On diphthongs and digraphs in Blackfoot

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Some definitions

- **Digraph**: orthographic entity
  - two orthographic symbols which are used to represent a single sound
  - English: [buθ] 'booth' has two digraphs: <oo> for [u], <th> for [θ],
  - Blackfoot: <ai>, <ao>, <oi>

- **Diphthong**: phonetic entity
  - a vowel sound which starts with one vowel quality and ends in a different vowel quality
  - English: [baj] 'buy', [bej] 'bay', [baw] 'bow (down)', [boj] 'boy'

Conventions: [...] for phonetics; <...> for orthography

Issue

- Diphthongs and digraphs are often *confused* in the Blackfoot literature
  - Digraphs =/= diphthongs
  - Digraphs can be pronounced as monophthongs *and* diphthongs
  - This variation in pronunciation has not been a research focus

Research Goal

To study the variation between (mid vowel) monophthongs and diphthongs within and across speakers of Blackfoot

Presentation Outline

1. Previous research
   - on digraphs
   - on diphthongs
1. Research goals
2. Corpus study (preliminary)
3. Implications

Conventions

[...]   for phonetics

/.../ for phonemics

<...> for orthography

⟦…⟧ = IPA created from orthography

Digraphs

Digraphs in previous research on Blackfoot

Digraphs are related to a variety of concepts:

1. A family of non-contrastive sounds
2. Underlying vowel sequences (across morpheme boundaries)
3. Underlying phonemic contrasts (morpheme-internally)

1. Digraphs: a family of non-contrastive sounds

- Before long consonants:
  - <ai> = [**ɛ**] like English *said*
  - <ao> = [**ɔ**] like English *dawn*
  - <oi> = like [**i**], but with rounded lips ([y]? [ʏ]?)

áínnisiwa	⟦**ɛ́**nːisiwą⟧	'he descends'
áóttakiwa	⟦**ɔ́**tːakiwą⟧	'bartender'
nitáakot**oi**ssikópii	⟦nitâːkot**y**ːsikopi⟧	'I will go to rest'

⟦ ⟧ = IPA created from orthography

(Frantz 2017: 2-3, 183)

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1. Digraphs: a family of non-contrastive sounds

- Before glottal stops:
  - <ai> has dialectal variants
    - [**ej**] like English *paid* (Káínai dialect)
    - [**aj**] like English *bite* (Siksiká dialect)
  - <ao> = [**aw**] like English *out*

	Káínai	*Siksiká*	
áí'poyiwa	⟦**éj**ʔpojiwạ⟧	⟦**áj**ʔpojiwạ⟧	'he speaks'
ák**ao**'toowa	⟦ák**aw**ʔtoːwạ⟧ =	⟦ák**aw**ʔtoːwạ⟧	'he has arrived'

⟦ ⟧ = IPA created from orthography

(Frantz 2017: 2-3, 183)

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1. Digraphs: a family of non-contrastive sounds

- In other positions (elsewhere; in open syllables)
    - <ai> has dialectal variants
        - [**æː**] like English *plaid* (Káínai dialect)
        - [**ej**] like English *paid* (Siksiká dialect)
    - <ao> like [**ɔː**] in English *dawn*
    - <oi> like [**oj**] in English *coin*

	Káínai		*Siksiká*	
áípotaawa	⟦**ǽ**ːpotaːwą̯⟧		⟦**éj**potaːwą̯⟧	'airplane'
áókska'siwa	⟦**ɔ́**ːkska?siwą̯⟧	=	⟦**ɔ́**ːkska?siwą̯⟧	'he's running'
nohk**óí**ksi	⟦noxʷk**ój**ksi̥⟧	=	⟦noxʷk**ój**ksi̥⟧	'my sons'

⟦ ⟧ = IPA created from orthography

(Frantz 2017: 2-3)

1. Digraphs: represent a family of non-contrastive sounds

● Digraphs obscure the actual phonetic pronunciation.
● Pronunciation varies due to phonological context and dialect.

Orthography   **Phonetic pronunciation**

\<ai\>   [ɛ], [æː]   or   [ej], [aj]

\<ao\>   [ɔ], [ɔː]   or   [aw]

\<oi\>   [y]   or   [oj]

monophthongs

diphthongs

(Frantz 1978, 2017: 2-3; Taylor 1969)

1. Digraphs: intraspeaker variation

- Even more variation than is reported in "reference" materials
- Narrow transcription of pronunciations of <ai> by Beatrice Bullshields (Blood dialect)
- Peter suggests: tense vowels or diphthongs next to plosives?

[ɛː] [ˈɛːpijʊk͡skḛ̥ːsi̥]
áípiiyokska'siwa
'he runs distances'

[eɪ] [ʔiçˈteɪ̥kimːiːweː]
iihtáíkimmiiwáyi
'he was lucky that she had pity for him'

[eː] [ˈeːpʊtːeː]
áípottaawa
'he's flying'

[ḁɛ] [kiˈt͡siːk͡stɛt kiˈtɛxkḁɛstʊtʊino̥ɛxsi]
kitsííksstato kitááhkaistotoinoahsi
'I want you to come to see her.'

2. Digraphs: represent underlying vowel sequences

- Digraphs represent underlying vowel sequences across morpheme boundaries (Elfner 2006; Frantz 2017: 186; Weber 2020).

⟦sap**í**ˢtotó:sa̧⟧
sap**í**stotóósa
[sap–**i**stoto]–:s–Ø
[correct–caus.TA]–2sg:3.imp–cmd
'reach an agreement with him!'

⟦sat**ɛ́ː**ˢtoto:s⟧
sat**áí**stotoosa
[sat**a**–**i**stoto]–:s–Ø
[offended–caus.TA]–2sg:3.imp–cmd
'purposely make her angry!'

⟦ ⟧ = IPA created from orthography

(Weber 2020: 241)

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3. Digraphs: represent underlying phonemic contrasts

● Some [ɛː] and [ɔː] are morpheme-internal, in overlapping environments with other long vowels. There is even a minimal pair:

[**ɔː**níːt]　　　　　　　　　　　　　[**aː**níːt]
aoníít　　　　　　　　　　　　　　**aa**níít
[**ao**–nii]–t–Ø　　　　　　　　　　[**aa**n–ii]–t–Ø
[hole–by.needle.ti]–2sg.imp–cmd　　[say–ai]–imp–cmd
'pierce it!'　　　　　　　　　　　　'say (s.t.)!'　　　　　　(BB)

NB: [oj] always occurs across a morpheme boundary.

