

itwêwina

<https://itwewina.altlab.app>

**Towards a morphologically intelligent and user-friendly on-line dictionary of
Plains Cree – next next round**

Antti Arppe¹, Jolene Poulin¹, Eddie Antonio Santos^{1,2}, Andrew Neitsch¹, Atticus
Harrigan¹, Katherine Schmirler¹, Daniel Hieber¹, Ansh Dubey¹ & Arok
Wolvengrey³

¹ Alberta Language Technology Lab, University of Alberta

² Canadian Indigenous Languages Technology Project, National Research
Council of Canada

³ First Nations University of Canada

21st Century Tools for Indigenous Languages Partnership Project

- <http://altlab.artsrn.ualberta.ca>
- <https://21c.tools/>
- Developing “low-hanging fruit” software for Indigenous languages
 - (1) intelligent electronic dictionaries (I-DICT)
 - (2) easily searchable, linguistically analyzed databases of spoken recordings and written texts
 - (3) intelligent spell-checkers (+ grammar-checkers) and keyboards, and
 - (4) intelligent computer-aided language learning applications (ICALL)
- Intelligent
 - make use of language technology
 - to deal with the complex word structure

Acknowledgements

- Numerous native (Plains) Cree speakers and Elders
- Cree language instructors
 - Miyo Wahkohtowin Education → Maskwacîs Education Schools Commission (MESC)
 - First Nations University of Canada
 - Wayne Jackson / nêhiyawêwin word of the day
- Long-standing, continuing, meticulous lexicographical work by Arok Wolvengrey
 - nêhiyawêwin : itwêwina / Cree : Words
- Funding through multiple grants from SSHRC, UAlberta, and Kule Institute of Advanced Study
- Support by National Research Council (NRC)
- Enduring encouragement
 - Arden Ogg (CLN), Earle Waugh (AECD), Ahmad Jawad (Intellimedia), Trond Trosterud, Sjur Moshagen, Lene Antonsen (Giellatekno/Divvun)

Spoken dictionary of Maskwacîs Cree

Mary Jean Littlechild, Louise Wildcat, Jerry Roasting, Harley Simon, Annette Lee, Arlene Makinaw, Rosie Rowan, Rose Makinaw, Kisikaw, Betty Simon, Brian Lightning, Brian Lee, Linda Oldpan, Mariam Buffalo, Debora Young, Ivy Raine, Paula Makinaw, Norma Linda Saddleback, Renee Makinaw, Atticus Harrigan, Katherine Schmirler, Dustin Bowers, Megan Bontogon, Sarah Giesbrecht, Patricia Johnson, Timothy Mills, Jordan Lachler & Antti Arppe

Maskwacîs Education Schools Commission (MESCC)

Morphological intelligence – rich word structure (English vs. Plains Cree)

- *see*
 - *sees*
 - *saw*
 - *seen*
 - *seeing*
 - *I see* ∅ *I see it* *I see him/her*
- *wâpiw* 's/he sees ∅'
- *wâpahtam* 's/he sees *it*'
- *wâpamêw* 's/he see *him/her*'
 - *kiwâpamin* 'You [one] see me'
 - *ê-wâpamiyan* 'You [one] see me'
 - *kiwâpaminân* 'You [one] see us'
 - *ê-wâpamiyâhk* 'You [one] see us'
 - *kiwâpaminâwâw* 'You all see me'
 - *ê-wâpamiyêk* 'You all see me'
 - *kiwâpaminân* 'You all see us'
 - *ê-wâpamiyâhk* 'You all see us'
 - ...
 - and up to 500 other core forms
 - plus thousands more complex forms (with 1-N preverbs)
- *pê-wâpamêw* 's/he comes and sees him/her'
- *nikî-nitawi-wâpamâw* 'I went and saw him/her'
- ...

Community/User feedback → initial design decisions

← Language instructors, feedback sessions, CILLDI courses delivered in 2020, feedback emails

→ simple, but extendible

- Automatic handling of both Cree and English as search language
- Showing only most essential core information first
 - But full lexicographical and other details easily accessible
- Plain (English) terminology as primary
 - But linguistic terminology/analysis easily accessible

Meeting expectations – Fall 2020 → Fall 2021 → Fall 2022

- Facebook: *nêhiyawêwin* word of the day – what linguistic help do people ask for?
 - Cree naming
 - What is the Cree word for X (English concept)?
 - Good start → multiword concepts
 - Cree phrases
 - How do I say X (English phrase) in Cree?
 - Step-wise through looking up paradigms → direct linking of English phrases to matching Cree word forms
 - Cree syllabics
 - How do I write X (Cree word) in Cree syllabics?
 - Done
 - Cree pronunciation
 - How do I say X (Cree word) in Cree?
 - Available for a part of the dictionary entries → increasing coverage of the Cree entries → adding fully spoken paradigms for select entries ← native speakers + synthesized
 - Cree-to-English translation
 - What does X (Cree word) mean in English?
 - good start → improving fuzzy matching

Meeting expectations – Fall 2020 → Fall 2021 → Fall 2022

- On-line dictionary as a language learning/instruction tool
 - Cree word building
 - What are little Cree words made up of?
 - Showing inflectional morpheme boundaries, in paradigms and throughout
- Meeting the needs and expectations of multiple user communities
 - (Spoken paradigms ← spoken examples are highly valued by Cree communities)
 - Community identity
 - user can select dictionary or speech community (→ spoken examples)
 - Cree-to-English content added from Alberta Elders' Cree Dictionary ← highly valued by Cree communities in Alberta
 - Fully implemented optionality for different user groups
 - user can select preferred format for any feature with multiple available options

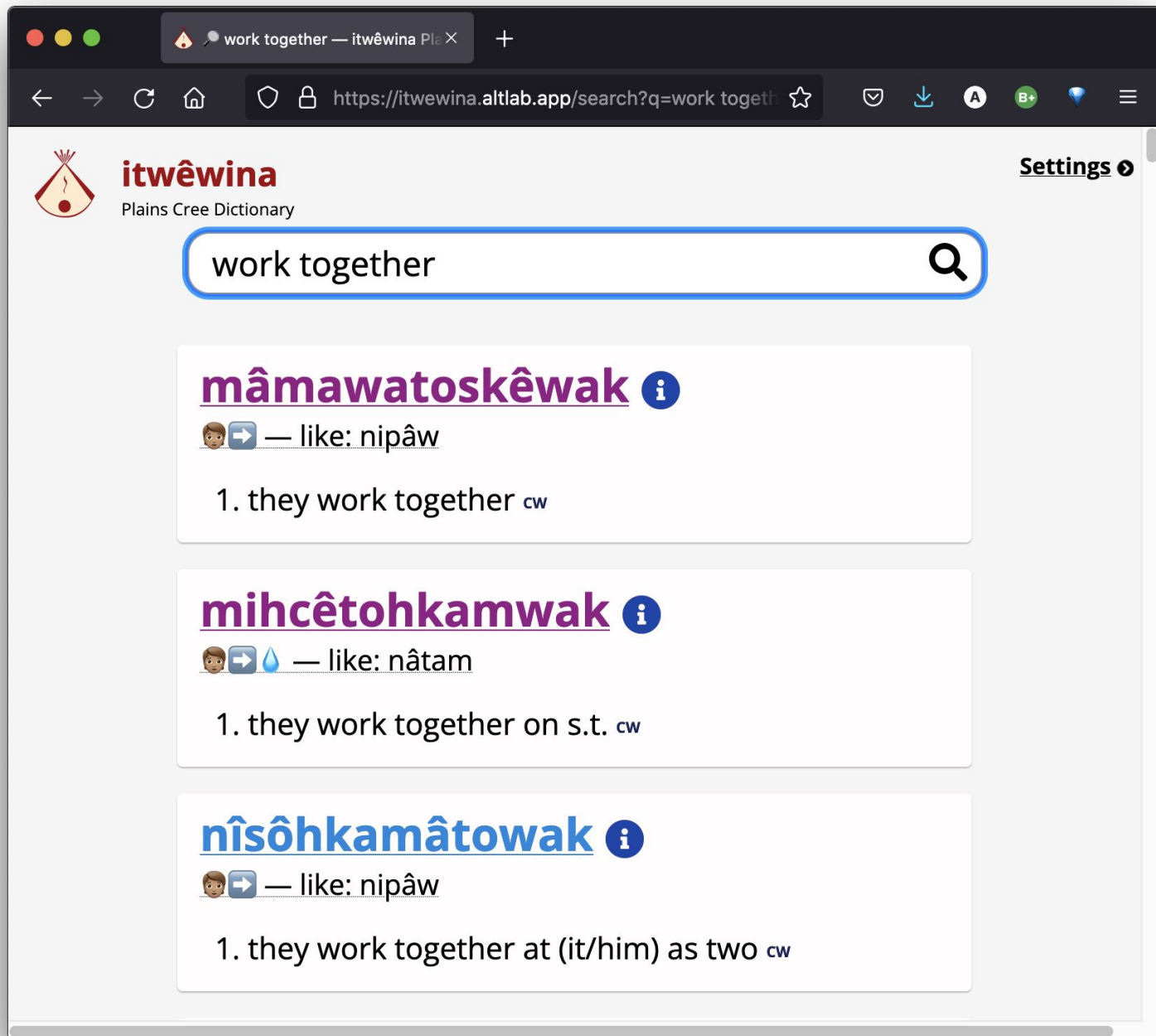
Meeting expectations – Fall 2020 → Fall 2021 → Fall 2022

- Devices/Contexts
 - Most users have majority language keyboards → diacritic characters present a challenge
 - Mobile gadgets, rather than desktops or even laptops
 - Designing for the smaller screens
 - mobile, non-physical keyboards → typing of characters even more fuzzy
 - Internet connectivity is not guaranteed ← in particular in remote communities
 - Most users in Indigenous language communities have Android rather than iOS mobile devices

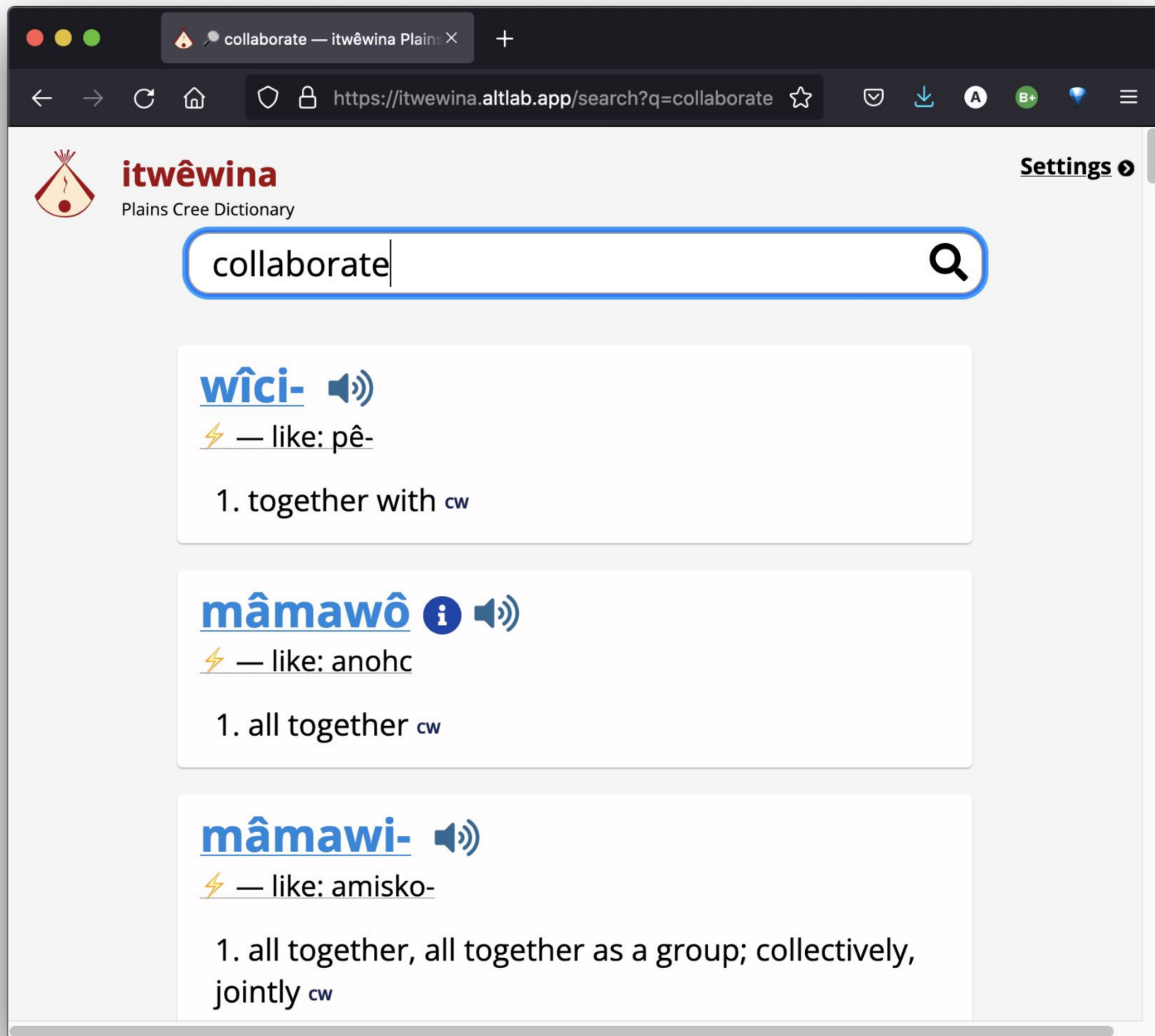
Developments up to Fall 2022

What is the Cree word for X?

