

Tibetan Corpus Linguistics:  
present obstacles and future prospects

Nathan W. Hill and Edward Garrett

# Tibetan in Digital Communication

## Overview

1. Current analytic obstacles

# Tibetan in Digital Communication

## Overview

1. Current analytic obstacles
2. Software development desiderata

# Tibetan in Digital Communication

## Overview

1. Current analytic obstacles
2. Software development desiderata
3. Future research questions

# Tibetan in Digital Communication

## Overview

1. Current analytic obstacles
2. Software development desiderata
3. Future research questions
4. Future collaborations

# Tibetan in Digital Communication

## Overview

1. Current analytic obstacles
2. Software development desiderata
3. Future research questions
4. Future collaborations
5. Possible projects

# Current analytical obstacles

- Demonstrative uses of relator nouns

# Current analytical obstacles

- Demonstrative uses of relator nouns
- Zero nominalization of verbs

# Current analytical obstacles

- Demonstrative uses of relator nouns
- Zero nominalization of verbs
- Names

# Current analytical obstacles

- Demonstrative uses of relator nouns
- Zero nominalization of verbs
- Names
- A few tricky words

*rañ, re, etc.*

# Demonstrative uses of relator nouns

Demonstratives are sometimes used without an antecedent.

- *der tshogs-paḥi lha-mi*

The gods and men who had gathered there

## Demonstrative uses of relator nouns

Demonstratives are sometimes used without an antecedent.

- *der tshogs-paḥi lha-mi*

The gods and men who had gathered there

We consequently treat some spatial words as demonstratives.

## Demonstrative uses of relator nouns

Demonstratives are sometimes used without an antecedent.

- *der tshogs-paḥi lha-mi*

The gods and men who had gathered there

We consequently treat some spatial words as demonstratives.

- *phug-paḥi mdun-na mar log ḥgro-ḥiḥ ḥdug-pa-la*

While they were returning back down, passing in front of the cave.

## Demonstrative uses of relator nouns

Demonstratives are sometimes used without an antecedent.

- *der tshogs-paḥi lha-mi*

The gods and men who had gathered there

We consequently treat some spatial words as demonstratives.

- *phug-paḥi mdun-na mar log ḥgro-ḥin ḥdug-pa-la*

While they were returning back down, passing in front of the cave.

We consequently treat relator nouns, when they are not relating, as demonstratives.

## Demonstrative uses of relator nouns

Demonstratives are sometimes used without an antecedent.

- *der tshogs-paḥi lha-mi*

The gods and men who had gathered there

We consequently treat some spatial words as demonstratives.

- *phug-paḥi mdun-na mar log ḥgro-ḥiḥ ḥdug-pa-la*

While they were returning back down, passing in front of the cave.

We consequently treat relator nouns, when they are not relating, as demonstratives.

- *phi-na gos-daḥ / naḥ-na ḥtsho-ba phye-daḥ bcud ye med-paḥi stobs-kyis / lus keḥ-rus ltar soḥ-ba /*

Because neither clothes outside nor nourishment inside, whether food or drink, had he any, his body became like a skeleton.

## Demonstrative uses of relator nouns

Demonstratives are sometimes used without an antecedent.

- *der tshogs-paḥi lha-mi*

The gods and men who had gathered there

We consequently treat some spatial words as demonstratives.

- *phug-paḥi mdun-na mar log ḥgro-ḥiḥ ḥdug-pa-la*

While they were returning back down, passing in front of the cave.

We consequently treat relator nouns, when they are not relating, as demonstratives.

- *phi-na gos-daḥ / naḥ-na ḥtsho-ba phye-daḥ bcud ye med-paḥi stobs-kyis / lus-keḥ-rus ltar soḥ-ba /*

Because neither clothes outside nor nourishment inside, whether food or drink, had he any, his body became like a skeleton.

Maybe the spatial (temporal) uses of relator nouns and demonstratives should get a special tag?

## Zero nominalization of verbs

In general Tibetan requires a suffix to change a verbal stem to a verbal noun, but not always, especially not in poetry.

- *bla-maḥi gsun // ma-rig min-pa dbyins-su dag /*

The words of the guru, which are not ignorant, are as pure as space.