(Weber 2020: 42)

Digraphs: represent underlying phonemic contrasts

- Phonological inventory: five long vowels, three short vowels
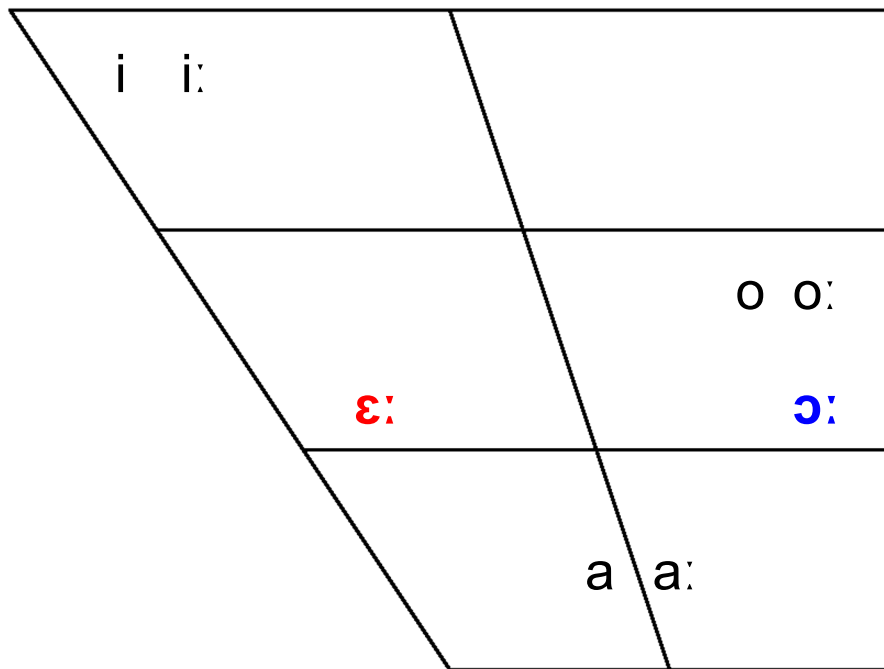
(Weber 2020: 41)

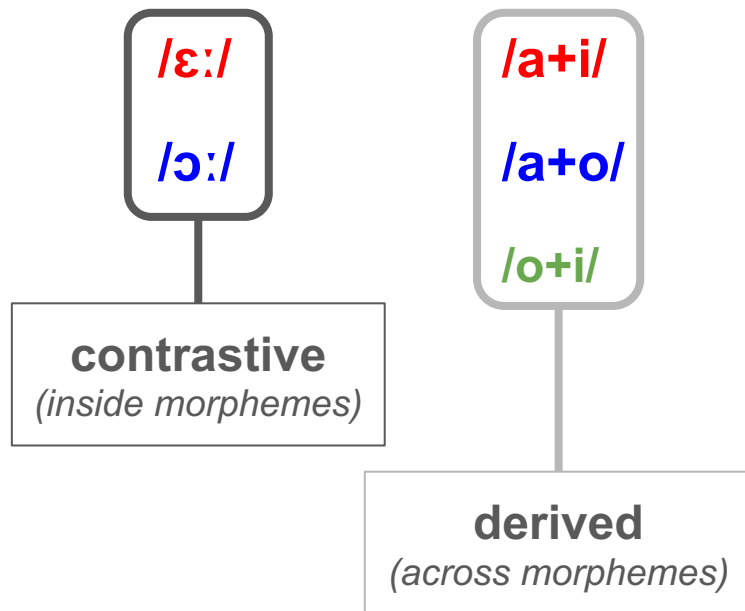# Relationship of digraphs, phonetics, and phonology

Orthography	Phonetic pronunciation	Underlying representation
<ai>	[ɛ] ~ [æː] ~ [ej] ~ [aj]	
<ao>	[ɔ] ~ [ɔː] ~ [aw]	
<oi>	[y] ~ [oj]	

/ɛː/
/ɔː/

/a+i/
/a+o/
/o+i/

contrastive
(inside morphemes)

derived
(across morphemes)

- Not always clear which aspect of digraphs researchers are studying.

Diphthongs

Diphthongs in previous research on Blackfoot

- Diphthongs are always a non-contrastive *phonetic variant* of monophthongs (Frantz 1978, 2017: 2-3; Kinsella 1972; Lowery 1979; Taylor 1969; Uhlenbeck 1938)

- Diphthongs have been mentioned as part of *phonological analyses*
    - Positional variants of mid vowels before glottal stop (Frantz 2017).
    - Diphthongization to [oj] is one vowel-hiatus resolution strategy, next to vowel coalescence, glide formation, and tolerance (Elfner 2006).

- ***No*** research focused only on diphthongs (acoustics, distribution, etc).

Summary of diphthongs and digraphs

- Digraphs represent a number of pronunciations
  - monophthongs like [æː] or [ɛ]
  - diphthongs like [ej] or [aj]
- Pronunciation is influenced by:
  - phonological context
  - dialect
  - speakers
  - unknown factors...
- Digraphs can occur:
  - across morpheme boundaries
  - inside of a morphemes as fully contrastive units
- No dedicated phonetic studies of diphthongs (as separate from digraphs)

Research goals

Research: goal and questions

Goal: study the variation between (mid vowel) monophthongs and diphthongs within and across speakers of Blackfoot

RQ1: In which environments do **monophthongs** occur? **diphthongs**?

RQ2: which factors influence the pronunciations of underlying vowel sequences?

RQ3: how are phonemic (morpheme-internal) mid vowels pronounced?

Corpus study

Why a corpus study?

Connected speech
    a. Some diphthongs occur at morpheme boundaries
    b. Natural speech shows what speakers actually do (vs. a lab context)
    c. Covid-19: crossing the border was not an option

Corpus for investigation

Recordings of connected speech (narrative) (age 50s~80s) [so far...]

Speakers	Gender	Band	Stories	Duration	Recording
Leo Fox	M	Káínai	Blood Clot	2:27 min	Glenbow Museum
Leo Fox	M	Káínai	Naapi ki siikokiinis	1:26 min	Glenbow Museum
Shirlee Crow Shoe	F	Aapátohsipikani	Friends	8:42 min	Recorded 2009
Earl Old Person	M	Aamsskáápipikani	One Frog Too Many	7:52 min	Recorded 2012

Data processing

(1) Ná:piowaʔán:ajɔwʔkˈiçką̆sá:kiɔxʷtáʔpawawʔw̥ą̆kajçk (H)
i:tówʔts:ton:átono:ksʷiʷksíˢtsikojĭçką̆. (..) (H)

Naapiowa   annayao'kihk   saakiohta'pawaawahkaiihk
Naapi–wa   ann–a–ya–o'k–iihk   saaki–oht–a'p–a–awahka–iihk
Naapi–PRX DEM–PRX–MOVG–??–NARR   still–from–around–IPFV–walk.AI–NARR

iito'tsstonnatonooksiksistsikoyihka.
ii\it–o't–sstonnat–onook–iksistsiko–iihk
IC\–then–here–terrible–stormy–day.II–NARR

'One time Napi was walking about when a great storm came up.'