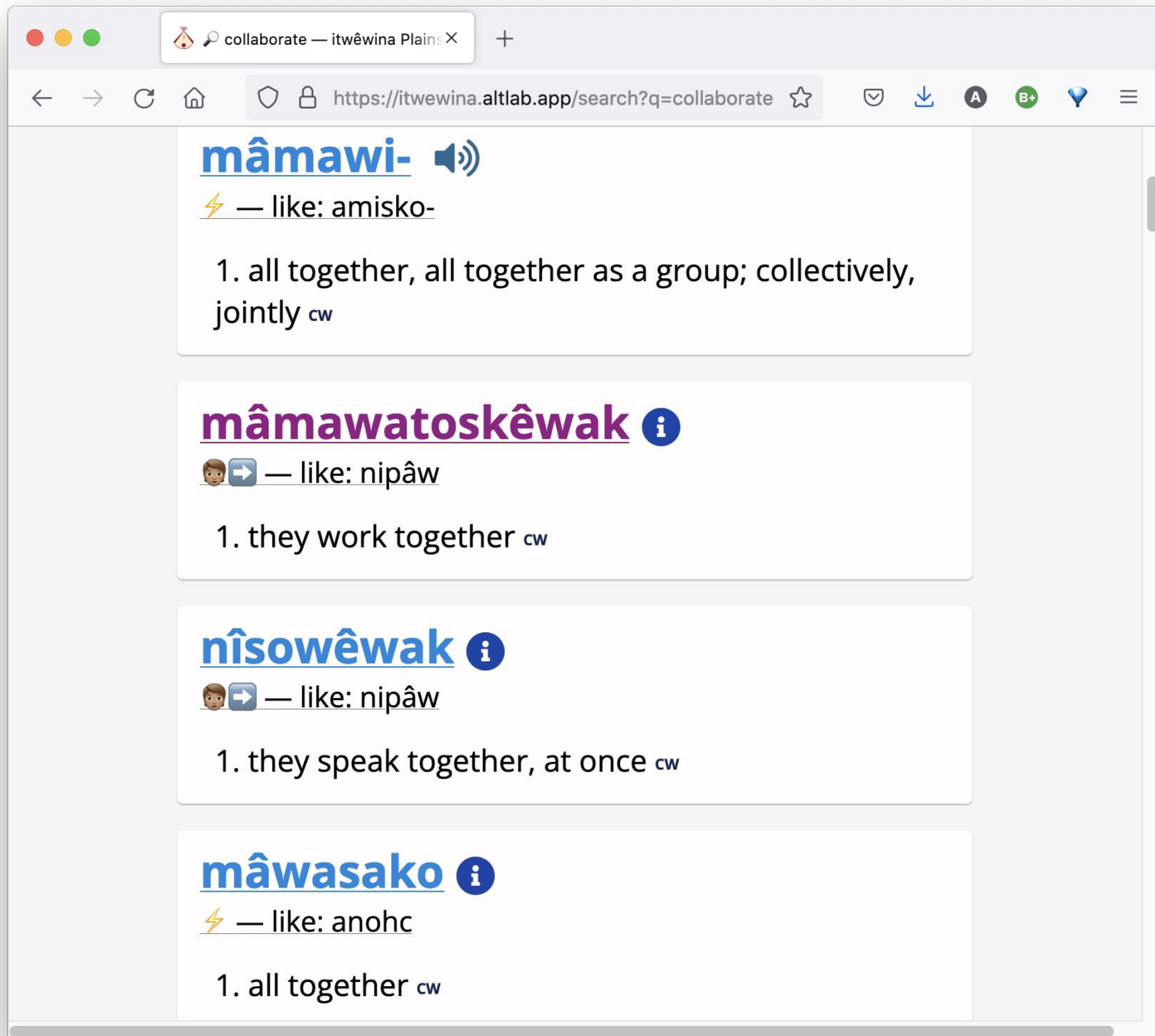
- multi-word searches
- “missing” rare words
- synonyms



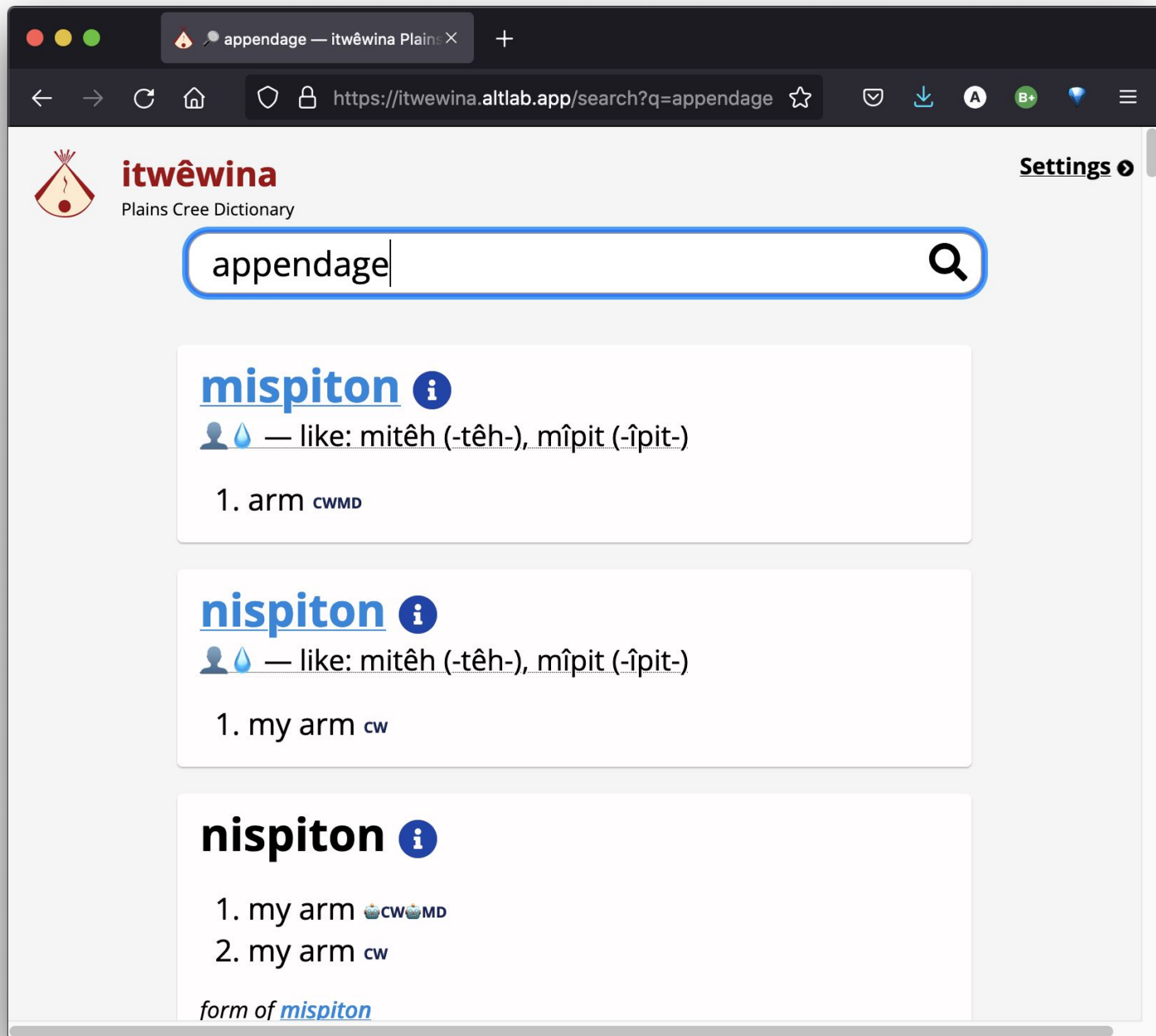
Searching with a multi-word expression: ***work together***



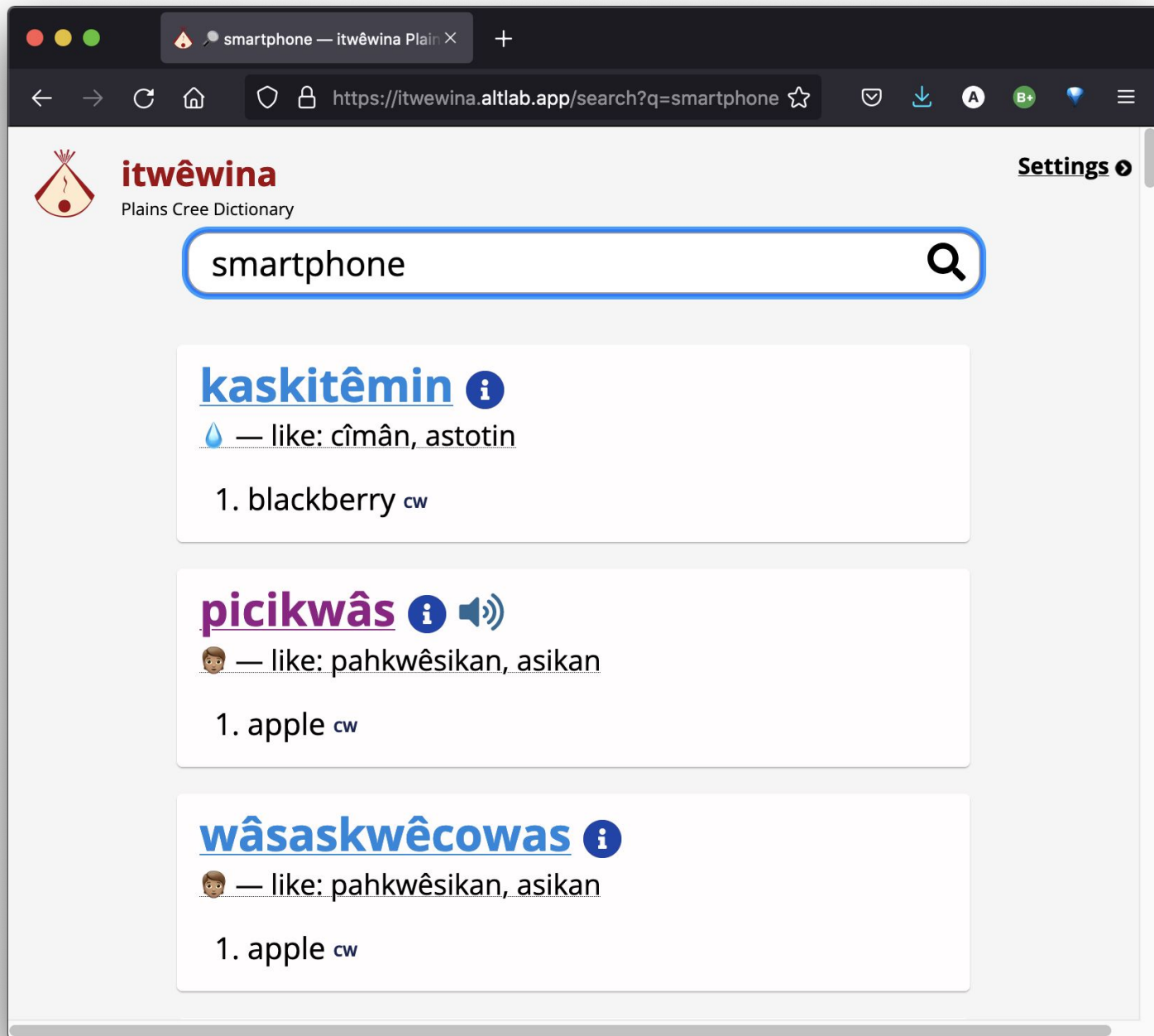
Searching with a rarer/synonymous word not in the English definitions: **collaborate**



Searching with a rarer/synonymous word not in the English definitions: **collaborate**



Searching with a rarer/synonymous word not in the English definitions: **appendage**



Searching with a rarer/synonymous word not in the English definitions: **smartphone**

How was this improvement to search achieved?

- Using multiple criteria to rank the relevance of the search results
 - edit-distance
 - occurrence in glossaries of introductory Cree textbooks
 - corpus-based frequency
 - morpheme frequency
 - user survey of relevance ranking of search results
- semantic vectors (trained on huge English corpora with billions of words ← Google News Corpus)
 - applied to search words, and
 - English definitions

How do I say X in Cree? – Part 1

- Matching simple English phrases directly with most frequent/central Cree word-forms

Click
headword
for
paradigms
and other
information

The screenshot shows a web browser window with the URL <https://itwewina.altlab.app/search?q=make+some>. The page header includes the **itwêwina** logo and the text "Plains Cree Dictionary", along with a "Settings" link. A search bar at the top contains the text "make someone work". Below the search bar, three results are displayed:

- atoskêwinihkêw** ⓘ
👤 ➡ — like: nipâw
1. s/he makes work (for someone) *cw*
- atotêw** ⓘ
👤 ➡ 👤 — like: nakatêw
1. He tells him or them to do some work. *MD*
2. s/he makes a request of s.o., s/he asks s.o. to do something; s/he engages s.o. for something, s/he employs s.o.; s/he commands s.o. *cw*
- atoskahêw** ⓘ
👤 ➡ 👤 — like: wîcihêw

Searching with an English multi-word concept: ***make (someone) work***

atotêw — itwêwina Plains Cree

https://itwewina.altlab.app/word/atotêw/?paradigm

itwêwina
Plains Cree Dictionary

Settings

Search in Cree or English

atotêw

👤 ➡ 👤 — like: nakatêw

VTA-4: transitive animate verb – class 4

1. He tells him or them to do some work. **MD**
2. s/he makes a request of s.o., s/he asks s.o. to do something; s/he engages s.o. for something, s/he employs s.o.; s/he commands s.o. **CW**

► Show plain English labels

	ni-/ki- word	ê-/kâ- word
<i>I → you (one)</i>	kitatotitin	ê-atotitân
<i>I → him/her</i>	nitatotâtaw	ê-atotak
<i>I → you (all)</i>	kitatotitinâwâw	ê-atotitakok

Looking up an inflected word-form in the paradigm: ***I made them work***

atotêw — itwêwina Plains Cree

https://itwewina.altlab.app/word/atotêw/

itwêwina
Plains Cree Dictionary

Settings

Search in Cree or English

atotêw

👤 — like: nakatêw

VTA-4: transitive animate verb – class 4

1. He tells him or them to do some work. **MD**
2. s/he makes a request of s.o., s/he asks s.o. to do something; s/he engages s.o. for something, s/he employs s.o.; s/he commands s.o. **CW**

▼ Show linguistic labels

	Ind
1s → 2s	kita
1s → 3s	nita
2s → 1s	kita
2s → 3s	kita

- Plain English labels
- Linguistic labels**
- Nêhiyawêwin labels

Changing the paradigm labeling to **linguistic (scientific)**

atotêw — itwêwina Plains Cree

https://itwewina.altlab.app/word/atotêw/

itwêwina
Plains Cree Dictionary

Settings

Search in Cree or English

atotêw

👤👤 — like: nakatêw

VTA-4: transitive animate verb – class 4

1. He tells him or them to do some work. **MD**
2. s/he makes a request of s.o., s/he asks s.o. to do something; s/he engages s.o. for something, s/he employs s.o.; s/he commands s.o. **CW**

▼ Show nêhiyawêwin labels

<i>niya</i> → <i>kiya</i>	Plain English labels
<i>niya</i> → <i>wiya</i>	Linguistic labels
<i>kiya</i> → <i>niya</i>	Nêhiyawêwin labels
<i>kiya</i> → <i>wiya</i>	

