackfoot from conducting language consultation sessions: "Through this project I was able to work with my mother, Kim Black Water, to go over and record phrases. [...] I took each session with her as an opportunity to learn more about Blackfoot, especially with the pronunciation of words and phrases."

Perhaps the best way to measure the effect of the project on individual participants is to see where it took them after the summer project finished: one of the speakers got a job teaching Blackfoot at a local high school; one of the speakers and her con-

sultant were encouraged to enroll in a locally offered Canadian Indigenous Language and Literacy Development Institute (CILLDI) program (offered through the University of Alberta) and are now working toward a Community Linguist Certificate; a graduating student got a job with a language testing company; two other students are continuing the study of Blackfoot in advanced course work; the PhD and MA students connected to the project were able to meet additional consultants for their theses and establish long-term working relationships; the PhD student got a one-term sessional teaching job at the University of Lethbridge; one of the team members got a research assistant job for another project; and several team members are considering pursuing graduate studies.

**7. Research** As alluded to in §4 above, for some practitioners of PAR and related community-based approaches, research is conceptualized in ways that may differ rather radically from what is normally considered to constitute academic research activity. This may take the form of focusing on the research process rather than the result, or even equating the two (Czaykowska-Higgins 2009). Perhaps as a result of this radical rethinking of the research enterprise, approaches such as Participatory Action Research and Community-based Research are sometimes mistakenly regarded as community service rather than research (Rice 2011a:194–198). While there certainly is a service aspect to PAR, and while it certainly often makes sense to treat the process as a result, PAR also does constitute real research. Rice gives many examples of research questions that can be answered by means of the results of community-based collaborative research, as well as new research directions that emerge from such work. In this section we will give some examples of how the Blackfoot Language Resources and Digital Dictionary project builds on existing research, itself constitutes research, and gives rise to new research and research questions in different areas: Part-of-Speech labeling and Blackfoot stem structure (§7.1) are matters of interest to Algonquianists and comparative and historical linguists; ethnosemantics and thematic categories are of interest to speakers, community members, and anthropological linguists (§7.2); language variation is of interest to speakers, community members, and dialectologists (§7.3). We focus here deliberately on the type of research questions that would easily be recognized as constituting research in the traditional scholarly sense. We leave the discussion of ways in which aspects of the process itself can be seen as research results, or the project requires us to rethink what constitutes research, for future consideration.

**7.1 Part-of-Speech labeling and Blackfoot stem structure** As can be seen in several of the images taken from the on-line dictionary (see, e.g., Figures 3, 5, 7, 8, 9), each Blackfoot headword entry is followed by a word class label, such as **na** (animate noun), **vta** (transitive animate verb), or **part** (particle). In the first version of our online dictionary these category labels were simply copied from the input database, and were identical to the labels in the print dictionary (Frantz & Russell 1995; 2017). However, several of these labels are now in need of reconsideration.

Some of this work is fairly straightforward. For instance, obligatorily (inalienably) possessed noun stems (mostly kinship terms and body parts) had a category label **nar** (animate relational noun) or **nir** (inanimate relational noun) in the original database. While this is not incorrect, the custom in Algonquian linguistics is to call such nouns ‘dependent’ rather than ‘relational’ and use the abbreviations **nad** and **nid**. In order to bring the Blackfoot dictionary in line with Algonquianist custom, and the general convention being developed for the Algonquian Dictionaries project we are part of, we have relabeled these dependent nouns accordingly. The online version shows the new labels (with mouse-over spelling them in full and links to explanatory pages, following a format adopted in our Algonquian Dictionaries infrastructure).