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Previously Recorded Narratives

one frog too many
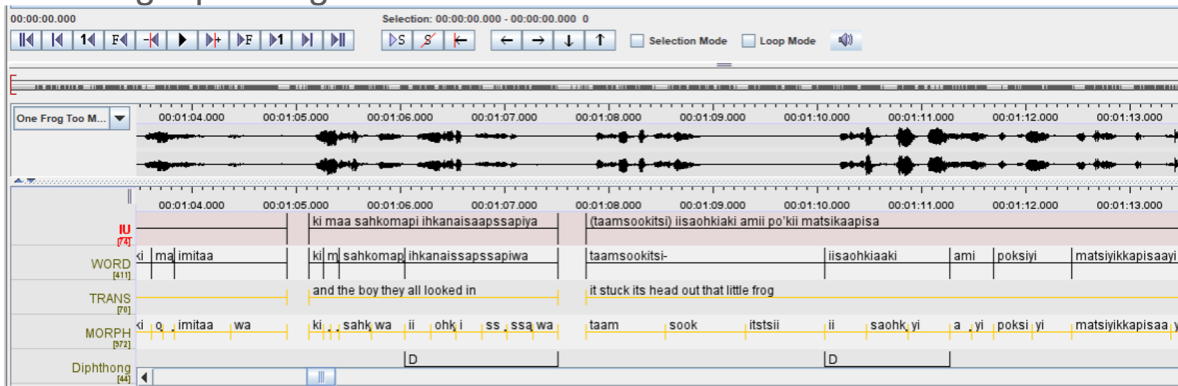by mercer and marianna mayer

The other two: recorded by Miyashita

Talking about images in the picture-only book "One Frog Too Many" (Mayer & Mayer 1975)

One was already orthographically transcribed and translated

Partially interlinearized in ELAN

Not phonetically transcribed → IPA transcribed -- only the words including diphthongs

Specific hypotheses

1. Digraphs before glottal stops are pronounced as diphthongs

2. Digraphs before long consonants are pronounced as short, lax vowels

3. Because diphthongs are one of several pronunciations of digraphs, no other orthographic sequences will be pronounced as diphthongs

4. Variation across speakers is due to dialect
   (currently untestable because there is one speaker per dialect)

5. Digraphs within a morpheme vs. across morpheme boundaries will be pronounced differently *(currently untestable; not enough tokens)*

Specific hypotheses

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5. ~~Digraphs within a morpheme vs. across morpheme boundaries will be~~ ~~pronounced differently~~ *~~(currently untestable; not enough tokens)~~*

Data and annotations

For every mid vowel and diphthong in the corpus, we:

- Transcribed what we heard
- Checked the formants visually
- Annotated the data for:
  - Monophthong vs. diphthong
  - Preceding consonant
  - Following consonant
  - Morpheme internal? (y/n)
  - Across word boundary? (y/n)
  - Stressed? (y/n)
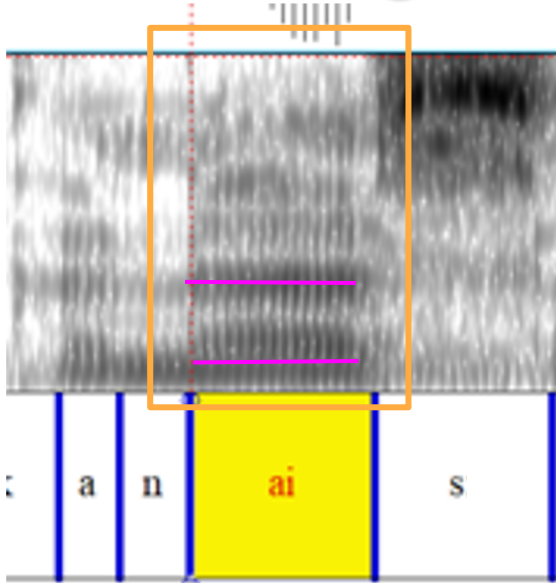
Data and annotations

Word (IPA)	Word (orthography)	Word (translation)	Story title	Speaker/Provenance	Line num	Time Stamp
ma:tomeipio:wɛksaw	máátomaipióówaiksaaw	they did not go far	Friends	Shirlee Crow Shoe		0:03:26
kiajaxkioxʷsi	kiayaahkioohsi	they were traveled by boat	One Frog Too Many	Earl Old Person		0:04:04
ots:a:kiajaxkioxʷsija	otssaakiayaahkioohsiya	when they were still traveling (by boat)	One Frog Too Many	Earl Old Person		0:04:24
má:txʷkoiʔtakiwe:ksa	maatohkoi'takiwaiksaaw	they didn't mind it	One Frog Too Many	Earl Old Person		0:04:16
naj:oo	nayoo	oh my!	Friends	Shirlee Crow Shoe		0:02:30
otsípçtxʷpejʔpi:ʔsi	otsipsstohpai'piiyihsi	that he jumped in	One Frog Too Many	Earl Old Person		0:07:14
s:amitapxʷkitxʷpejʔpi:	stamitapohkitohpai'piiyi	he jumped on (him)	One Frog Too Many	Earl Old Person		0:07:17
ꜛâ:wasejʔnꜛî:naii	aawaasainiinayi	crying	Blood Clot	Leo Fox (Glenbow Museum	7	
kejʔsxʷkawa:ʔsejʔniw	kai'sohkawaa'sainiw	he cried out	Friends	Shirlee Crow Shoe		0:03:40
awa:sejʔniw	awaasai'niw	he was crying	Friends	Shirlee Crow Shoe		0:07:09
itọkí:mi:çkınɛ:	litohkiimiihkinai	he (obv.) was married	Blood Clot	Leo Fox (Glenbow Museum	1	
ọtáwạkómọọkiç (...) kɛ̣ɛ̣	otaawa'komookihkai	he (obv.) was made to chase them for him (prox	Blood Clot	Leo Fox (Glenbow Museum	3	