Changing the paradigm labeling to plain **nêhiyawêwin**

atotêw — itwêwina Plains Cree

https://itwewina.altlab.app/word/atotêw/?paradigm

something happened earlier

	ni-/ki- word	ê-/kâ- word
<i>I → you (one)</i>	kikî-atotitin	ê-kî-atotitân
<i>I → him/her</i>	nikî-atotâw	ê-kî-atotak
<i>I → you (all)</i>	kikî-atotitinâwâw	ê-kî-atotitakok
<i>I → them</i>	nikî-atotâwak	ê-kî-atotakik
<i>I → him/her/them</i>	nikî-atotimâwa	ê-kî-atotimak

	ni-/ki- word	ê-/kâ- word
<i>you (one) → me</i>	kikî-atosin	ê-kî-atosiyan
<i>you (one) → him/her</i>	kikî-atotâw	ê-kî-atotat
<i>you (one) → we (but not you)</i>	kikî-atosinân	ê-kî-atosiyâhk
<i>you (one) → them</i>	kikî-atotâwak	ê-kî-atotacik
<i>you (one) → him/her/them</i>	kikî-atotimâwa	ê-kî-atotimat

	ni-/ki- word	ê-/kâ- word
<i>we (but not</i>	kikî-atotitinân	ê-kî-atotitâhk

Looking up an inflected word-form in the paradigm: **Past+I+them** → *I made them work*

How do I say X in Cree? – Part 2

- What is the Cree word-form that corresponds to a simple English phrase?
- Is there a better solution than paradigm lookup?

itwêwina
Plains Cree Dictionary

Settings

I made them work espt:1

nikî-atotâwak ⓘ

Preverb : **kî-** ⓘ

form of [atotêw](#)

atotêw

👤 ➡ 👤 — like: nakatêw

1. He tells him or them to do some work. MD
2. s/he makes a request of s.o., s/he asks s.o. to do something; s/he engages s.o. for something, s/he employs s.o.; s/he commands s.o. CW

kocipayihtâw ⓘ

👤 ➡ 💧 — like: kisihtâw

Looking up with a simple English phrase: *I made them work* → *nikî-atotâwak*

when I make them work espt:1

atotakwâwi ⓘ

1. when I tell them or them to do some work. 🗨️MD
2. when I make a request of them, when I ask them to do something; when I engage them for something, when I employ them; when I command them 🗨️CW

form of [atotêw](#)

atotêw

👤👤 — like: nakatêw

1. He tells him or them to do some work. MD
2. s/he makes a request of s.o., s/he asks s.o. to do something; s/he engages s.o. for something, s/he employs s.o.: s/he commands s.o. CW

Looking up with another simple English phrase: ***when I make them work*** → ***atotakwâwi***

my many bears espt:1 — itwê X

https://itwewina.altlab.app/search?q=my many be

itwêwina
Plains Cree Dictionary

Settings

my many bears espt:1

niwâkâyôsak ⓘ

1. my black bears. MD
2. my bears CW

form of [wâkâyôś](#)

wâkâyôś

— like: pahkwêsikan, asikan

1. A black bear. MD
2. bear CW

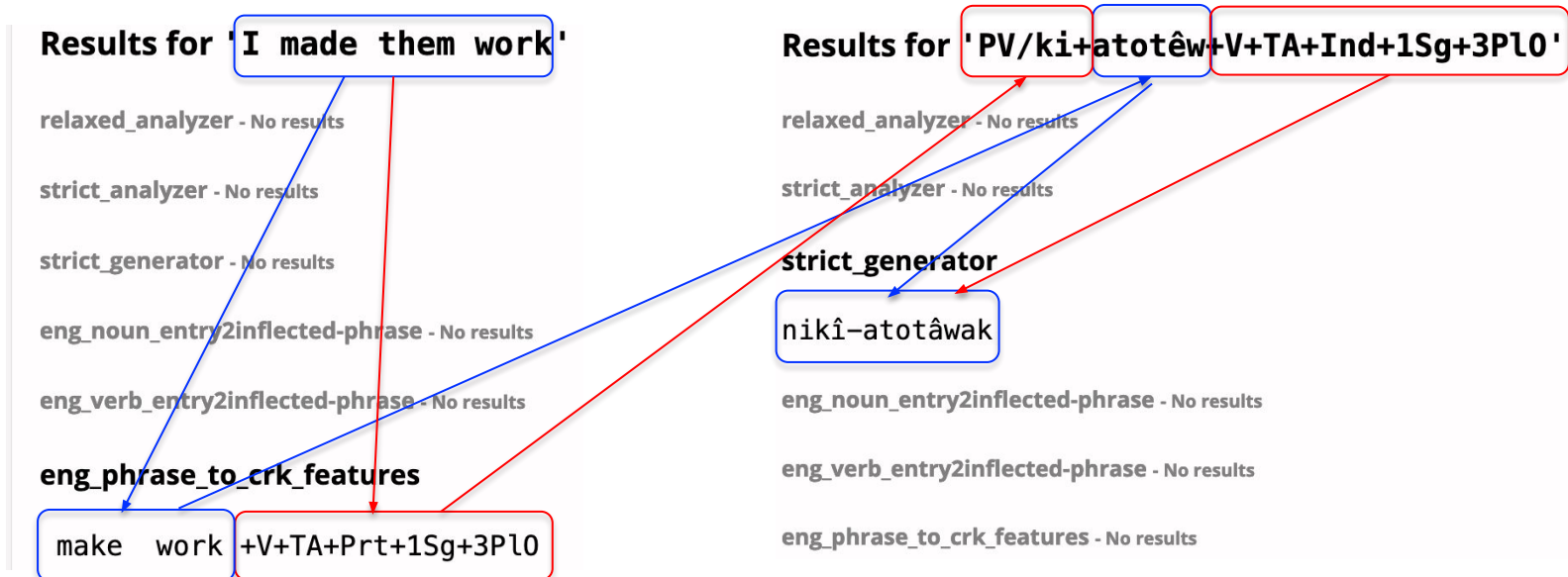
wâkâyôś ⓘ

1. a little black bear; a little literally: a little crooked

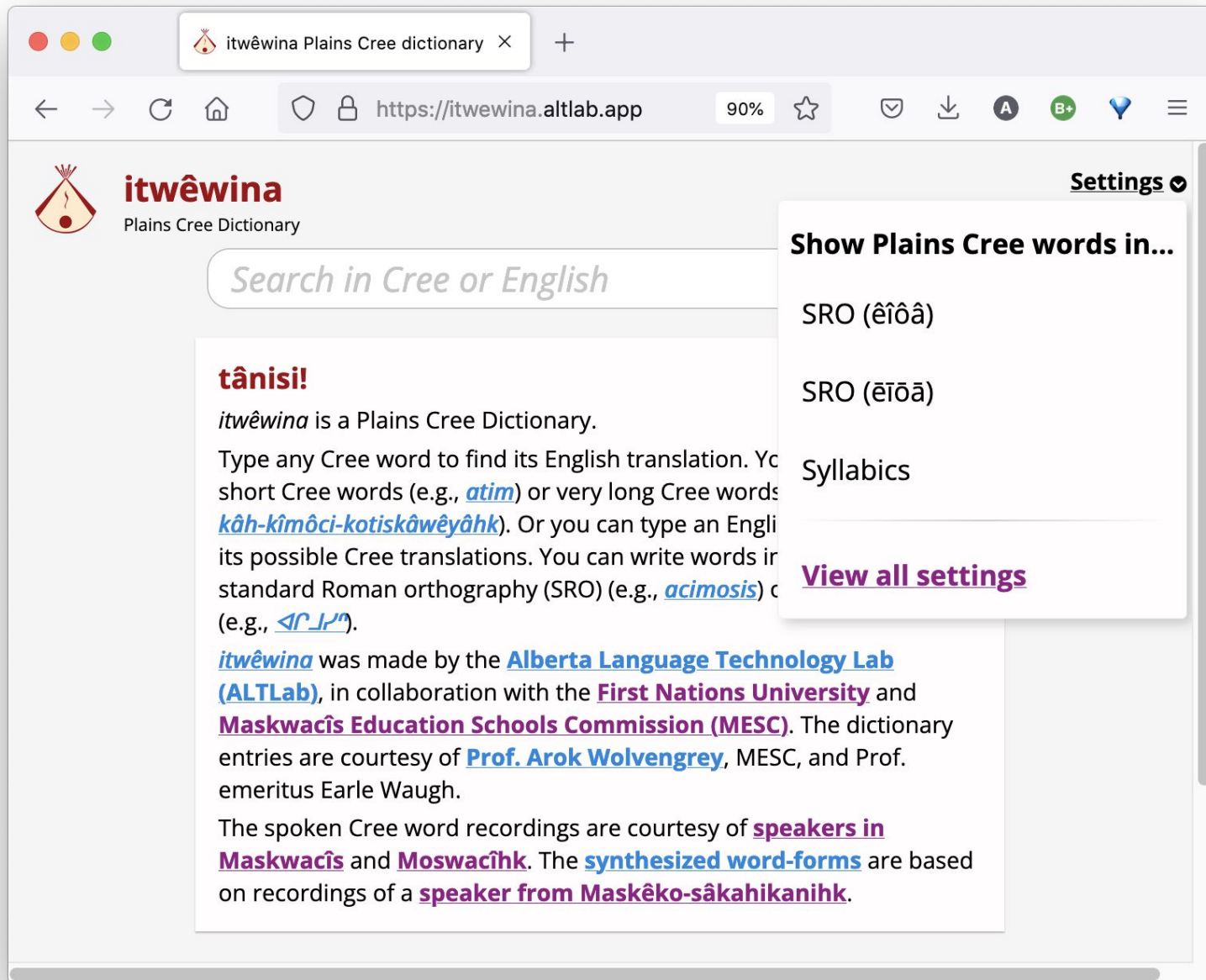
Looking up with a simple English phrase: **my many bears** → **niwâkâyôsak**

How is this achieved?

- A computational model for the analysis of simple English phrases
- These are matched with the Cree word-forms in the full paradigms



How is this functionality selected? → Settings



The screenshot shows a web browser window with the address bar displaying `https://itwewina.altlab.app`. The page title is "itwêwina Plains Cree dictionary". The website header includes the "itwêwina" logo and the text "Plains Cree Dictionary". A search bar with the placeholder text "Search in Cree or English" is visible. The main content area displays the word "tânisi!" and a description of the dictionary. A "Settings" button with a checkmark is located in the top right corner. A dropdown menu is open from the "Settings" button, showing the following options:

- Show Plains Cree words in...
- SRO (êôâ)
- SRO (ēōā)
- Syllabics
- [View all settings](#)

The main content area contains the following text:

tânisi!

itwêwina is a Plains Cree Dictionary.

Type any Cree word to find its English translation. You can type short Cree words (e.g., [atim](#)) or very long Cree words (e.g., [kâh-kîmôci-kotiskâwêyâhk](#)). Or you can type an English word to find its possible Cree translations. You can write words in standard Roman orthography (SRO) (e.g., [acimosis](#)) or in syllabics (e.g., [ᐱᑕᐢᓄᐢᓂᓴ](#)).

itwêwina was made by the [Alberta Language Technology Lab \(ALTLab\)](#), in collaboration with the [First Nations University](#) and the [Maskwacîs Education Schools Commission \(MESC\)](#). The dictionary entries are courtesy of [Prof. Arok Wolvengrey](#), MESC, and Prof. emeritus Earle Waugh.

The spoken Cree word recordings are courtesy of [speakers in Maskwacîs](#) and [Moswacîhk](#). The [synthesized word-forms](#) are based on recordings of a [speaker from Maskêko-sâkahikanihk](#).

itwêwina Plains Cree dictionary

+

←

→

↻

🏠

🔒

https://itwewina.altlab.app/s

📄

90%

☆

📧

⬇️

A

B+

🔗

☰

Automatically translate English phrases into Cree word-forms

☒ **Yes**

Generate Cree word-forms matching simple English verb or noun phrases

☐ **No**

Only show dictionary entry headwords as they are


Automatically translate Cree word-forms into English phrases

☒ **Yes**

Generate English definitions matching core Cree word-forms

☐ **No**

Only show dictionary definitions as they are

[Help](#) 

[Legend of abbreviations](#)

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[Settings](#)

View search results with:

[Plain English labels](#)

[Linguistic labels](#)

[Plains Cree labels](#)

Simple English phrase translation (coverage)

- Verb phrases (linguistic labels)
 - Subject
 - first/second/third person singular/plural/obviative, unspecified
 - Object
 - first/second/third person singular/plural/obviative, unspecified
 - Tense/aspect
 - Present, Past (**kî-**), Future Definite (**ka-**), Future Intentional (**wî-**), Future Conditional, Infinitive/Irrrealis (**ka-/ta-** + Conjunct), Imperative (Immediate + Delayed)

Simple English phrase translation (coverage)

- Verb phrases (plain English labels)
 - Actor
 - I, you, he, she, it, we, you and we, you all, they, someone
 - Goal
 - me, you, him, her, it, us, you and us, you all, them, someone
 - Time/completion
 - something happens now / someone does something now
 - s.t. happened / s.o. did s.t. earlier (**kî-**)
 - s.t. will certainly happen / s.o. will certainly do s.t. (**ka-**)
 - s.t. is going to happen / s.o. is going to do s.t. (**wî-**)
 - when s.t. happens / when s.o. does s.t.
 - for s.t. to happen / for s.o. to do s.t. (**ka-/ta-** + Conjunct),
 - let s.o. do s.t. now
 - let s.o. do s.t. later

Simple English phrase translation (coverage)

- Noun phrases (linguistic labels)
 - Non-possessed
 - singular, plural, obviative, locative
 - Possessed
 - Possessor: first/second/third person
singular/plural/obviative, unspecified
 - singular, plural, obviative, locative, (distributive)

Simple English phrase translation (coverage)

- Noun phrases
 - Non-possessed
 - one, many, further, in/on/to
 - Possessed
 - "Owner": my, your, his, her, its, our, your and our, your, their, someone's
 - one, many, further/another, in/on/to, (among)

How do I write X in Cree
syllabics?