A slightly more complicated example relates to the labeling of verb stems. Verbs in Algonquian languages come in four main types: **vai** (animate intransitive – an intransitive verb with an animate notional subject); **vii** (inanimate intransitive – an intransitive verb with an inanimate notional subject); **vta** (transitive animate – a transitive verb with an animate object); and **vti** (transitive inanimate – a transitive verb with an inanimate object) (Bloomfield 1946; for Blackfoot see Frantz 2009; 2017:Chapter 7; Genee 2016:1079–1081; Russell et al. 2012:58–61). These labels conform to those in the print dictionary. It is common in Algonquian linguistics to divide **vai** verb stems into two subclasses: a class of truly intransitive verbs which can never take an object (e.g., *soka’pssi* ‘be good/nice’) and a class of verbs which can, somewhat paradoxically, occur with an object while being inflected as an intransitive verb (e.g., *ooyi* ‘eat’). Such verbs are often labelled **vai+o** (animate intransitive plus object – an intransitive verb with an animate notional subject plus an object which is not cross-referenced on the verb; see also Frantz 2009:41). This class is not distinguished in the print dictionary. Our digitized database has allowed us to begin to separate such verbs and provide them with the correct label, again bringing the dictionary more in line with dictionaries of related languages. This work is being done in several phases. The first phase is complete and consisted of a search for verbs with particular endings, which always indicate a **vai+o** stem. A second phase will include other verbs by checking whether the dictionary contains any example sentences that include an object. A third phase will involve fieldwork with fluent speakers to ascertain whether remaining suspected **vai+o** verbs can occur with an object. (For a more complete discussion of Algonquian standards for verb labeling and classification see Arppe et al. 2018.)

Other relabeling issues involve morpheme classes known as medials and finals in Algonquian linguistics, the nature of numeral stems, and how to properly distinguish pronouns from clitics. While this is not the place to further discuss these highly technical matters in detail, it is important to point out that these questions, which are central concerns in Algonquian linguistics, were both prompted by the digitization project and will be tackled using the data generated by it. Our goal is a dictionary that is as much as possible organized and presented in a way that makes it comparable with other dictionaries for Algonquian languages, in order to facilitate future comparative and historical work.

**7.2 Ethnosemantics and thematic categories** As mentioned in §5.2 above, a set of semantic codes was imported from the original database. Each Blackfoot headword entry is accompanied by up to three of such codes. The list of currently available semantic classes can be seen by choosing the browse function and selecting Themes.<sup>14</sup> Some of these categories are perhaps more grammatical than lexical, and more likely to be of interest to linguists, such as a class currently called “factivity/truth/possibility/ability” which includes several items with (mostly epistemic) modality and polarity meanings, and a class currently called “aspect/tense/duration” which includes lexical and grammatical items relating to the expression of time. Classes such as “change of state” and “cognition” are most likely to be of interest to a linguist working on event structure or verb classes. Other categories are more of a general nature and include classes like “kinship”, “body parts”, “plants” (renamed from “flora”), etc.

Ethnosemantics (Kephart 2006) is an approach to semantics that takes its cues as much as possible from the language under investigation as well as its speakers rather than imposing classifications from outside. Semantic categories emerging from the language itself would include such areas as kinship systems, in which the names given to specific family members provide an indication of how kinship relations are conceptualized. As we saw in §5.3 above, Blackfoot kinship terminology includes distinct terms for older and younger siblings of males and females, suggesting that siblings have different roles in the family depending upon relative age and gender. Semantic categories emerging from speakers of the language require an investigation of what speakers feel belongs together in terms of groupings or classifications. This is sometimes called folk taxonomy (e.g., Otieno et al. 2015). Several culturally-specific semantic classes are already distinguished in the existing list, such as “hunting”, “horses and tack”, “hide preparation”, and the Blackfoot participants in our project proposed several new ones, such as “traditional values”, “names”, “dances”, and the subdivision of plants into medicinal, ceremonial, edible, and other plants. In the summer of 2017 one of the Blackfoot participants proposed a new theme “Two-Spirit”, which would include the few terms the dictionary contains that pertain to this area, plus new words as they arose from a set of interviews with Elders and members of the Blackfoot Two-Spirit community. This work is ongoing and has not yet been made public, as it requires a fairly intense consultation and validation process.

The collaborative nature of the teamwork made it clear that this semantic work is very meaningful and important to the Blackfoot participants and deserves a much more systematic investigation. As far as we are aware this work has not yet been undertaken for Blackfoot, but this type of work has been successfully conducted for the East Cree language (Junker et al. 2013; Junker 2014; Visitor et al. 2013a; 2013b), so we already have a model and a method that could be adapted to the Blackfoot language. The project has thus so far served to raise this as a research question fitting a PAR approach, and the data generated by it will assist in the investigation.