Data and annotations

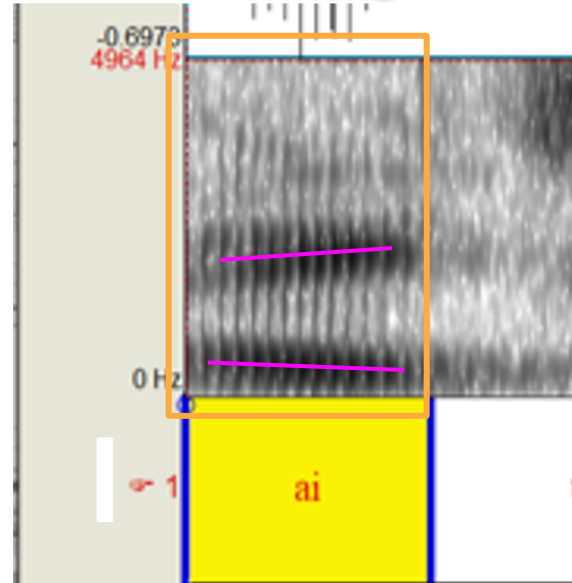| UR/Orth	Phonetics	Diphthongized? (y/n)	Tautomorphemic? (y/n)	Across word boundaries?	Stressed? (y/n)	Occurs after which sound?	Occurs before which sound?
ai	ɛ	n	n?	n	n	w	k
io	io	y	n?	n	n	k	x^w
io	io	y	n?	n	n	k	x^w
oi	øi	y	n?	n	n	k	ʔt
a	a	y	y	n	?	n	j
ai	ej	y	y	n	n	p	ʔp
ai	ej	y	y	n	n	p	ʔp
ai	ej	y	y	n	n	s	ʔn
ai	ej	y	y	n	n	s	ʔn
ai	ej	y	y	n	n	s	ʔn
ai#	ɛː	n	y	n	n	n	#
ai#	ɛː	n	y	n	n	k	#

Earl Old Person

[æː] 🔊

[ej] 🔊

Ihkan**ai**sapssapiwa
'they all looked in'

aitssapakaopiiwa
'he sat in it'

Hypotheses #1 and #2

- Digraphs before glottal stops are pronounced as diphthongs → PARTLY TRUE
- Digraphs before long consonants are pronounced as short, lax vowels → TRUE

	<ai>	<ao>	<oi>
Total # tokens	85	34	8
Before [ʔ]	[ej], [eː]	[ɔ], [ɔː] [ow], [ɔw]	øi (1 token)
Before CC	[æ], [ɛ], [a]	(none)	[oj] (2 tokens)
Elsewhere	[æː], [ɛː], [ɛ] [aiː], [aj], [eː], [e], [ej]	[ɔː], [ɔ] [aw], [ɔw]	[oj]

Hypothesis #3

- Because diphthongs are one of several pronunciations of digraphs, no other orthographic sequences will be pronounced as diphthongs → <u>FALSE</u>!

1. [inɔ́wʔks**êj**ʔs:kʌ́m:içhkạ]
   <iinao'ks**ay**sskammiihka>
   iinao'k-s**aw**-sskaa-mm-iihk
   however-neg-break.ai-ind-report
   'but it did not break'   *Naapi ki siikokiinis* by Leo Fox

2. [s:kaiʔsawaxsim::iw**aj**]
   <sskai'sawaahsimmiiw**ayi**>
   sska'-isaw-yaahsimm-ii-w=**ayi**
   shock-neg-feel.pleased.ta-dir-3=3obv
   'he is not very pleased'   *Friends* by Shirlee Crow Shoe

- Conclusion: diphthongs are widespread!

Future work

Natalie and Mizuki's transcriptions/perception do not always match

- Future:
  - include acoustic measurements (F1, F2)
  - add more tokens to the corpus
  - study environments (outside of digraphs) where monophthongs and diphthongs occur
- Ideally: statistical models (if we have enough tokens)

Implications

Disconnecting diphthongs and digraphs

Blackfoot Grammar, 3rd ed. (Frantz 2017)

"Diphthongs" section discusses digraphs

- First few chapters written for people without linguistics training (Miyashita and Many Bears 2018)

- But this may mislead learners and researchers in several ways...

DIPHTHONGS

ai varies among speakers and from dialect to dialect. Before double consonants (see below) it is about like the <u>ai</u> of English <u>said</u>:

áínnisiwa	'he descends/falls'
áíkkiwa	'he blows a whistle'

Before a glottal stop (written **'**; see below) or another vowel <u>i</u> it is similar to the <u>ai</u> of English <u>paid</u> (though on the Siksika Reserve it may sound like the <u>i</u> of English <u>bite</u>):

áí'poyiwa	'he speaks'
náíipisstsiwa	'it is cloth'

In other positions of a word, this diphthong will sound like the <u>ai</u> of English <u>plaid</u> on the Blood Reserve, but like the <u>ai</u> of English <u>paid</u> on the Siksika Reserve:

Confusion in the literature

- Digraphs may be confused with *diphthongs*

"Frantz (1997) observes **three diphthongs** in Blackfoot: [ai], [ao] and [oi]." (Peterson 2004).

Confusion in the literature

- Digraphs may be confused with *phonemes*.

Kaneko claims there is a symmetrical vowel system with three phonemic short vowels, three phonemic long vowels, and **three phonemic diphthongs** (Kaneko 1999: 13-14).

"Blackfoot also has **long diphthongs**, and the mid front vowel /ɛ/ is a reduction of the long diphthong /ai/" (Derrick 2007: 1).

Denzer-King discusses the "**underlying vowels and diphthongs** in Blackfoot" (Denzer-King 2009: 17)

Confusion in the literature

- Digraphs obscure phonetic *variation*.

  Digraphs 'include *ai*, and *ao* **realized as long monophthongs, /ɛː/ or /eː/, and /ɔː/**, respectively. Blackfoot's only true diphthong is /ɔj/, represented orthographically as *oy* or *oi*' (Stacy 2004: 9-10).

(see Gambarage 2017 for a similar discussion of Bantu orthography)

Connections to language teaching and learning

- The orthography might not tell you all the information you need about how words are pronounced
- Teachers might want to use these generalizations and teach them explicitly

Summary

- Diphthongs =/= digraphs
- These are often *confused* in the Blackfoot literature
- Preliminary corpus study results:
  - all three speakers use a mix of phonetic monophthongs and diphthongs.
  - phonological context affects pronunciation
  - some variation remains unexplained
- Diphthongs could be studied in their own right in the future.