itwêwina
Plains Cree Dictionary

I made them work espt:1

nikî-atotâwak ⓘ

Preverb : **kî-** ⓘ

form of **atotêw**

atotêw

👤 ➡ 👤 — like: nakatêw

1. He tells him or them to do some work. MD
2. s/he makes a request of s.o., s/he asks s.o. to do something; s/he engages s.o. for something, s/he employs s.o.; s/he commands s.o. CW

kocipayihtâw ⓘ

👤 ➡ 👤 — like: kocipayihtâw

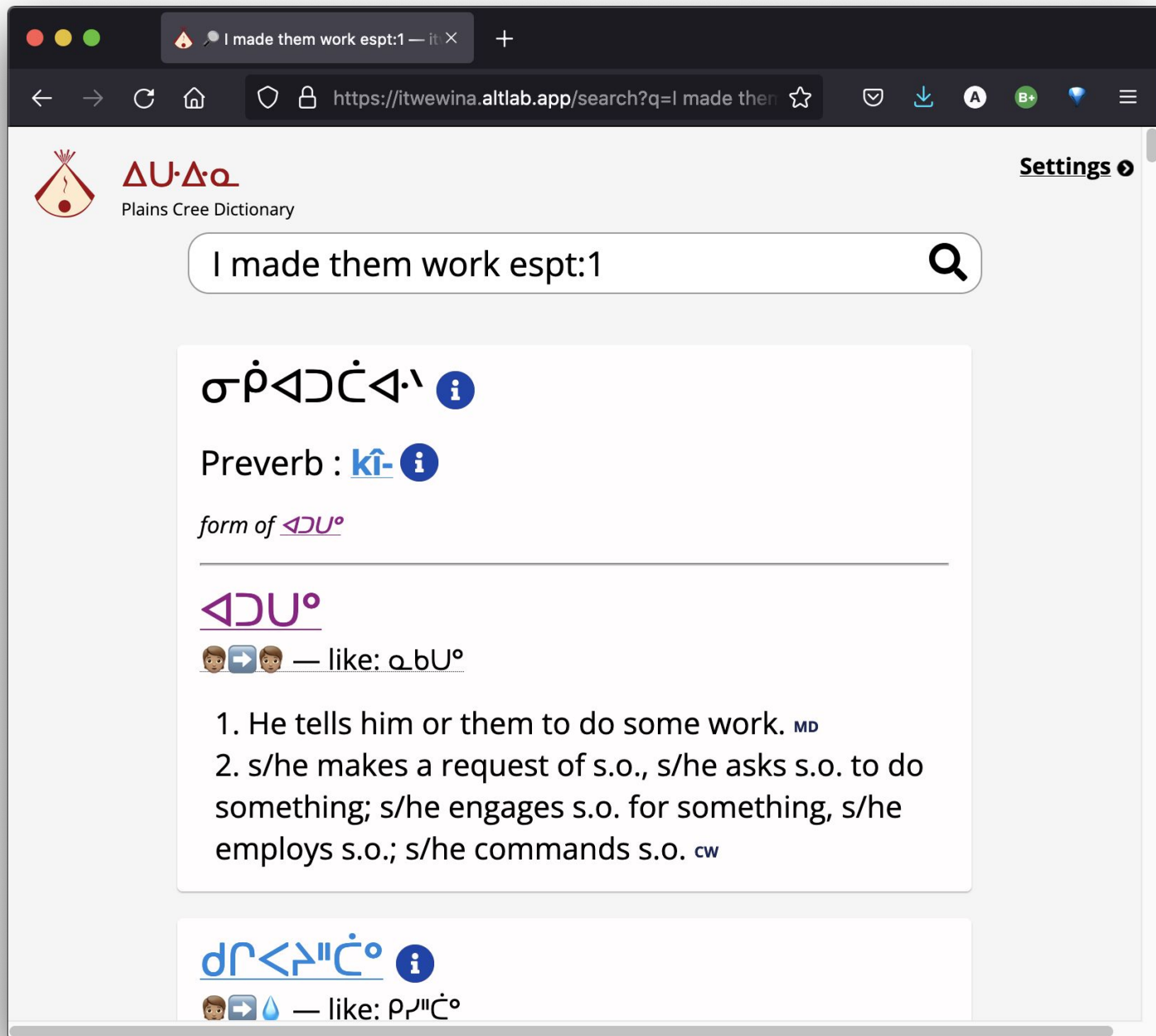
Show Plains Cree words in...

- SRO (êîôâ)
- SRO (ēīōā)
- Syllabics

[View all settings](#)

Settings

Choosing **Western Cree syllabics** as the display orthography for the Cree content



Choosing *Western Cree syllabics* as the orthography of the Cree content

atotêw — itwêwina Plains Cree

https://itwewina.altlab.app/word/atotêw/?paradig

itwêwina
Plains Cree Dictionary

Settings

Search in Cree or English

atotêw

👤👤 — like: nakatêw

VTA-4: transitive animate verb – class 4

1. He tells him or them to do some work. **MD**
2. s/he makes a request of s.o., s/he asks s.o. to do something; s/he engages s.o. for something, s/he employs s.o.; s/he commands s.o. **CW**


▼ Show nêhiyawêwin labels


ê-ispayik anohc/m		ni-/ki- itwêw
niya → kiya	kitatotitin	Plain English labels
niya → wiya	nitatotât	Linguistic labels
niya →	kitatotitinâw	Nêhiyawêwin labels


Choosing **Western Cree syllabics** as the display orthography for the Cree content

atotêw — itwêwina Plains Cree

https://itwewina.altlab.app/word/atotêw/

 **ΔU·Δ·α**
Plains Cree Dictionary Settings

Search in Cree or English 

ᐱᐅᐅᐅ
 — like: αbU°
 VTA-4: transitive animate verb – class 4

1. He tells him or them to do some work. **MD**
 2. s/he makes a request of s.o., s/he asks s.o. to do something; s/he engages s.o. for something, s/he employs s.o.; s/he commands s.o. **CW**

► Show nêhiyawêwin labels

σ↳ → ρ↳	σ-/ρ- ΔU·Δ·?
σ↳ → Δ·↳	ρCᐅᐅᐅᐅ
ρ↳ → σ↳	σCᐅᐅᐅᐅ
ρ↳ → Δ·↳	ρCᐅᐅᐅᐅ

Choosing **Western Cree syllabics** as the orthography of the Cree content – also in the **paradigms**

How do I ***SAY*** X in Cree?

itwêwina — itwêwina Plains Cree ×

https://itwewina.altlab.app/search?q=nipiy

itwêwina
Plains Cree Dictionary

Settings

nipiy

nipiy ⓘ 🔊
— like: mîkisasâkay, oskasâkay
1. water CWMD

nîpiy ⓘ 🔊
— like: mîkisasâkay, oskasâkay
1. leaf; blade of grass cw
2. [plural:] leaves; salad cw

pikwâwanipiy ⓘ
— like: mîkisasâkay, oskasâkay
1. spring of water cw

Minimal pairs

itwêwina Plains Cree Dictionary

Search in Cree or English

nîpiy 🔊

— like: mîkisasâkay, oskasâkay

NI-2: Vowel-glide inanimate noun stem

Choose a name from the dropdown to hear the word said by the speaker.

Rose Makinaw, Maskwacîs ▾ ▶ [Learn more about the speaker.](#)

1. leaf; bl
2. [plural:

✓ Rose Makinaw, Maskwacîs
 Annette Lee, Maskwacîs
 Annette Lee, Maskwacîs

► Show nêhiyawêwin labels

<i>pêyak</i>	nîpiy
<i>mihcêt</i>	nîpiya
<i>pîhci-, tahkoht, ohci</i>	nîpîhk
<i>nawac apisîs / ayiwâk osk-âyis</i>	

Selecting another **speaker** for their recording

nîpiy — itwêwina Plains Cree dictX

Maskwacîs Speech DB

https://speech-db.altlab.app/maskw

50%


Maskwacîs Speech DB

Search

Advanced Search

Options

Rose Makinaw



Listen in nêhiyawêwin:

0:00 / 0:00

(nêhiyawêwin translation coming soon)

Listen in English:

0:00 / 0:00

Read in English:

My name is Rose Makinaw, I was born here in Maskwacîs. I've listened to Cree all my life, my late Dad, my late sisters and my brother all spoke Cree, and when I wasn't with them I was with my late grandmother, and in that household it was all Cree, so it was something that I was raised with, and I was familiar with. I mentioned earlier that when I went to school when I was seven years old, I only spoke Cree, so, as I was telling my people here, I really don't

Looking up the speaker page for **Rose Makinaw** (Maskwacîs)

kâ-nêhiyawî-pîkiskwêcik maskwacîsihk — Maskwacîs Cree Speakers



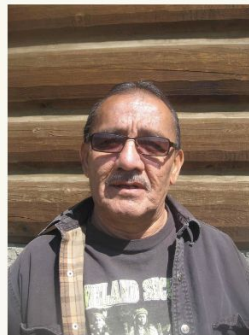
Mary Jane Littlechild



Louise Wildcat



Jerry Roasting



Harley Simon



Annette Lee



Arlene Makinaw



Rosie Rowan



Rose Makinaw



Kisikaw



Betty Simon



Spoken Paradigms

by humans
and
synthesizer

itwêwina Plains Cree dictionary

https://itwewina.altlab.app/search?q=nik

90%

Settings

itwêwina
Plains Cree Dictionary

nikinipan

nikî-nipân ⓘ 🔊

1. I slept, I was asleep CW
2. S/he was sleeping. AECD
3. I slept. MD

Preverb : **kî-** ⓘ

form of nipâw

nipâw

VAI-1 ⓘ 🔊 like: nipâw 📖

1. s/he sleeps, s/he is asleep CW
2. S/he is sleeping. AECD
3. He sleeps. MD


For many inflected word-forms, we do not have a human recording, but for some **selected** nouns and verbs we have full spoken paradigms, with either **human** or **synthesized** recordings.