## Zero nominalization of verbs

In general Tibetan requires a suffix to change a verbal stem to a verbal noun, but not always, especially not in poetry.

- *bla-maḥi gsun // ma-rig min-pa dbyins-su dag /*

The words of the guru, which are not ignorant, are as pure as space.

- *ḥdir bźugs gsan cig*

'listen, O you who sit here!'

## Zero nominalization of verbs

In general Tibetan requires a suffix to change a verbal stem to a verbal noun, but not always, especially not in poetry.

- *bla-maḥi gsun // ma-rig min-pa dbyins-su dag /*

The words of the guru, which are not ignorant, are as pure as space.

- *ḥdir bźugs gsan cig*

'listen, O you who sit here!'

- *gzun-dan ḥdzin-paḥi sgrib gñis bral*

free from the two obscurations of 'taken' and 'taker'

## Zero nominalization of verbs

In general Tibetan requires a suffix to change a verbal stem to a verbal noun, but not always, especially not in poetry.

- *bla-maḥi gsuñ // ma-rig min-pa dbyiñs-su dag /*

The words of the guru, which are not ignorant, are as pure as space.

- *ḥdir bźugs gsan cig*

'listen, O you who sit here!'

- *gzuñ-dañ ḥdzin-paḥi sgrib gñis bral*

free from the two obscurations of 'taken' and 'taker'

- *ña-rgyal-dañ ni ma-dad dañ // don-du gñer-ba med ñid dañ // phyi-rol-rnam-g.yeñ-nañ-bsdus dañ // skyo-ba-ñan-paḥi dri-ma yin //*

Pride and lack of faith, lack of interest and being distracted outward, being withdrawn inward and dejection, (these) are flaws of listening.

# Names

Names made up of more than one word make our word breaking inconsistent.

- *Chos kyi blo-gros*

'Intelligence of dharma'

# Names

Names made up of more than one word make our word breaking inconsistent.

- *Chos kyi blo-gros*  
'Intelligence of dharma'
- *Rgyal-po hi khab*  
'King's palace'

# Names

Names made up of more than one word make our word breaking inconsistent.

- *Chos kyi blo-gros*

'Intelligence of dharma'

- *Rgyal-po hi khab*

'King's palace'

Ultimately this is solvable by tagging them as if they were not names and adding an additional workflow step of 'named entity recognition'.

## A few tricky words

- rañ

- [p.refl]

*rañ gi bu-mo rnams sad-du btañ-ste* '(he was) sent to wake his own daughters'

*khyed rañ* 'you', *ña rañ* 'I', etc.

## A few tricky words

- rañ

- [p.refl]

*rañ gi bu-mo rnams sad-du btañ-ste* '(he was) sent to wake his own daughters'

*khyed rañ* 'you', *ña rañ* 'I', etc.

- [p.pers]

*rañ gis rañ la lcag btab-nas* 'they each hit one another'

## A few tricky words

- rañ

- [p.refl]

*rañ gi bu-mo rnams sad-du btañ-ste* '(he was) sent to wake his own daughters'

*khyed rañ* 'you', *ña rañ* 'I', etc.

- [p.pers]

*rañ gis rañ la lcag btab-nas* 'they each hit one another'

- [d.det]

*khyod las rem-po rañ źig* 'one more assiduous even than thou'

## A few tricky words

- rañ

- [p.refl]

*rañ gi bu-mo rnams sad-du btañ-ste* '(he was) sent to wake his own daughters'

*khyed rañ* 'you', *ña rañ* 'I', etc.

- [p.pers]

*rañ gis rañ la lcag btab-nas* 'they each hit one another'

- [d.det]

*khyod las rem-po rañ žig* 'one more assiduous even than thou'

- [???

*la-la na-re Mar-pa rañ smyos-nas* 'some said Marpa (himself) had gone (quite) crazy'.