Acknowledgements

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  - Leo Fox (Káínai; Blood)
  - Shirlee Crow Shoe (Aapátohsipikani; Northern Piegan)
  - Earl Old Person (Aamsskáápipikani; Blackfeet or Southern Peigan)
  - Rosella Many Bears (Káínai; Blood - Transcriber/Translator)
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In memoriam

Don Frantz

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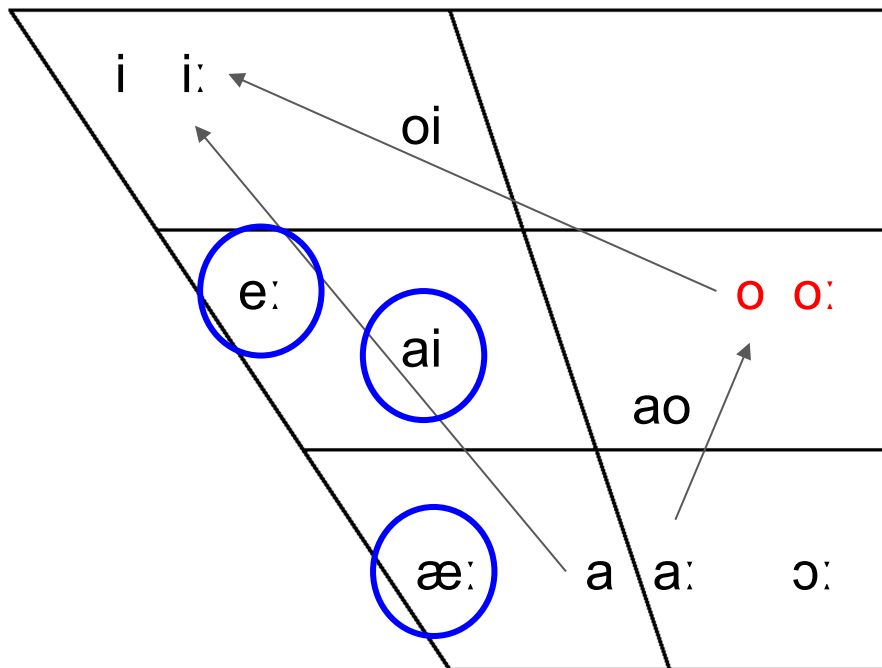
Digraphs: relationship to phonemes
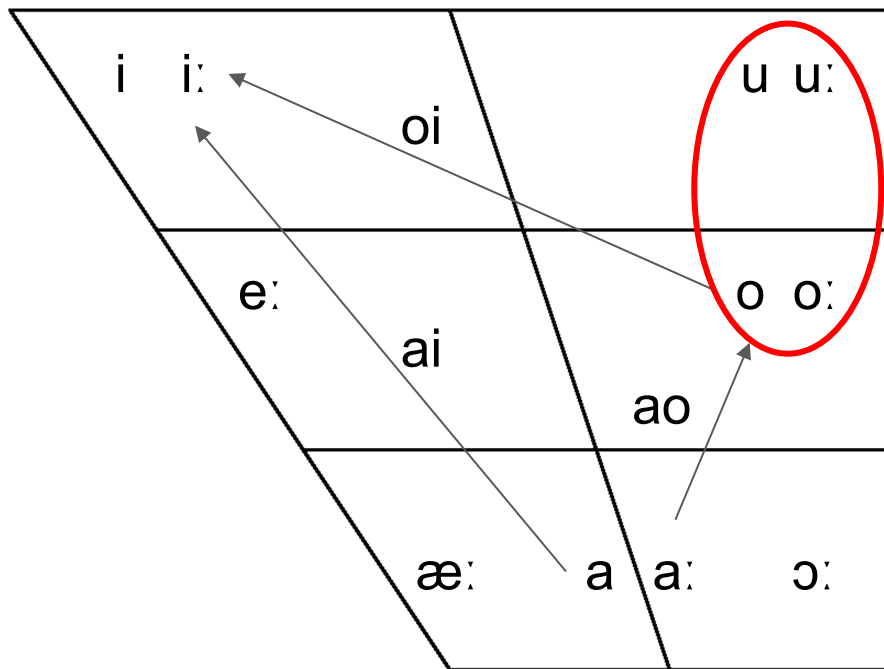
[u uː] ~ [o oː]

(modified from Frantz 1978; Weber 2020; only open syllables shown)
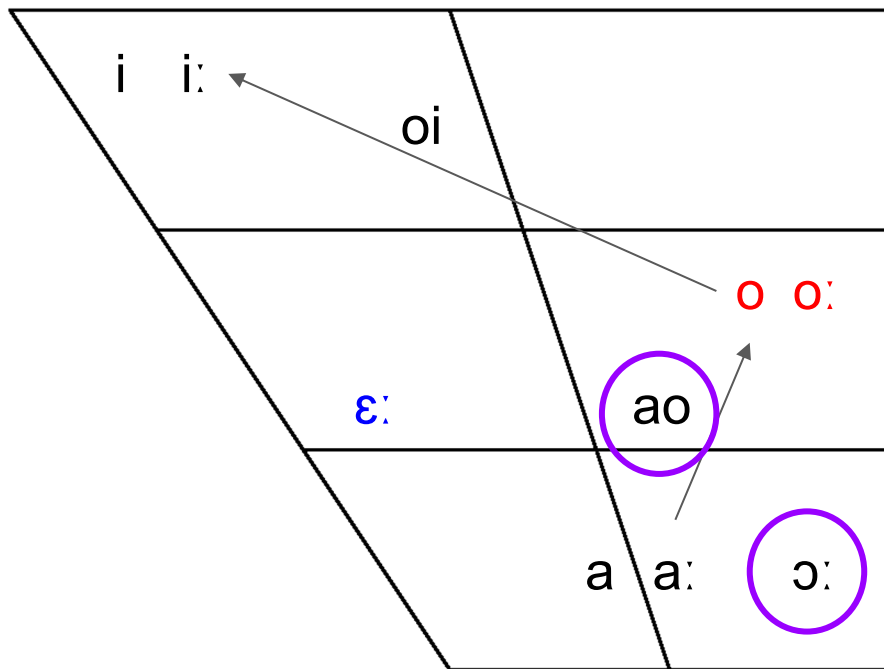
Digraphs: relationship to phonemes

/o oː/ = [u uː] ~ [o oː]

[eː] ~ [æː] ~ [ai]