Browser tabs: nipâw — itwêwina Plains Cree dictionary

Address bar: <https://itwewina.altlab.app/word/nipâw/>

Page title: itwêwina Plains Cree Dictionary









Search bar: Search in Cree or English

Word: **nipâw** 

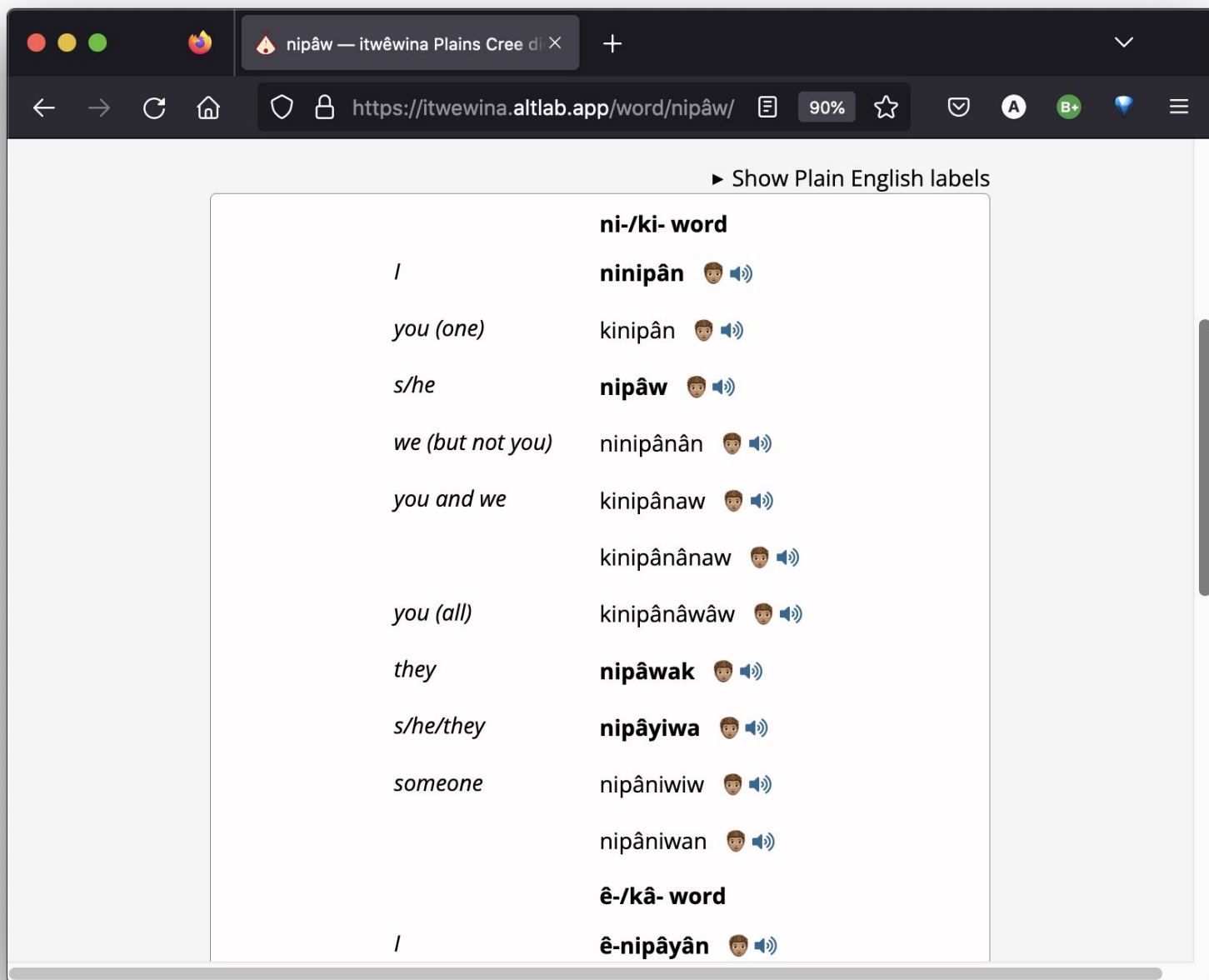
VAI-1   like: nipâw

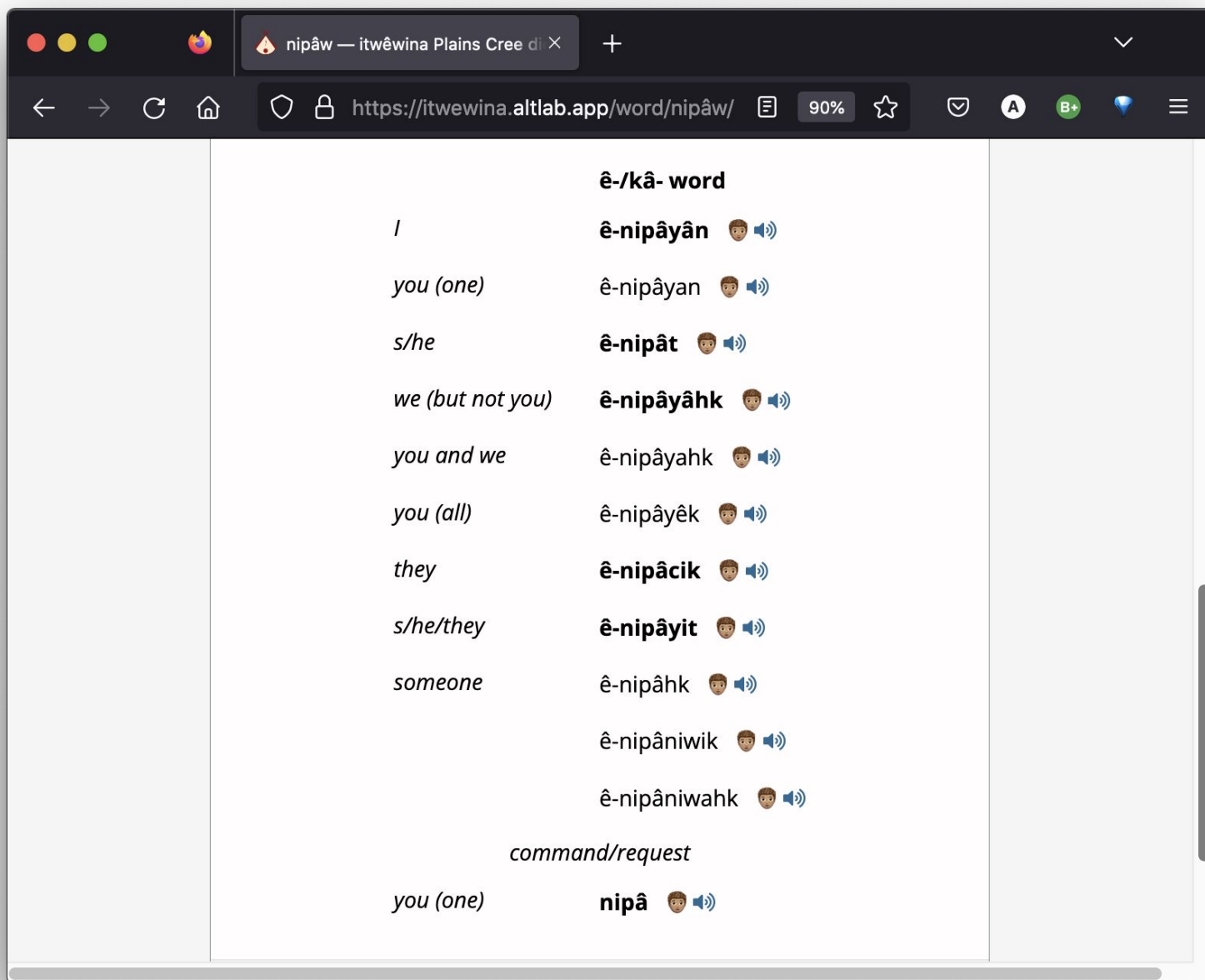
1. s/he sleeps, s/he is asleep **cw**
2. S/he is sleeping. **AECD**
3. He sleeps. **MD**

[Show Plain English labels](#)

ni-/ki- word	
I	ninipân  
you (one)	kinipân  
s/he	nipâw  
we (but not you)	ninipânân  

Human recordings are indicated in the paradigms with the **person** emoji next to the **speaker** emoji





nipâw — itwêwina Plains Cree dic

+

←

→

↻

🏠

🔒

https://itwewina.altlab.app/word/nipâw/?

📄

90%

☆


🛡️

A

B+

💡

☰



itwêwina
Plains Cree Dictionary

Settings ⌵

Search in Cree or English

🔍

nipâw 🔊

VAI-1 🧑 ➡ like: nipâw

1. s/he sleeps, s/he is asleep **cw**

2. S/he is sleeping. **AECD**

3. He sleeps. **MD**

► Show Plain English labels

something is happening now

ni-/ki- word

ni-/kî- word

ni-/kî- word

ni-/kî- word

ni-/kî- word

ni-/kî- word

ni-/kî- word

ni-/kî- word

ni-/kî- word

ni-/kî- word

ni-/kî- word

ni-/kî- word

ni-/kî- word

ni-/kî- word

ni-/kî- word

ni-/kî- word

I

you (one)

s/he

ninipân 🔊

kinipân 🔊

nipâw 🔊

ê-nipâyân 🔊

ê-nipâyan 🔊

ê-nipât 🔊

nipâw — itwêwina Plains Cree dicX

https://itwewina.altlab.app/word/nipâw/? 90%

when/if something happens

<i>I</i>	nipâyâni 🗣️ 🔊
<i>you (one)</i>	nipâyani 🗣️ 🔊
<i>s/he</i>	nipâci 🗣️ 🔊
<i>we (but not you)</i>	nipâyâhki 🗣️ 🔊
<i>you and we</i>	nipâyahko 🗣️ 🔊
	nipâyahki 🤖 🔊
<i>you (all)</i>	nipâyêko 🗣️ 🔊
<i>they</i>	nipâtwâwi 🗣️ 🔊
<i>s/he/they</i>	nipâyici 🗣️ 🔊

command/request

	now	later
<i>you (one)</i>	nipâ 🗣️ 🔊	nipâhkan 🗣️ 🔊
<i>you and we</i>	nipâtân 🗣️ 🔊	nipâhkahk 🗣️ 🔊
<i>you (all)</i>	nipâk 🗣️ 🔊	nipâhkêk 🗣️ 🔊

Human
Synthesized

Synthesized recordings are indicated in the paradigms with the **robot head** emoji next to the **speaker** emoji

Maskwacîs Speech DB

←

→

↺

🏠

🔒

https://speech-db.altlab.app/maskwacis/se

67%

☆

📧

⬇️

A

B+

🔗

☰

Maskwacîs Speech DB

Search

Search

Advanced Search

► Options

Results for "nîpiy"

nîpiy

Translation: 2. A leaf.

This phrase is already in the Maskwacîs dictionary.

Flag this entry for review

More Options

Where to all these recordings come from? ← *Spoken Dictionary of Maskwacîs Cree:*
<https://speech-db.altlab.app>

Best Recording

☆

▶

0:00 / 0:00

🔊

☆

▶

0:00 / 0:00

🔊

☆

▶

0:00 / 0:00

🔊

☆

▶

0:00 / 0:00

🔊

☆

▶

0:00 / 0:00

🔊

☆

▶

0:00 / 0:00

🔊

Speaker

This recording is...

This recording has the...

Recording Session

ROS

Good

Bad

Wrong Speaker

Wrong Word

2015-03-23-__-__-

ROS

Good

Bad

Wrong Speaker

Wrong Word

2015-03-23-__-__-

JON

Good

Bad

Wrong Speaker

Wrong Word

2015-03-23-__-__-

JON

Good

Bad

Wrong Speaker

Wrong Word

2015-03-23-__-__-

ANN

Good

Bad

Wrong Speaker

Wrong Word

2015-03-23-__-__-

ANN

Good

Bad

Wrong Speaker

Wrong Word

2015-03-23-__-__-

Add a New Recording:

Record

Stop

Recordings

What does X (Cree) mean (in English)?

- Providing a simple English phrase as a translation, rather than a linguistic analysis

itwêwina Plains Cree dictionary

https://itwewina.altlab.app/search?q=niwapamaw

itwêwina
Plains Cree Dictionary

Settings

niwapamaw

niwâpamâw ⓘ

1. I see **wâpam-**

2. I see Action word — like: wîcihêw, itêw w
ni-/ki- word
I → him/her

form of **wâpamêw**

— like: wîcihêw

1. He sees him. MD

2. s/he sees s.o., s/he witnesses s.o. CW

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View search results in:
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Linguist mode

Looking up the relatively common Cree word-form: **niwâpamâw** → *analysis in pop-up*

itwêwina Plains Cree dictionary

https://itwewina.altlab.app/search?q=niwapamaw

itwêwina
Plains Cree Dictionary

Settings

niwapamaw

niwâpamâw VTA-1 ⓘ

1. I **wâpam-**

2. I Verb — transitive animate
Independent
form c Actor: 1st Person Singular → Goal: 3rd Person Singular

wâpamêw

transitive animate verb – class 1: regular

1. He sees him. MD

2. s/he sees s.o., s/he witnesses s.o. CW

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Swapping the labeling of linguistic features to: *linguistic labels*

niwapamaw auto:1 — itwêwin X

https://itwewina.altlab.app/search?q=niwapamaw

itwêwina
Plains Cree Dictionary

Settings

niwapamaw auto:1

niwâpamâw ⓘ

1. I see him/her. MD
2. I see him/her, I witness him/her CW

form of wâpamêw

wâpamêw

👤➡️👤 — like: wîcihêw

1. He sees him. MD
2. s/he sees s.o., s/he witnesses s.o. CW

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View search results in:
Community mode
Linguist mode

Looking up the relatively common Cree word-form: **niwâpamâw** → *I see him/her, ...*

Browser window showing the **itwêwina** Plains Cree Dictionary search results for **nimaskomak**.

The search bar contains **nimaskomak** and **auto:1**. A red arrow points from the search bar to the word **nimaskomak** in the results.

nimaskomak ⓘ

- 1. my bears. MD
- 2. my bears, my black bears CW

form of [maskwa](#)

maskwa

— like: wâhkwa, ihkwa

- 1. A bear. MD
- 2. bear, black bear CW

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- Settings
- View search results in: **Community mode** **Linguist mode**

Looking up the relatively common Cree word-form: **nimaskomak** → **my bears, ...**

nikinitawiwapamaw auto:1 — ×

https://itwewina.altlab.app/search?q=nikinitawiwa

itwêwina
Plains Cree Dictionary

Settings

nikinitawiwapamaw auto:1

nikî-nitawi-wâpamâw ⓘ

Preverb : **kî-** ⓘ

Preverb : **nitawi-** ⓘ

form of **wâpamêw**

wâpamêw

👤 ➡ 👤 — like: wîcihêw

1. He sees him. MD
2. s/he sees s.o., s/he witnesses s.o. cw

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View search results in:
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Linguist mode

For more complex Cree word-forms: **nikî-nitawi-wâpamâw** → *only pop-up analysis available*

nikinitawiwapamaw — itwêwii X

https://itwewina.altlab.app/search?q=nikinitawiwapamaw

itwêwina
Plains Cree Dictionary

Settings

nikinitawiwapamaw

nikî-nitawi-wâpamâw ⓘ

Preverb : **kî-** ⓘ
Preverb : **nitawi-** ⓘ
*form of **wâpamêw***

wâpam-
Action word — like: wîcihêw, itêw
ni-/ki- word
I → him/her

wâpamêw
👤➡️👤 — like: wîcihêw

1. He sees him. **MD**
2. s/he sees s.o., s/he witnesses s.o. **cw**

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About
Contact us

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For more complex Cree word-forms: **nikî-nitawi-wâpamâw** → **only pop-up analysis available**

itwêwina Plains Cree dictionary

https://itwewina.altlab.app/search?q=nikinitawiwapamaw

itwêwina
Plains Cree Dictionary

Settings

nikinitawiwapamaw

nikî-nitawi-wâpamâw VTA-1 ⓘ

Preverb : **kî-** ⓘ
Preverb : **nitawi-**

form of **wâpamêw**

wâpam-
Verb — transitive animate
Independent
Actor: 1st Person Singular → Goal: 3rd Person Singular

wâpamêw
transitive animate verb – class 1: regular

1. He sees him. MD
2. s/he sees s.o., s/he witnesses s.o. CW

Help ⓘ
Legend of abbreviations
About
Contact us

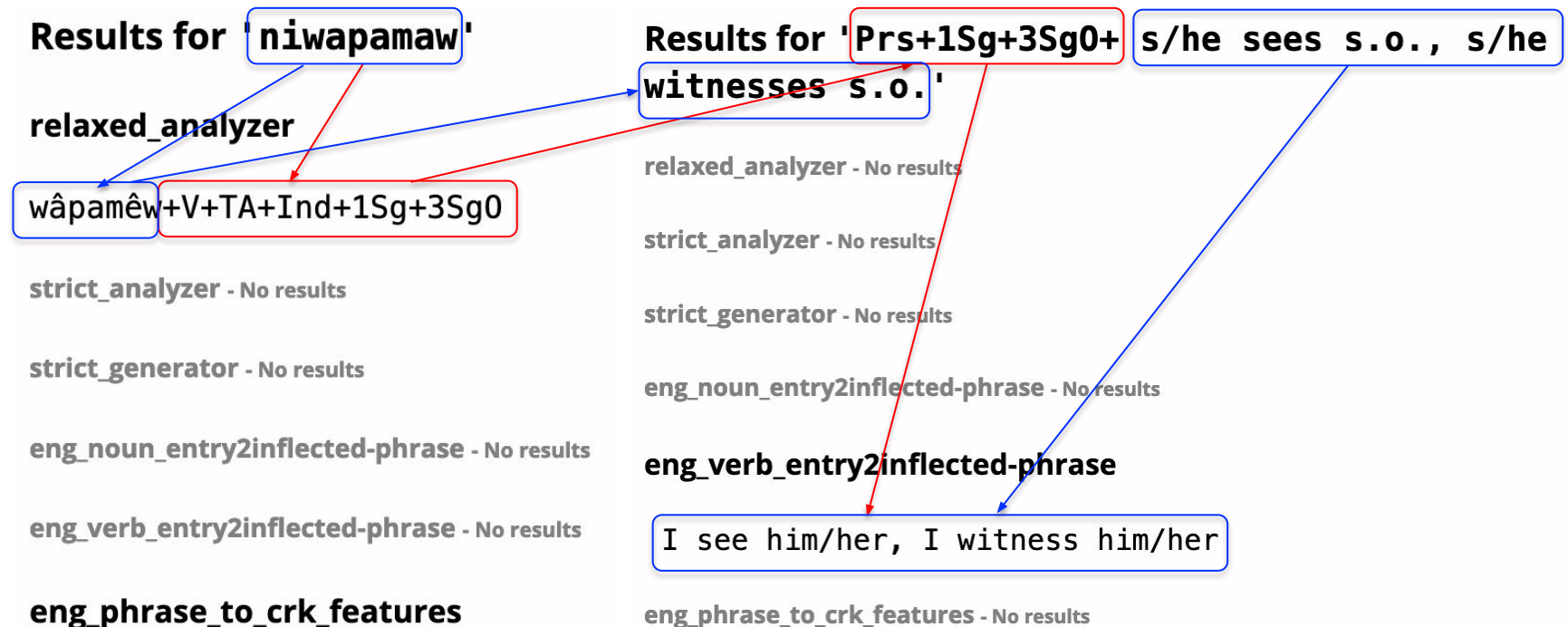
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Settings
View search results in:
Community mode
Linguist mode