## A few tricky words

- *re*
  - [p.indef]  
*re ran* 'each' (we use this tag inconsistently)

## A few tricky words

- *re*

- [p.indef]

*re ran* 'each' (we use this tag inconsistently)

- [d.det]

*yum-gyis nas khal re yod-paḥi chaṅ tshod chen-po gsum btsos-pa-la*

'mother cooked up each load of barley that she had into three great measures of beer'

## A few tricky words

- *re*

- [p.indef]

*re ran* 'each' (we use this tag inconsistently)

- [d.det]

*yum-gyis nas khal re yod-paḥi chaṅ tshod chen-po gsum btsos-pa-la*

'mother cooked up each load of barley that she had into three great measures of beer'

- [n.count]

*re žig* 'one time', *re* 'hope'

## A few tricky words

- *re*

- [p.indef]

*re ran* 'each' (we use this tag inconsistently)

- [d.det]

*yum-gyis nas khal re yod-paḥi chaṅ tshod chen-po gsum btsos-pa-la*  
'mother cooked up each load of barley that she had into three great measures of beer'

- [n.count]

*re žig* 'one time', *re* 'hope'

- [num.card]

*žo re žo do* 'one or two ounces'

# Software development desiderata

- Automation of recompiling and retagging

# Software development desiderata

- Automation of recompiling and retagging
- Incorporation of Pablo's consistency tester

# Software development desiderata

- Automation of recompiling and retagging
- Incorporation of Pablo's consistency tester
- Post hoc rule based consistency checker

# Software development desiderata

- Automation of recompiling and retagging
- Incorporation of Pablo's consistency tester
- Post hoc rule based consistency checker
- Seamless web interface

# Post hoc rule based consistency checker

- Negation and verb stems

*mi* [neg] *dgah-ba* [n.v.fut.n.v.pres] 'not happy'

*mi* [n.count] *dgah-ba* [n.v.invar] 'happy person'

# Post hoc rule based consistency checker

- Negation and verb stems

*mi* [neg] *dgah-ba* [n.v.fut.n.v.pres] 'not happy'

*mi* [n.count] *dgah-ba* [n.v.invar] 'happy person'

\**mi* [n.count] *dgah-ba* [n.v.fut.n.v.pres]

\**mi* [neg] *dgah-ba* [n.v.invar]

# Post hoc rule based consistency checker

- Negation and verb stems

*mi* [neg] *dgaḥ-ba* [n.v.fut.n.v.pres] 'not happy'

*mi* [n.count] *dgaḥ-ba* [n.v.invar] 'happy person'

\**mi* [n.count] *dgaḥ-ba* [n.v.fut.n.v.pres]

\**mi* [neg] *dgaḥ-ba* [n.v.invar]

- If *mi* is [n.count] then change *dgaḥ-ba* [n.v.fut.n.v.pres] to *dgaḥ-ba* [n.v.invar]

# Post hoc rule based consistency checker

- Negation and verb stems

*mi* [neg] *dgaḥ-ba* [n.v.fut.n.v.pres] 'not happy'

*mi* [n.count] *dgaḥ-ba* [n.v.invar] 'happy person'

\**mi* [n.count] *dgaḥ-ba* [n.v.fut.n.v.pres]

\**mi* [neg] *dgaḥ-ba* [n.v.invar]

- If *mi* is [n.count] then change *dgaḥ-ba* [n.v.fut.n.v.pres] to *dgaḥ-ba* [n.v.invar]
- If *mi* is [neg] then change *dgaḥ-ba* [n.v.invar] to *dgaḥ-ba* [n.v.fut.n.v.pres]

# Post hoc rule based consistency checker

*de* [adv.proclausal] *hi* [case.gen] *tshe* [n.rel] 'at that time'

*de* [d.dem] *hi* [case.gen] *tshe* [n.count] 'his life'

# Post hoc rule based consistency checker

*de* [adv.proclausal] *hi* [case.gen] *tshe* [n.rel] 'at that time'

*de* [d.dem] *hi* [case.gen] *tshe* [n.count] 'his life'

\**de* [d.dem] *hi* [case.gen] *tshe* [n.rel]

\**de* [adv.proclausal] *hi* [case.gen] *tshe* [n.count]

# Post hoc rule based consistency checker

*de* [adv.proclausal] *hi* [case.gen] *tshe* [n.rel] 'at that time'

*de* [d.dem] *hi* [case.gen] *tshe* [n.count] 'his life'

\**de* [d.dem] *hi* [case.gen] *tshe* [n.rel]