(modified from Frantz 1978; Weber 2020; only open syllables shown)
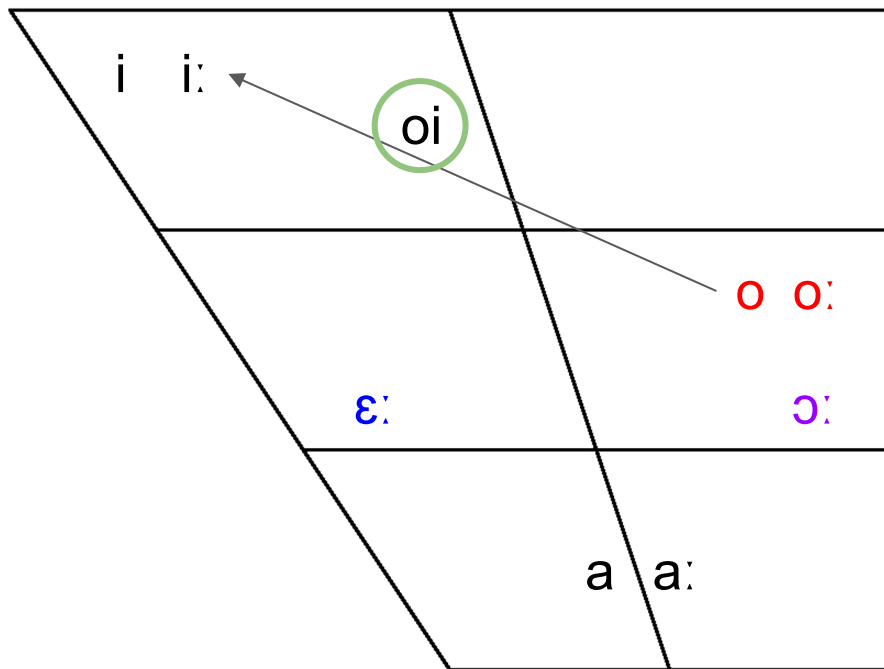
Digraphs: relationship to phonemes

/o oː/ = [u uː] ~ [o oː]

/ɛː/ =   [eː] ~ [æː] ~ [ai]

          [ɔː] ~ [ao]

(modified from Frantz 1978; Weber 2020; only open syllables shown)

Digraphs: relationship to phonemes

/o oː/ = [u uː] ~ [o oː]

/ɛː/ = [eː] ~ [æː] ~ [ai]

/ɔː/ = [ɔː] ~ [ao]

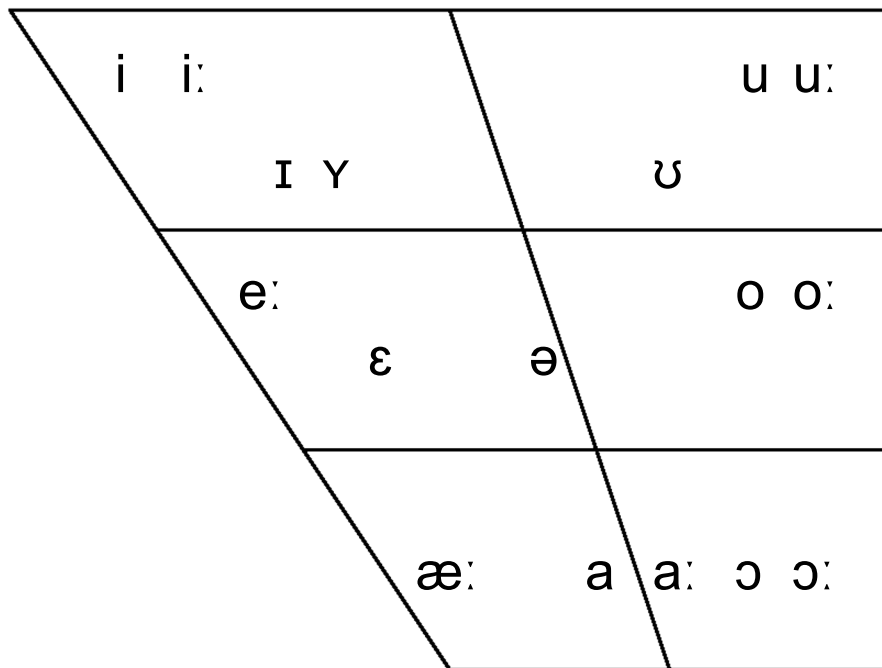(modified from Frantz 1978; Weber 2020; only open syllables shown)

Relationship of digraphs, phonemes, and pronunciation

Orthography	Phonology	Phonetics
<ai>	/ɛː/	[eː] ~ [æː] ~ [ai]
<ao>	/ɔː/	[ɔː] ~ [ao]
<oi>		[y] ~ [oi]

"Digraphs" in previous research

● Represent a variety of non-contrastive pronunciations

i   iː   u uː

        ɪ ʏ   ʊ

    eː   o oː

          ɛ   ə

                                                      (modified from Frantz 1978)

    æː   a aː ɔ ɔː

Napi and the Black Birch

One time **Napi** was walking about when a great storm came up. The strong wind began to blow him all over the place. He grasped at the branches of trees and bushes as he went by, but they all broke off in his hand. Finally, he clutched at a birch tree. The flexible birch bent, but did not break and **Napi** was able to stop.

When the storm died down, **Napi** climbed out of the tree and began beating it with a stick. "Why did you stop me? I was having such fun being blown about by the big wind!" The marks left by the beating are still visible on the striped bark of birch trees.

We learned from this story that black birch makes good tipi pegs and will always hold our lodges down in a wind storm.

Listen to the story in Blackfoot (1m 26sec, 507KB)

top

Courtesy of Glenbow Museum

Naapi ki Siikokiinis

Naapiowa annayao'kihk saakiohta'pawaawahkayihk
iito'tsstonnatonooksiksistsikoyihk.
Iimo'tapa'paohpapokayihk anni niitsiiksopoyihk.
Iimo'tapa'pao'kaasiihk. Onoohko'kasatoohpistsi miistsiisti
aikaksskayihkiaistsi. Nainowayissinio'tsimihk mi siikokiinis.
Ayiisskohpapokayiihk ma siikokiinis iinao'ksaisskammihk.
Aisawattohta'pohpapokayihk Naapiowa.

Otaipanissi, Naapiowa iitsinisaatsiih mi siikokiinis
iito'kaasiihk miistsisi itomatapipotsiihkai.
"Kimo'kattssikaakssi, noohkitsit a'paohpapokay!
Nohksskaitaami'tsi'pinai sopoyi nitsita'paohpapokaani!"
Annihkayi siikokiinistsiiksi ihtaisisakksinammiawa annohk.
Annahkao'k Naapiowa omattaipotahsai.

Aamoi atsiniksini ihto'tssksini'p siikonkiinistsi
otsoka'pissawa aahkohtaisstaoka'tskao'saawa.
Maataakohtsikoohpapoka'wa kitsiitokoyinnoonistsi
iimakomayiiksoposi.