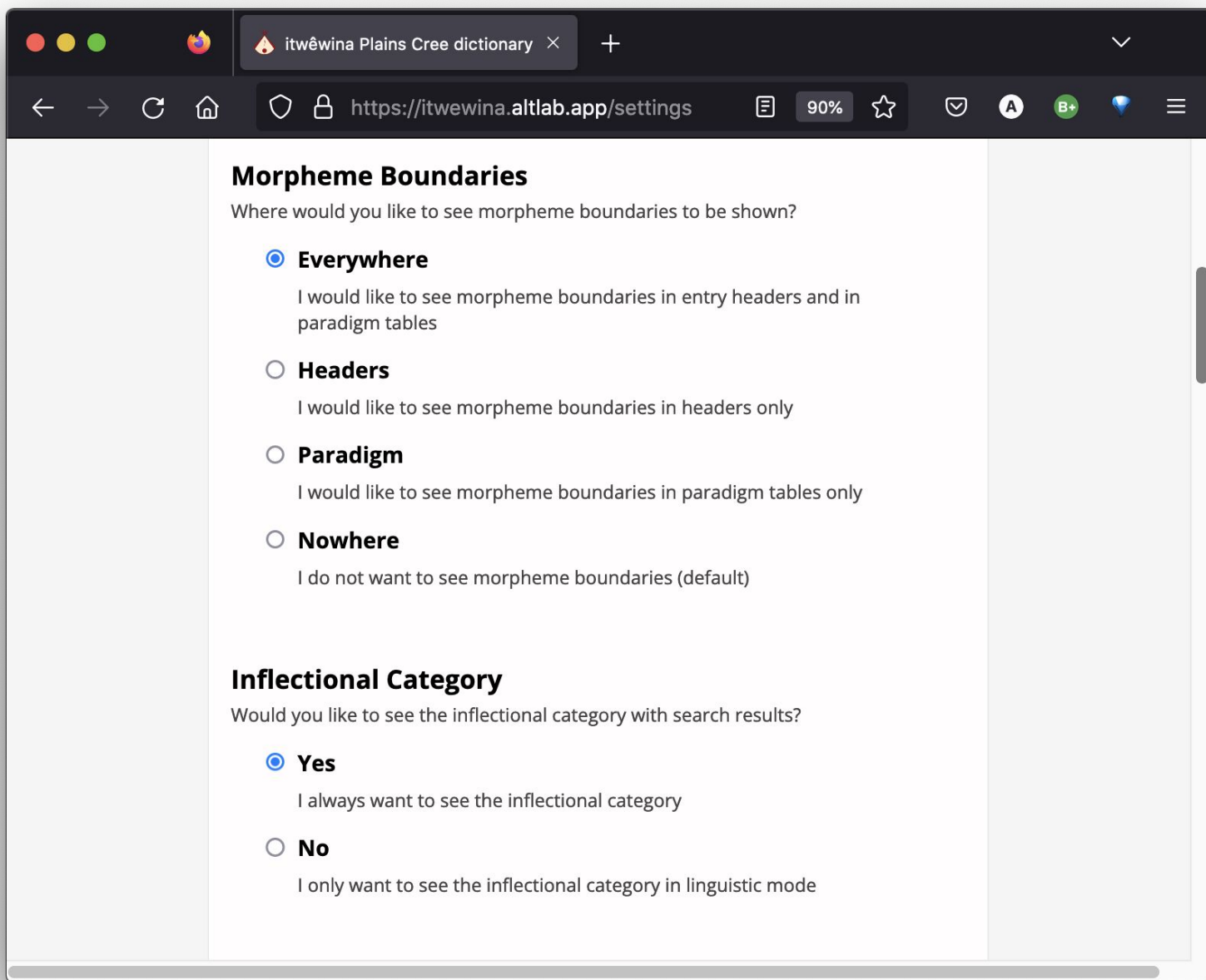
For more complex Cree word-forms: **nikî-nitawi-wâpamâw** → **only pop-up analysis available**

How is this achieved?

- Linguistic analyses for Cree word-forms are used to computationally generate corresponding simple English phrases



What parts are Cree words made
up of?



Browser window showing the **itwêwina** Plains Cree Dictionary search results for **nimaskomak**.

The search results display the standardized form **ni·mask·om·ak** (with an information icon) and its form of **maskwa**.

The entry for **maskwa** is shown, including the NA-4w emoji and the note: **like: wâhkwa, ihkwa** (with a book icon).

The first definition is: **1. bear, black bear** (with a CW icon).

The footer contains navigation links (Help, Legend of abbreviations, About, Contact us), copyright information (2019–2022 © Alberta Language Technology Lab. Modified icons copyright © 2019 Font Awesome, licensed under CC BY 4.0.), and search result options (Settings, View search results with: Plain English labels, Linguistic labels, Plains Cree labels).

Here, the morpheme boundaries are shown for the standardized form of the search string.

maskwa — itwêwina Plains Cree

https://itwewina.altlab.app/word/maskwa

90%

maskwa

NA-4w like: wâhkwa, ihkwa

1. bear, black bear

Show Plain English labels

one

maskw·a

many

maskw·ak

further

maskw·a

smaller / younger / lesser

one

mask·os

whose / whom something belongs to

my

ni·mask·om

your (one)

ki·mask·om

his/her







o·mask·om·a

+ show more

maskwa — itwêwina Plains Cree X

https://itwewina.altlab.app/word/maskwa@1/?paradigm-siz 90%

► Show Plain English labels

one	maskw·a	 	
many	maskw·ak	 	
further	maskw·a	 	
among	mask·onâhk		
	<i>smaller / younger / lesser</i>		
one	mask·os		
	<i>whose / whom something belongs to</i>		
	one	many	further
my	ni·mask·om	ni·mask·om·ak	ni·mask·om·a
your (one)	ki·mask·om	ki·mask·om·ak	ki·mask·om·a
his/her	—	—	o·mask·om·a
our (but not your)	ni·mask·om·inân	ni·mask·om·inân·ak	ni·mask·om·inân·a
your and our	ki·mask·om·inaw	ki·mask·om·inaw·ak	ki·mask·om·inaw·a
your (all)	ki·mask·om·iwâw	ki·mask·om·iwâw·ak	ki·mask·om·iwâw·a
their	—	—	o·mask·om·iwâw·a
his/her/their	—	—	o·mask·om·iyiw·a

The morpheme boundaries can also be shown in all the word-forms in the paradigms.

Can I choose the dictionary
source or speech community?

itwêwina Plains Cree dictionary

https://itwewina.altlab.app/search 90%

itwêwina
Plains Cree Dictionary

Settings

nimaskomak

ni·mask·om·ak ⓘ

form of [maskwa](#)

[maskwa](#)

NA-4w ⓘ like: wâhkwa, ihkwa ⓘ

1. bear, black bear cw

Show Plains Cree words in...

- SRO (êîôâ)
- SRO (ēīōā)
- Syllabics

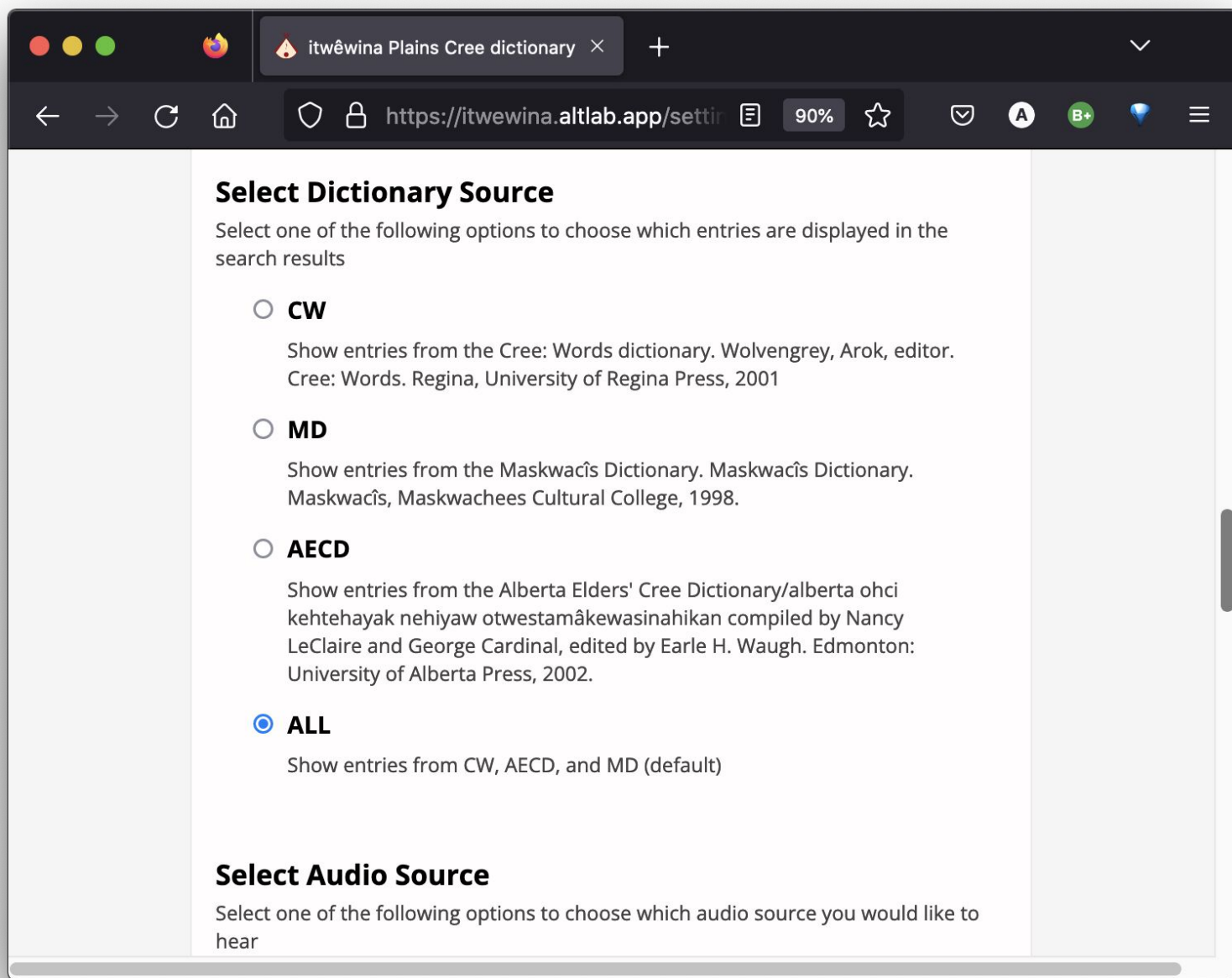
[View all settings](#)

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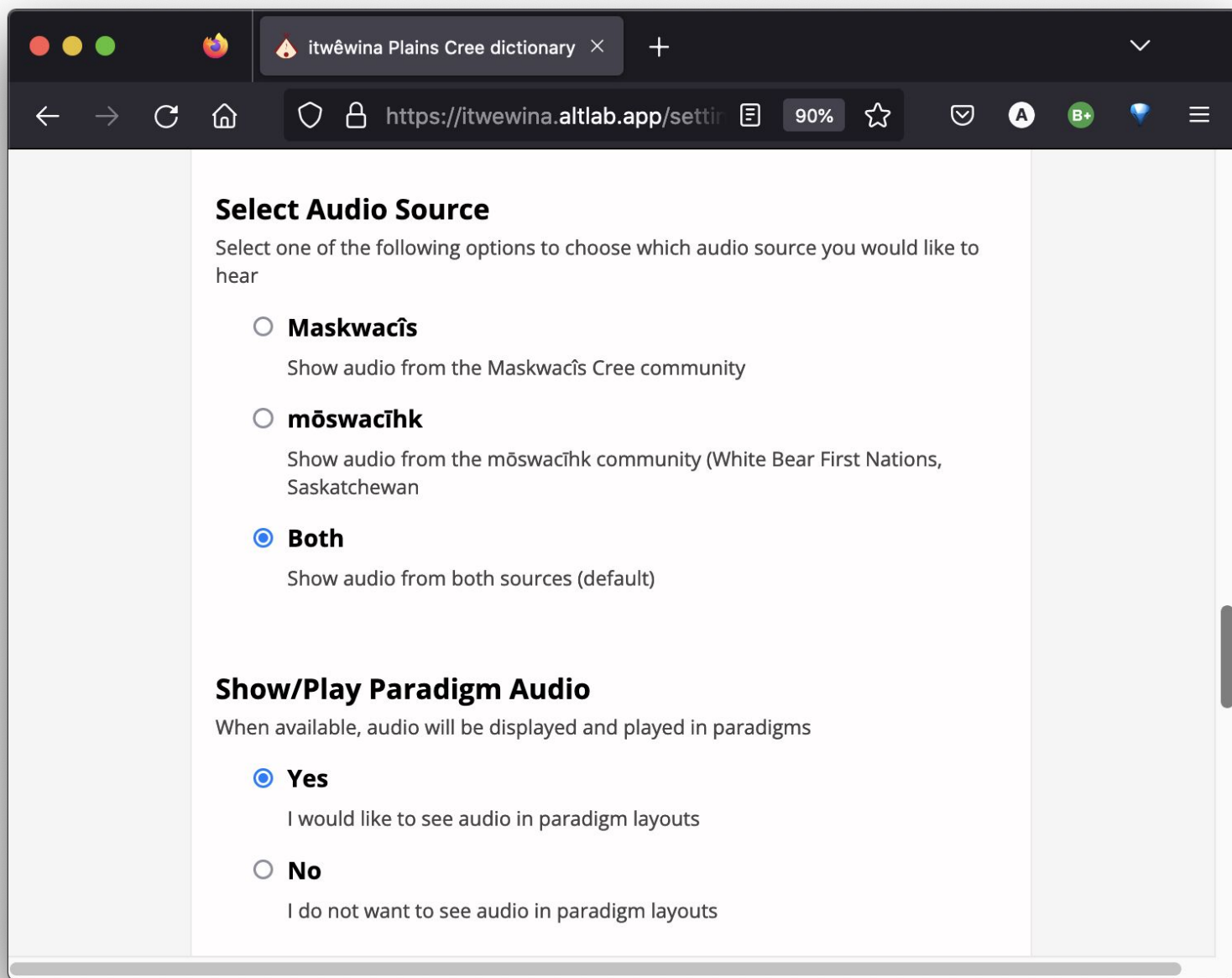
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Settings
View search results with:
[Plain English labels](#)
[Linguistic labels](#)
[Plains Cree labels](#)

To select the dictionary source, we go to the settings and select to view all our options.



Here, we have chosen to see content from **all three** dictionary sources.