\**de* [adv.proclausal] *hi* [case.gen] *tshe* [n.count]

- If *tshe* is [n.count] then change *de* [adv.proclausal] to *de* [d.dem]

# Research questions we can address with our Corpus

1. Conflicts between *da-drag* rules and syntactic cues to verb stem disambiguation.

# Research questions we can address with our Corpus

1. Conflicts between *da-drag* rules and syntactic cues to verb stem disambiguation.

*ku-sú ḥdi ni ḥbras-bu las skyes-pa ma lags te | chab-mig cig gi nañ nas rñed-pa s slan-cad  
ni bdag gis mi rñed de | mi ḥbyor [v.past] ~ [v.pres] to*

"This apple was not born from fruit, but I found it from inside a spring, so I cannot find it hereafter. It will not be encountered."

# Research questions we can address with our Corpus

1. Conflicts between *da-drag* rules and syntactic cues to verb stem disambiguation.

*ku-sú ḥdi ni ḥbras-bu las skyes-pa ma lags te | chab-mig cig gi nañ nas rñed-pa s slan-cad  
ni bdag gis mi rñed de | mi ḥbyor [v.past] ~ [v.pres] to*

"This apple was not born from fruit, but I found it from inside a spring, so I cannot find it hereafter. It will not be encountered."

If *da-drag* rules are ordered before the rule that prevents the past stem after *mi*, then the suffix *-to* would have triggered [v.past].

# Research questions we can address with our Corpus

1. Conflicts between *da-drag* rules and syntactic cues to verb stem disambiguation.

*ku-sú ḥdi ni ḥbras-bu las skyes-pa ma lags te | chab-mig cig gi nañ nas rñed-pa s slan-cad  
ni bdag gis mi rñed de | mi ḥbyor [v.past] ~ [v.pres] to*

"This apple was not born from fruit, but I found it from inside a spring, so I cannot find it hereafter. It will not be encountered."

If *da-drag* rules are ordered before the rule that prevents the past stem after *mi*, then the suffix *-to* would have triggered [v.past].

(We order negation rules before *da-drag* rules, so *ḥbyor* is tagged [v.pres].)

# Research questions we can address with our Corpus

1. Conflicts between *da-drag* rules and syntactic cues to verb stem disambiguation.
2. See whether any converbs imply things about what verb stems can be coordinated (e.g. *V-pa-dañ ... V-pa-dañ*, do they have to be the same stem?)

# Research questions we can address with our Corpus

1. Conflicts between *da-drag* rules and syntactic cues to verb stem disambiguation.
2. See whether any converbs imply things about what verb stems can be coordinated (e.g. *V-pa-dañ ... V-pa-dañ*, do they have to be the same stem?)
3. Can we identify different uses of *śad* by counting how many words occur between them?

# Research questions we can address with our Corpus

1. Conflicts between *da-drag* rules and syntactic cues to verb stem disambiguation.
2. See whether any converbs imply things about what verb stems can be coordinated (e.g. *V-pa-dañ ... V-pa-dañ*, do they have to be the same stem?)
3. Can we identify different uses of *śad* by counting how many words occur between them?
4. How do conditional clauses work (cf. Greek).

# Research questions we can address with our Corpus

1. Conflicts between *da-drag* rules and syntactic cues to verb stem disambiguation.
2. See whether any converbs imply things about what verb stems can be coordinated (e.g. *V-pa-dañ ... V-pa-dañ*, do they have to be the same stem?)
3. Can we identify different uses of *śad* by counting how many words occur between them?
4. How do conditional clauses work (cf. Greek).
5. Functions of *la* [cv.all] other than to coordinate imperatives.

# Future Collaborations

- TBRC
- Berkeley
- CASS
- You!

# Possible Projects

- Tibet Daily Corpus (e.g. for keywords in current affairs)

## Possible Projects

- Tibet Daily Corpus (e.g. for keywords in current affairs)
- Continuous crawling of Tibetan blogs (e.g. for new terminology)

# Possible Projects

- Tibet Daily Corpus (e.g. for keywords in current affairs)
- Continuous crawling of Tibetan blogs (e.g. for new terminology)
- Yours?

*Thank you*