Niitsi'powahsini niitsistsiiwakatoot (1m 26sec, 507KB)

Spoohtsi

ihtsspomihtawa
Glenbow Museum

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(1) Ná:piowaˀán:ajɔwˀkˈiçką̆sá:kioxʷtáˀpawawˀw̥ą̆kaĵçk (H)
     i:tówˀts:ton:átono:ksʷiʷksíˢtsikojĭçką̆. (..) (H)

Naapiowa   annayao'kihk   saakiohta'pawaaawahkaiihk

Naapi–wa   ann–a–ya–o'k–iihk   saaki–oht–a'p–a–awahka–iihk

Naapi–PRX   DEM–PRX–MOVG–??–NARR   still–from–around–IPFV–walk.AI–NARR

    iito'tsstonnatonooksiksistsikoyihka.

    ii\it–o't–sstonnat–onook–iksistsiko–iihk

    IC\–then–here–terrible–stormy–day.II–NARR

'One time Napi was walking about when a great storm came up.'

(2) i:múˀtapaˀpɔxʷpápokajˀˈiçkán:iəni: (H) ni:tsí:ji:ksopoĭçką̆ (..) (H)

Iimo'tapa'paohpapokayihk   anni   niitsiiyiiksopoiihka.

ii\omo'tap–a'p–a–ohpapoka–iihk   ann–i   niit–iiyiik–sopo–iihk

IC\all.over–around–IPFV–cause.blow.II–NARR   DEM–IN.SG   true–hard–blow.II–NARR

'The strong wind began to blow him all over the place.'

Word (orthography)	Word (translation)	Story title	Speaker/Provenance
kitsisskawayinnoon	our people	Blood Clot	Leo Fox (Glenbow Museum)
iinaksipokayini	baby	Blood Clot	Leo Fox (Glenbow Museum)
noohkitsita'paohpapok**aay**	from blowing around	Naapi ki siikokiinis	Leo Fox (Glenbow Museum)

# Diphthongs in previous research in Blackfoot (cont.)

- No consensus on how diphthongs are "treated"
  - Non-contrastive variants of monophthongs.
    - *ai* varies with [εj] or even [εː], which Uhlenbeck (1938) writes invariably as *ai*
    - Taylor (1969) writes [ai] and [εː] in different phonological environments
  - /ai/ and /ao/ treated as vowel sequences (Uhlenbeck 1938, Taylor 1969, Kinsella 1972, Lowery 1979)
    - Taylor (1969) lists diphthongs in the "long vowels" section
    - *ai* and *au* are the most "diphthong-like" vowel combinations (Uhlenbeck 1938)
    - Kinsella (1972) and Lowery (1979) do not include diphthongs in the vowel inventory, but transcriptions include vowel sequences, e.g. [ai] (Kinsella 1972); [ay] (Lowery 1979).
  - Peter (2014) and Kaneko (1999) include narrow phonetic transcriptions, including diphthongs

Data and annotations

| Occurs a	Occurs bef	Occurs bef	Word (IPA)	Word (orthography)	Word (translation)	Story title	Speaker/Provenance
p	w	w	ná:pjoẉą	Naapiowa	Naapi	Naapi ki siikokiinis	Leo Fox (Glenbow M
p	w	w	ná:pjoẉą	Naapiowa	Naapi	Naapi ki siikokiinis	Leo Fox (Glenbow M
k	#		ʔiçkókjọ	ihkokkiwa	what he gave us	Blood Clot	Leo Fox (Glenbow M
m	ssk	sC	m⁺óisk	moisk	this	Blood Clot	Leo Fox (Glenbow M
m	#		á:moj	Aamoi	this	Naapi ki siikokiinis	Leo Fox (Glenbow M
k	s:	gem s	otêjʔtsinikois:i	Otai'tsinikoissi	when they had told him their story	Blood Clot	Leo Fox (Glenbow M
t	xp	x	manɪˢtókstotojçpja:w	maanistoksistotoihpiaaw	he devised a plan to do them wrong	Blood Clot	Leo Fox (Glenbow M
k	#		ksaxkoj	ksaahkoyi	land	Blood Clot	Leo Fox (Glenbow M
p	xk	x	ni:tsí:ji:ksopoiçką	niitsiiyiiksopoiihka	strong wind	Naapi ki siikokiinis	Leo Fox (Glenbow M
k	xk	x	mʌt:siksɪksíˢtsikoi:çkʰ	mattsiksistsikoyiihk	one day	Blood Clot	Leo Fox (Glenbow M
t	xk	x	itóxʷtôî:çkjậ:w	iitoohtoyiihkiawa	they heard him	Blood Clot	Leo Fox (Glenbow M
n	xk	x	itsínoi:çkja	iitsinoyiihkia	they saw him	Blood Clot	Leo Fox (Glenbow M
k	n:	gem nas	kitsí:toko:jn:o:nɪˢtsj	kitsiitokooinnoonistsi	our lodges	Naapi ki siikokiinis	Leo Fox (Glenbow M
n	j	j	naj:oo	nayoo	oh my!	Friends	Shirlee Crow Shoe
m	sst	sC	omes:ton:at:s:oxʷkoyoxwtsimi:nayi	omaisstonnattssoohkoyoohtsimiina	he is difficult to listen (to people/obey)	Friends	Shirlee Crow Shoe
#	k:	gem obs	ɛk:atsimaw	aikkatsimaaw	it is croakin	Friends	Shirlee Crow Shoe
t	s:	gem s	kjáxkitɛ:-is:atɛ:stotowaw	kitááhkisitaissataistotowa	you might make him (angry)	Friends	Shirlee Crow Shoe
p	ʔp	glot	tamso:kxʷtsips:txʷpejʔpi:yini	tamsookohtsipsstohpai'piiyini	Suddenly he jumped inside	Friends	Shirlee Crow Shoe
k	ʔs	glot	iskéjʔsawaxsi-	isskai'sawaahsi-	he was not happy	Friends	Shirlee Crow Shoe

Earl Old Person

[æː]

[æː]