We can also choose to select which community we want to hear spoken audio from

Can I choose my preferred format for
how information is shown?

itwêwina Plains Cree dictionary

+


← → ↺ 🏠

🔒 <https://itwewina.altlab.app/setting>

90% ☆

📧 A B+

📶 ☰



itwêwina
Plains Cree Dictionary

Settings

▼

Search in Cree or English

Settings

Display Mode

How would you like the labels to appear throughout the site?

☒ Plain English labels

☐ Linguistic labels

☐ nêhiyawêwin labels

Examples: *I, you (one), s/he; something is happening now, something happened earlier*

Examples: *1s, 2s, 3s; Present, Past*

Examples: *niya, kiya, wiya; ê-ispayik anohc/mêkwâc/mâna, ê-ispayik kwayâc*

Show Plains Cree words in...

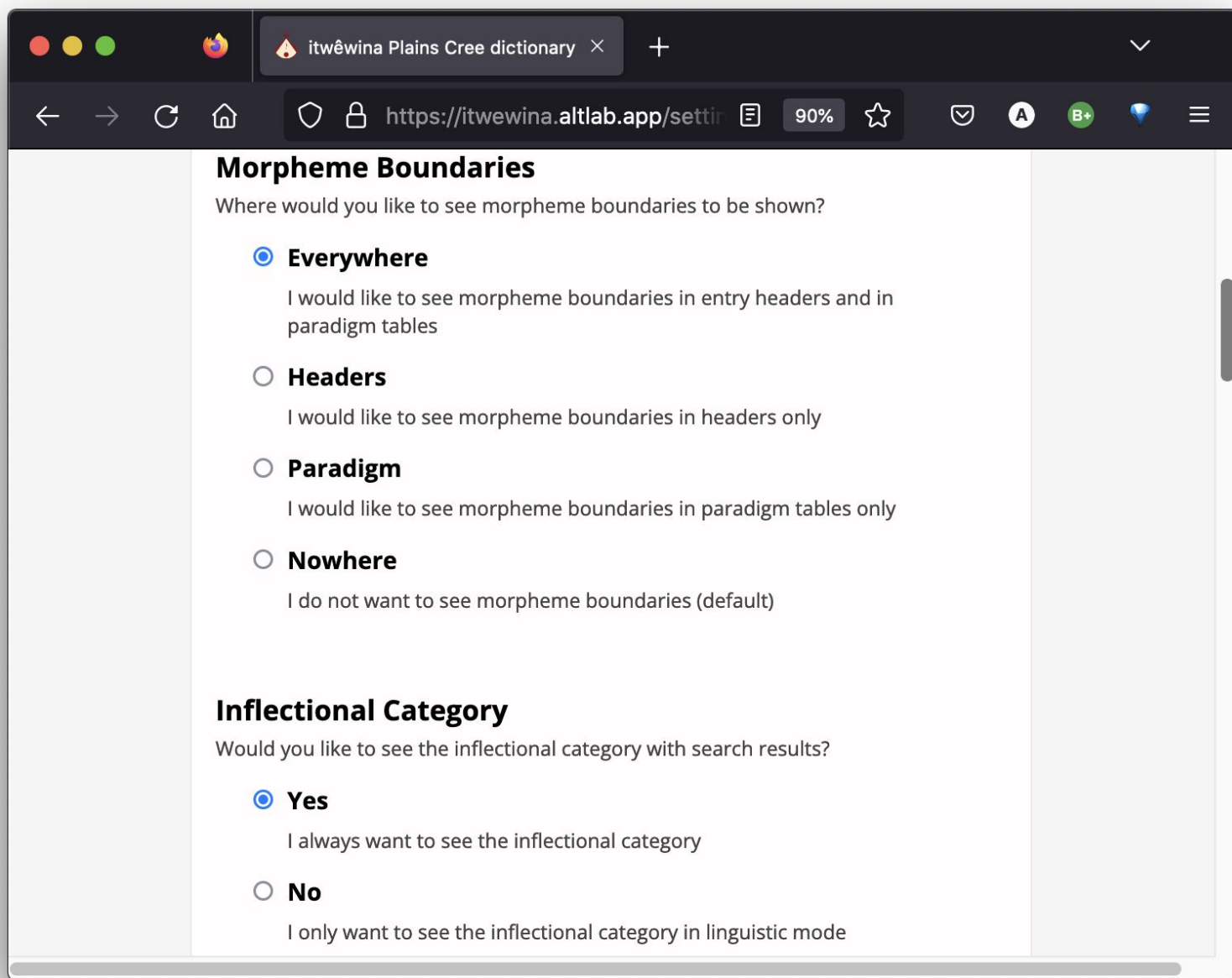
SRO (êîôâ)

SRO (ēīōā)

Syllabics

View all settings

<https://itwewina.altlab.app/settings>



Morpheme Boundaries

Where would you like to see morpheme boundaries to be shown?

☒ **Everywhere**

I would like to see morpheme boundaries in entry headers and in paradigm tables

☐ **Headers**

I would like to see morpheme boundaries in headers only

☐ **Paradigm**

I would like to see morpheme boundaries in paradigm tables only

☐ **Nowhere**

I do not want to see morpheme boundaries (default)

Inflectional Category

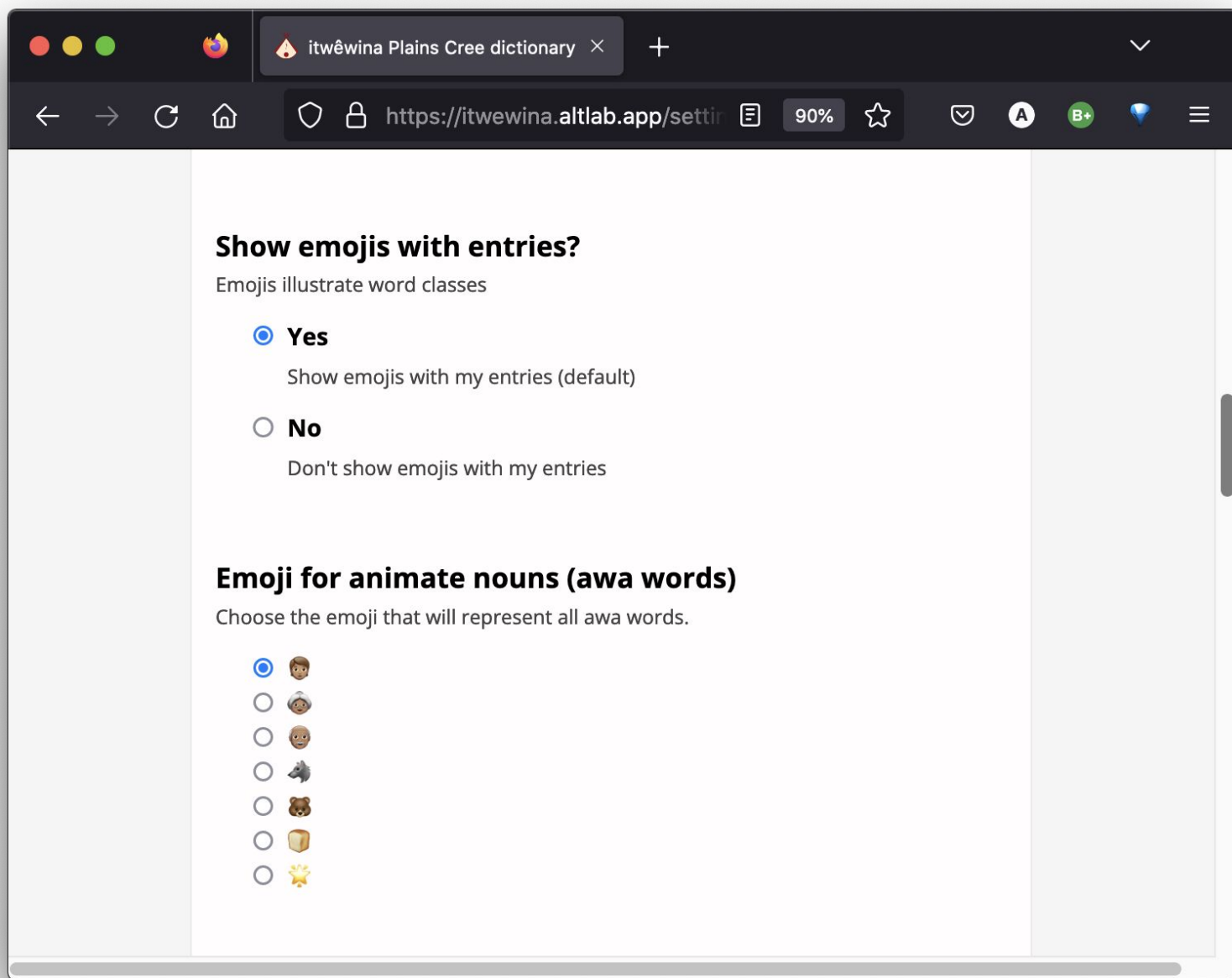
Would you like to see the inflectional category with search results?

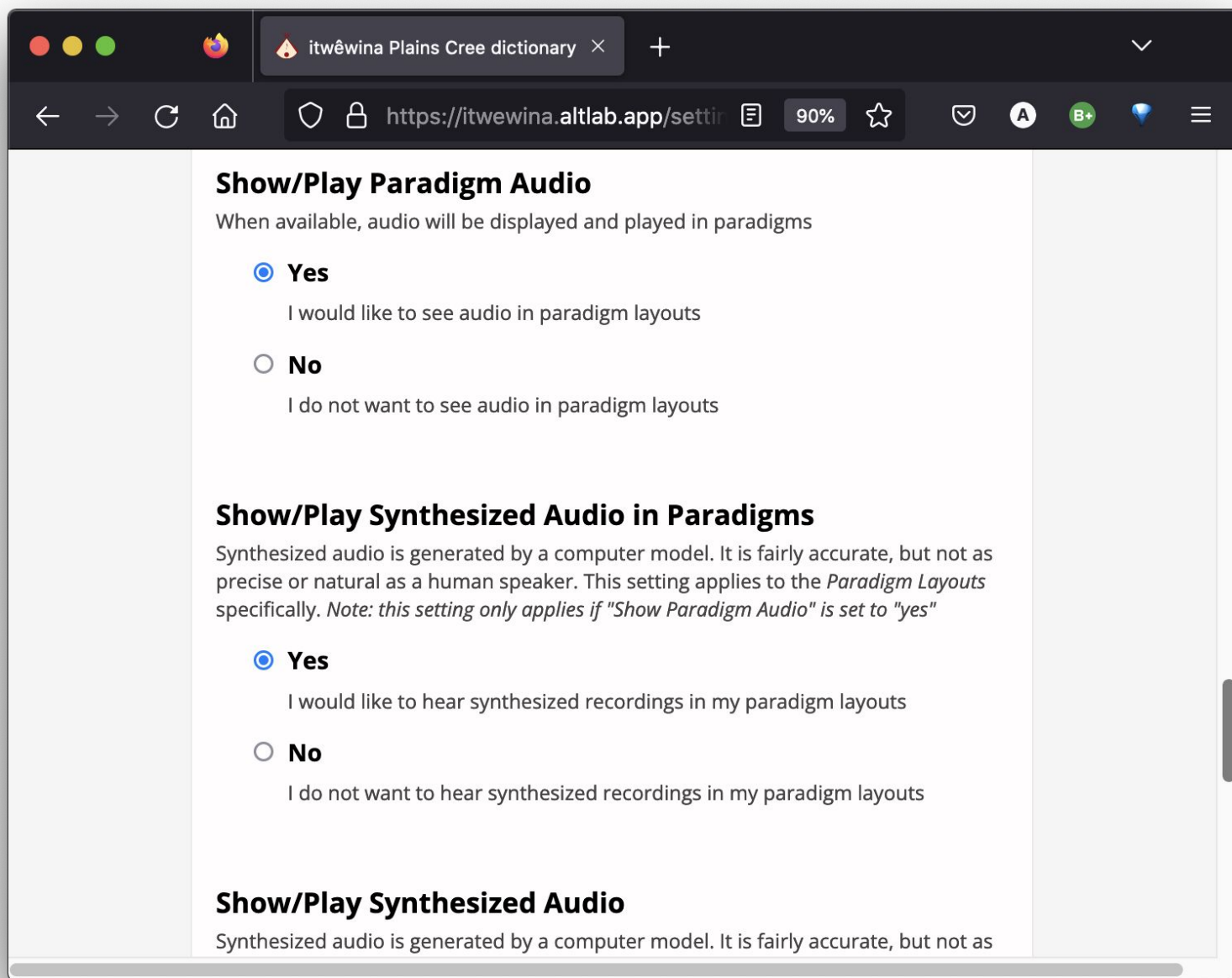
☒ **Yes**

I always want to see the inflectional category

☐ **No**

I only want to see the inflectional category in linguistic mode





Show/Play Paradigm Audio

When available, audio will be displayed and played in paradigms

☒ **Yes**

I would like to see audio in paradigm layouts

☐ **No**

I do not want to see audio in paradigm layouts

Show/Play Synthesized Audio in Paradigms

Synthesized audio is generated by a computer model. It is fairly accurate, but not as precise or natural as a human speaker. This setting applies to the *Paradigm Layouts* specifically. *Note: this setting only applies if "Show Paradigm Audio" is set to "yes"*