<sup>14</sup><https://dictionary.blackfoot.atlas-ling.ca/browse>.

**7.3 Language variation** Variation based on dialect, age, gender, and other social factors has not been systematically investigated for the Blackfoot language, although there is some work that refers to it (see §2 above). The collaborative work on the dictionary has made it clear that such variation is very important to speakers and deserves a more thorough exploration (see §5.2 above). Some of the data generated for inclusion on the Algonquian Linguistic Atlas as well as the Blackfoot Digital Dictionary will allow us to begin the study of contemporary dialect differences in terms of pronunciation and morphology. Four complete sets of identical phrases have been collected to date, of which three are currently visible on the Atlas. Even a cursory glance reveals some important patterns of variation in the pronunciation of several phonemes, phoneme clusters, prefixes and suffixes, as well as some variation in inflectional morphology. This large set of comparable data will give new impulse to this work (Genee et al. 2017).

Some of the data generated or re-examined for the project contains lexical variation that deserves closer inspection and explanation. In §5.2 above we mentioned the word *áípakkobtamm*, which literally means ‘it makes a chugging sound’, and can be used to refer to a motorcycle or tractor depending on dialect. Deeper implications are attached to a word like *Isttsinaiksistsiko* lit. ‘ration day’, which can refer to either Tuesday (Piikani) or Thursday (Kainai) depending on when rations were handed out by the Indian agent. This lexical difference provides some window onto life in the early reserve period and experience with colonization that can be investigated further by asking people with knowledge in this area to tell stories or provide additional information.

**8. Conclusion** This article has demonstrated how collaborative teamwork based on principles grounded in the Participatory Action Research (PAR) framework has resulted in important new directions for the Blackfoot Language Resources and Digital Dictionary project. Using PAR as a guide to the work done by a team of participants has allowed a project that began its life as advocacy research, i.e., a digital repatriation project, to develop in the direction of empowerment research. Spending time and energy early on in the process on team building and training, and working throughout on finding ways for every team member to contribute on aspects of the project that were most important to them, paid off by producing a large amount of high-quality work. Intensive consultation and collaboration within the team resulted in optimal viewing and search capabilities for the dictionary, new directions for improved and innovative content, and a clearer vision for enhancement features that will allow the resource to be useful in local language maintenance and revitalization efforts. Participants gained awareness, respect, knowledge, and skills, which also translated into concrete results in the form of employment or further education. New research questions were generated by the project; these include both practical and applied questions as well as fundamental and theoretical questions.

**Attributions** In this section we present, in alphabetical order, the names of every person involved in the project up to the final writing stage of this article (February 2018). In brackets behind each person we give an indication of their role and contribution. In doing this we build on ideas around attribution presented in the Contributor Roles taxonomy developed by the Consortia Advancing Standards in Research Administration Information (CASRAI 2015) and follow our own developing ideas about attribution and authorship (Bliss et al. 2017a; 2017b). Funding for this project was provided by the Social Sciences and Humanities Research Council of Canada (Grant numbers # 435-2015-1082 and # 435-2014-1199), the Province of Alberta Summer Temporary Employment Program (STEP), the Chinook Summer Research Award Program, the University of Lethbridge SSHRC Undergraduate Summer Research Award Program, and the Jacobs Research Fund.

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- Kim Black Water (speaker on audio recordings, translation)
- Heather Bliss (story archive (lead), media collection, transcription, translation, data analysis)
- Peter Chief Calf (speaker on audio recordings, translation, validation)
- Natalie Creighton (consultation, validation)
- Shirlee Crowshoe (speaker on audio recordings, translation)
- Francis First Charger (University of Lethbridge Elder in residence)
- Don Frantz (lexical database, funding acquisition, data analysis)
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- Kristen Healy (media processing)
- Rachel Hoof (media collection and processing, visualization)
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- Janine Jackson (media collection and processing, resource pages, bibliography)
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