[ej]
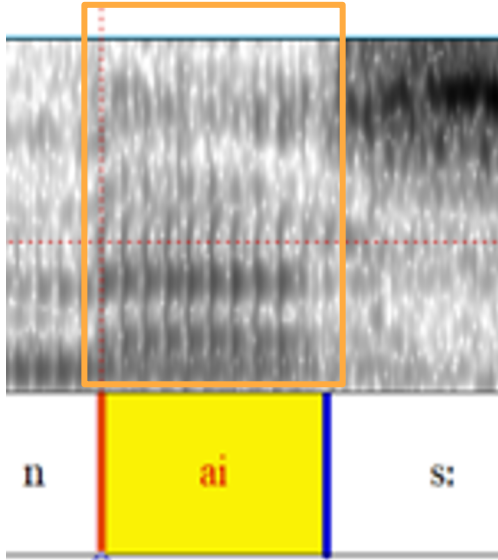
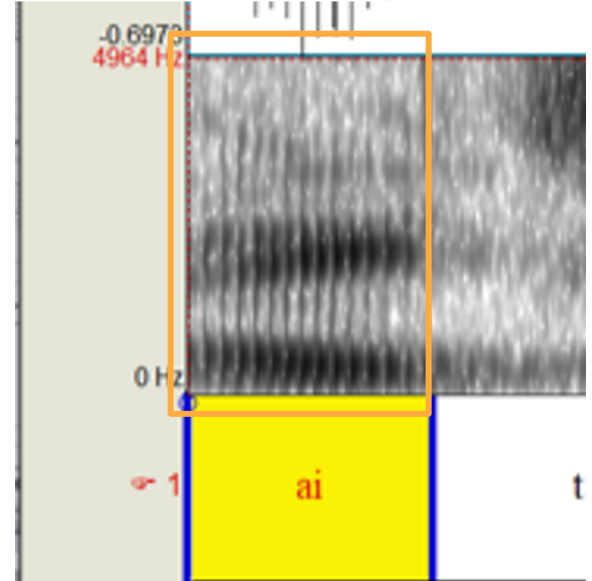
Aohkanaisapopiiya
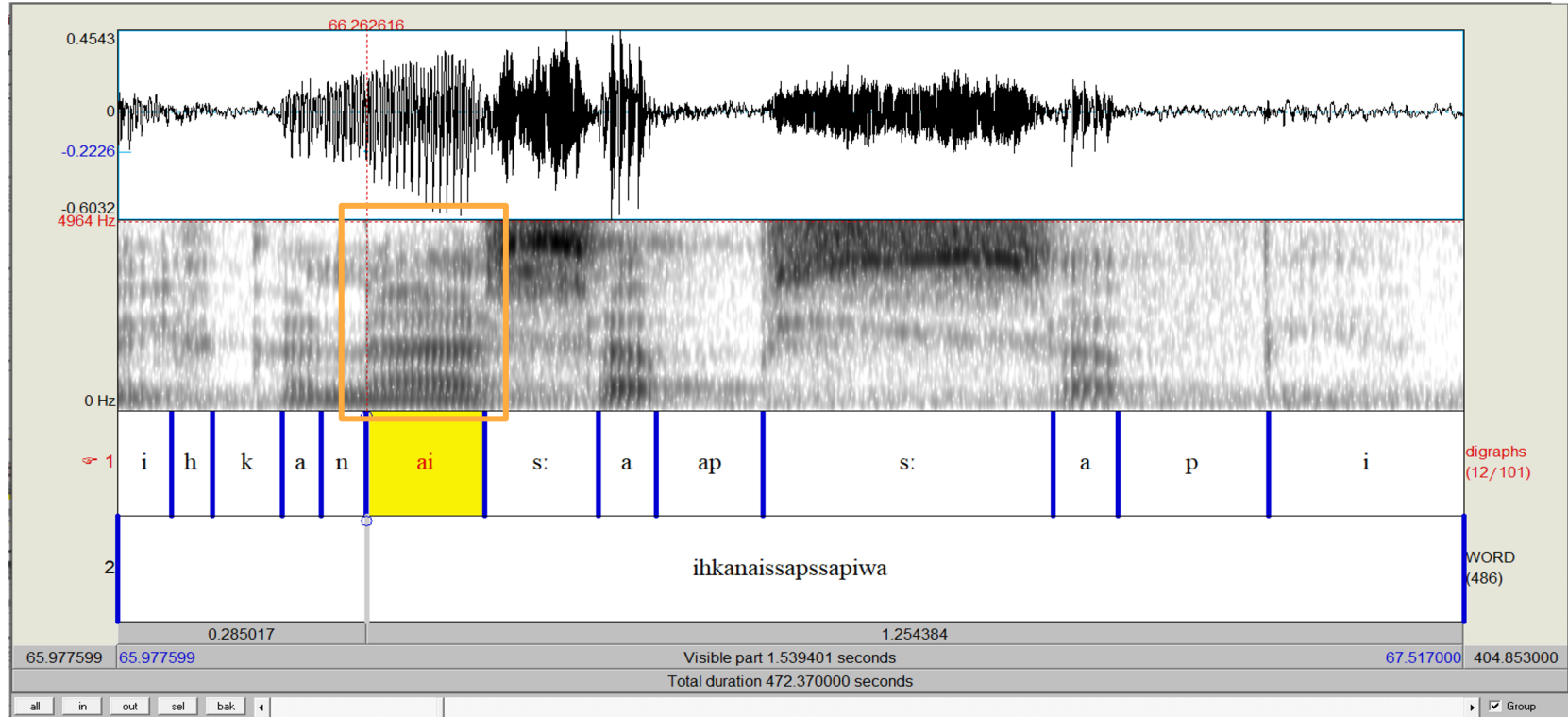'they all went in it'
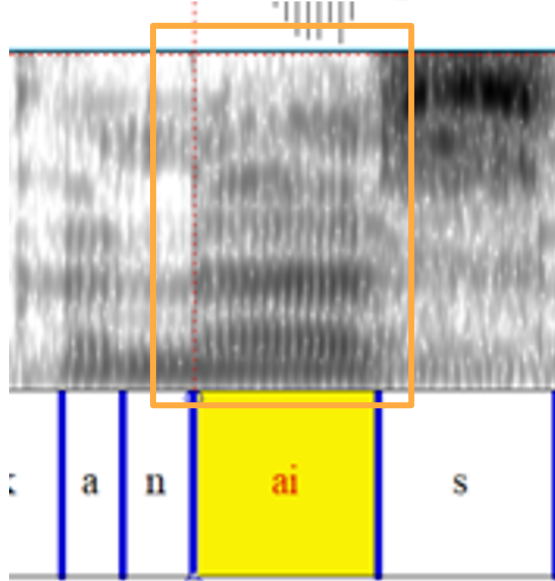
Ihkanaisapssapiwa
'they all looked in

aitssapakaopiiwa
'he sat in it'

Earl Old Person

Earl Old Person

258.286788

3103

0

1207

7969

0 Hz

4 Hz

0 Hz

| ao | h | k | a | n | ai | s: | a | p | o | p | i: | y | a |

ki | aohkanaisapopiiya | mii

D | D

0.417592 | 1.033662