☒ **Yes**

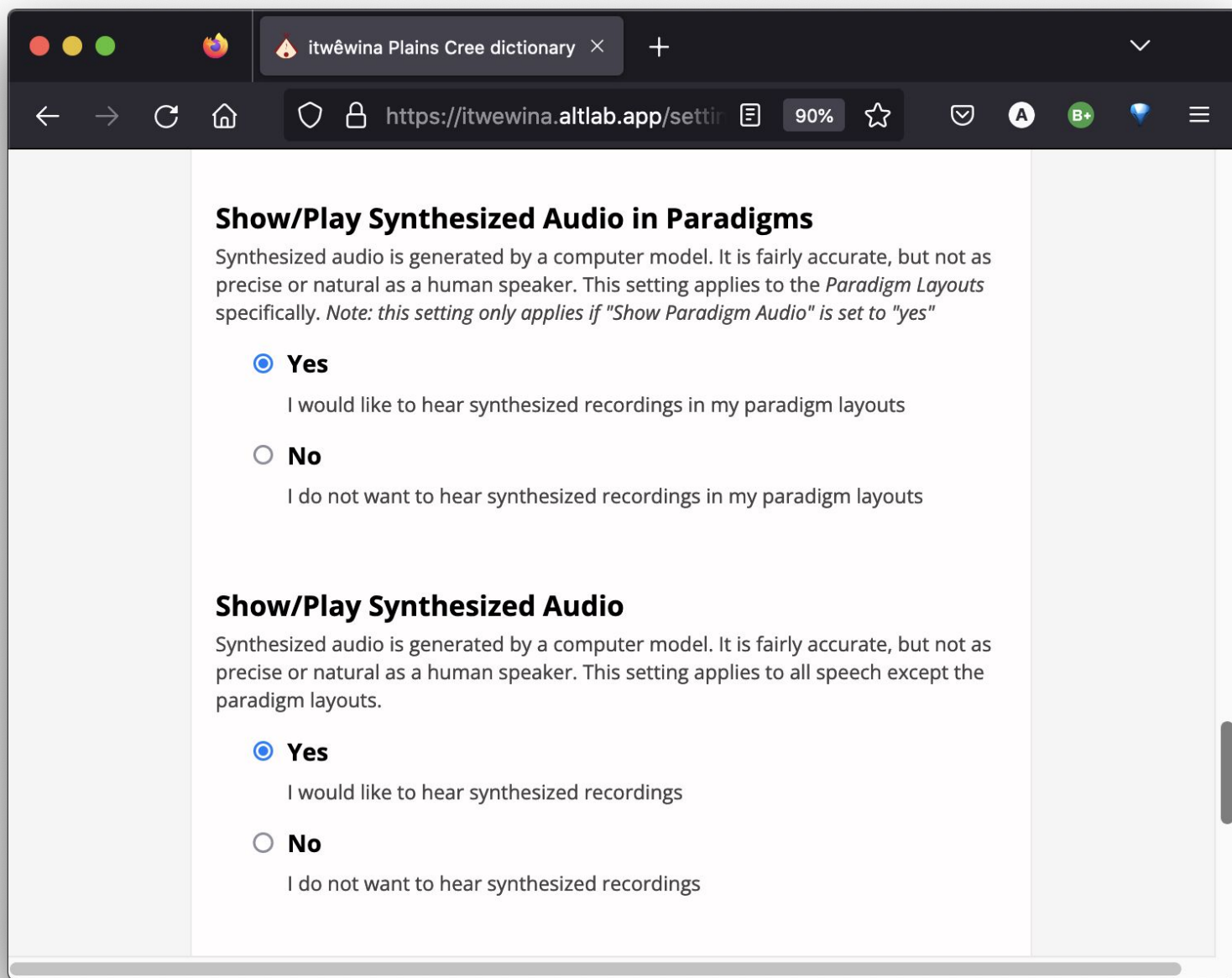
I would like to hear synthesized recordings in my paradigm layouts

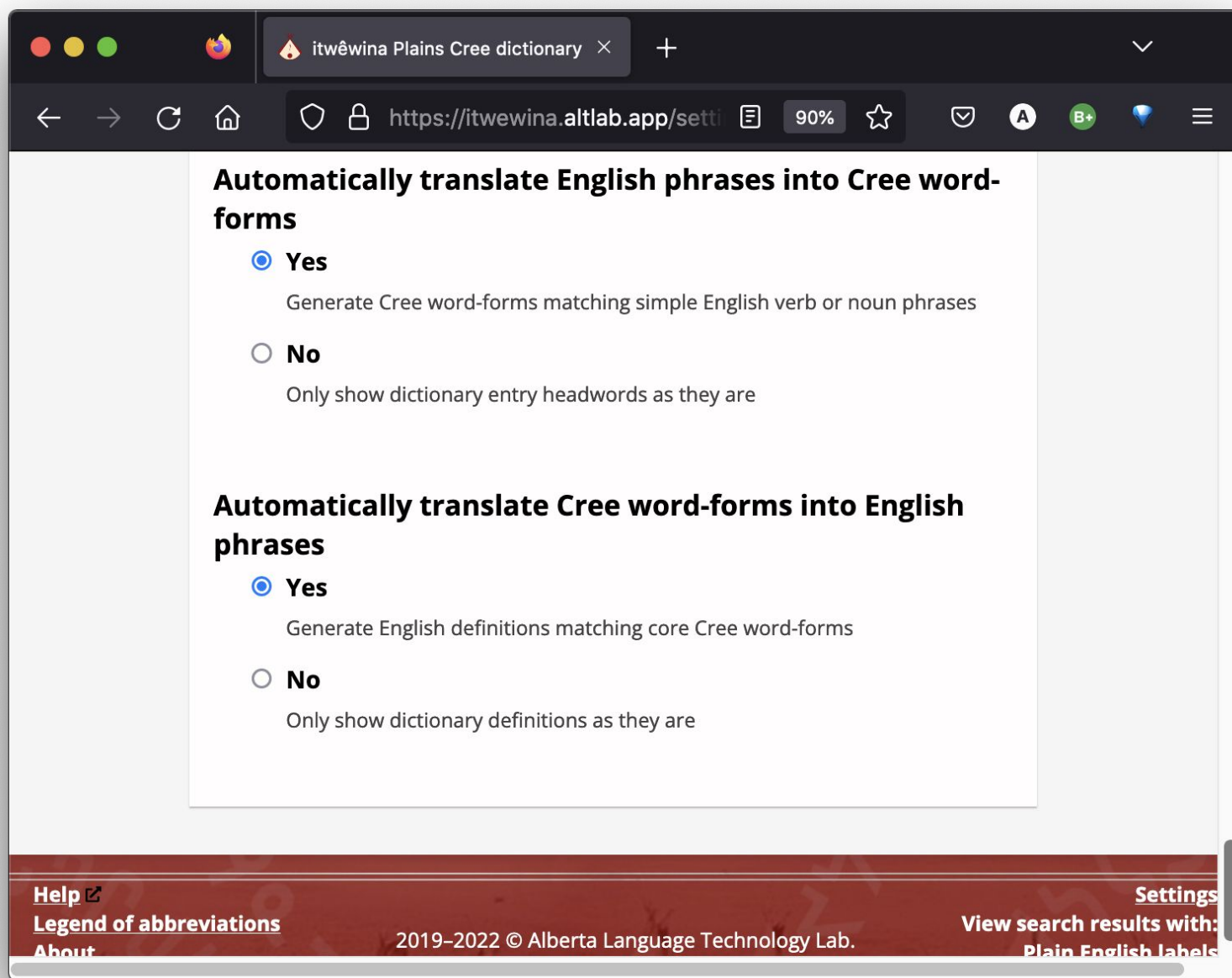
☐ **No**

I do not want to hear synthesized recordings in my paradigm layouts

Show/Play Synthesized Audio

Synthesized audio is generated by a computer model. It is fairly accurate, but not as





Automatically translate English phrases into Cree word-forms

☒ **Yes**

Generate Cree word-forms matching simple English verb or noun phrases

☐ **No**

Only show dictionary entry headwords as they are

Automatically translate Cree word-forms into English phrases

☒ **Yes**

Generate English definitions matching core Cree word-forms

☐ **No**

Only show dictionary definitions as they are

[Help](#)

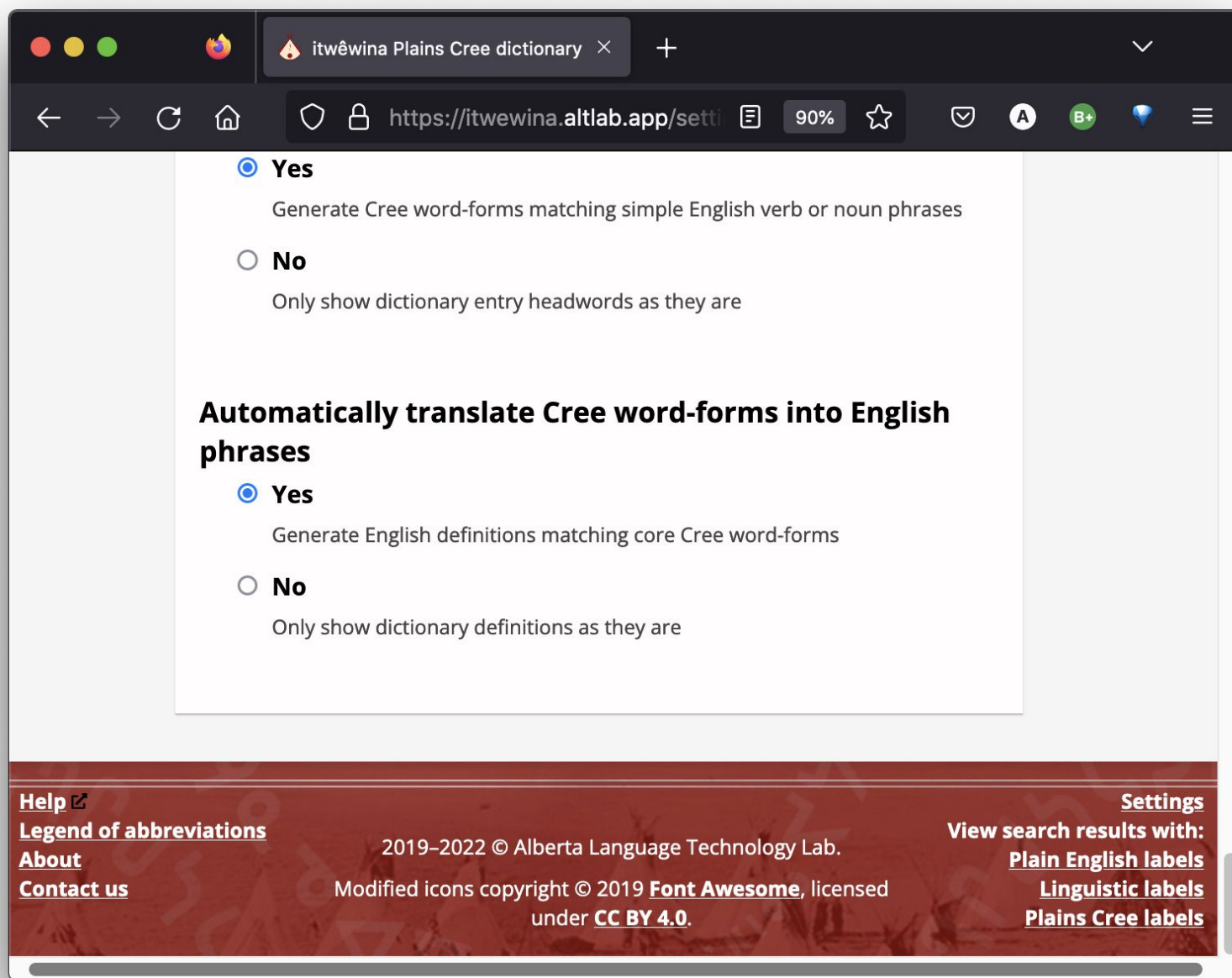
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[View search results with:
Plain English labels](#)



☒ **Yes**

Generate Cree word-forms matching simple English verb or noun phrases

☐ **No**

Only show dictionary entry headwords as they are

Automatically translate Cree word-forms into English phrases

☒ **Yes**

Generate English definitions matching core Cree word-forms

☐ **No**

Only show dictionary definitions as they are

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View search results with:

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[Linguistic labels](#)

[Plains Cree labels](#)

Meeting expectations – Fall 2020 → Fall 2021 → Fall 2021

- Facebook: *nêhiyawêwin* word of the day – what linguistic help do people ask for?
 - Cree naming
 - What is the Cree word for X (English concept)?
 - Good start → multiword concepts
 - Cree phrases
 - How do I say X (English phrase) in Cree?
 - Step-wise through looking up paradigms → direct linking of English phrases to matching Cree word forms
 - Cree syllabics
 - How do I write X (Cree word) in Cree syllabics?
 - Done
 - Cree pronunciation
 - How do I say X (Cree word) in Cree?
 - Available for a part of the dictionary entries → increasing coverage of the Cree entries → adding fully spoken paradigms for select entries ← native speakers + synthesized
 - Cree-to-English translation
 - What does X (Cree word) mean in English?
 - good start → improving fuzzy matching

Meeting expectations – Fall 2020 → Fall 2021 → Fall 2022

- On-line dictionary as a language learning/instruction tool
 - Cree word building
 - What are little Cree words made up of?
 - Showing inflectional morpheme boundaries, in paradigms and throughout
 - Spoken paradigms
- Meeting the needs and expectations of multiple user communities
 - Community identity
 - user can select dictionary or speech community
 - Cree-to-English content added from Alberta Elders' Cree Dictionary
 - Fully implemented optionality for different user groups
 - user can select preferred format for any feature with multiple available options
 -

Other possible/necessary developments?

- ***Mobile/off-line*** version of ***itwêwina*** available for beta testing
 - minimal set of functionalities
 - BUT can be used without an Internet/WiFi connection
- Full functionalities available in **on-line *itwêwina***
- Available for testing on iOS devices via Testflight
 - <https://testflight.apple.com/join/E7uvQ1i2>
- Android version under development (minimally functional prototype already exists)



Troms Reise



TFT Mobillett



Slack



Optik TV



Lyft



Uber



Conference&E...



Lime



Dictionary



Zulip



DivvunDev...



SkyView Lite



Remote



Docs



Intact



HSL



ArriveCAN



Mehiläinen



ΔUΔα.off...



MyUALberta





nikî-nipân ⓘ

Preverb : [kî-](#) ⓘ

form of [nipâw](#)

[nipâw](#)

👤 ➡ — like: nipâw

1. He sleeps. ^{MD}
2. s/he sleeps, s/he is asleep ^{cw}

Other possible/necessary next developments?

- On-line dictionary as a language learning/instruction tool
 - Cree word building
 - Showing derivational morpheme boundaries
 - Showing information about the individual morphemes
 - Distinguishing search results by English senses, when searching with an English word(s) → "true" English-to-Cree search
 - Organizing and splitting paradigms into smaller, more manageable panes that can be expanded and collapsed
 - Semantic search of dictionary entries (← semantic classification already exists ← WordNet / RapidWords)
 - Linguistic reference data → "grammar" pages
- Meeting the needs and expectations of multiple user communities
 - Choice of application interface language: English → Cree / nêhiyawêwin

Final words

- Developing an on-line language-technological application for an Indigenous language community – that the community will fully use – is much more than a one-off delivery
 - gathering feedback and adjusting the tool accordingly requires time
 - feedback can change over time, as experience with the tool grows
- Software coding development is the bottleneck, not so much the creation of linguistic models and resources

Thank you – ay hay – kiitos!

Questions? Comments! Feedback?

Application: <https://itwewina.altlab.app/>

Instructions:

<https://altlab.artsrn.ualberta.ca/itwewina/>

Source code:

<https://github.com/UAlbertaALTLab/morphodict/>