Creating linguistic resources for use in digital humanities: notes from one proudly South African adventure

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DH Colloquium

Learn without limits.

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In this presentation…

- Quick introduction to the AfWN and the MLTB respectively

- Our approach and experiments

- What we learnt from it

- Suggestions and conclusion

Wordnets in a nutshell

- Princeton WordNet for English

  (https://wordnet.princeton.edu/)

- Open Multilingual

  Wordnet

  (http://compling.hss.ntu.edu.sg/omw/)

AfWN development: Background (1)

- The African Wordnet has steadily added more synsets, definitions and usage examples to wordnets for 9 South African languages

  - 2007: Initial workshop with all South African languages represented

  - 2010: Development starts for isiZulu, isiXhosa, Setswana and Sesotho sa Leboa

  - 2013: Addition of Tshivenḓa

  - 2018: Addition of Sesotho & Siswati

  - 2019: Addition of Xitsonga & isiNdebele

  - 2020-2022: Expansion of these languages and new release

- South African Digital Language Resource Centre (SADiLaR) became the long-term host for the AfWN in 2018

AfWN development: Background (2)

- The *expand approach* is suggested for less-resourced languages
  - Uses the tried and tested ontological structure and content of an existing wordnet (often the English Princeton WordNet (PWN)) as a template
  - Translation of synsets from (American) English to the target language
  - Advantages: no advanced language resources needed & a less complicated approach for inexperienced teams
  - Disadvantages: labour intensive task; requires advanced linguistic knowledge from the team & time spent on unlexicalised concepts
- AfWN followed this advice and is still using the PWN as guide, although the need for more intricate localization has become obvious
- The AfWN currently includes roughly 70 000 synsets across the 9 languages

First experiment: Linking wordlists to the PWN (1)

- The AfWN team acquired the following resources:
  - English-Venda Bilingual Dictionary (Murphy; 1997)
  - The Comprehensive Northern Sotho Dictionary (Ziervogel and Mokgokong; 1975)
    - trilingual monodirectional dictionary for Northern Sotho, Afrikaans and English;
  - Setswana-English Dictionary (Brown; 1925);
  - For isiXhosa and isiZulu, a selection of private bilingual wordlists were made available to the project team
- Since language resources are a scarce commodity, we have to make the most of what we have

Tswana_Dictionary_Final.tab.txt

```
12996  Yale ——adv——.   .  Aforetime ; lately ; some time ago ; then.  Yale ka,  at the time when ;  referring to a past time.
12997  Yalo ——adv——., Thus, so.  Referring to something past.
12998  Yalwa / jalwa ——v.——, pass. of yala, pft. yadilwa, is being sown.
12999  Yaana ——v.——, pft. yaanye, rec. of ya, bite, or eat, each other.
13000  Yana ——adv——., of manner, Thus, so.  Used of present or future ; adv. of time. Now.
13001  Yanong / jaanong ——adv——. of time, Now.
13002  Yantse——v.——, pft. of yanya, has struck hard and wounded, as with a sword.
13003  Yantsha——v.——, pft. yantshitse, caus. of yanya, cause to strike against, etc.
13004  Yantshana ——v.——, pft. yantshanye, rec. of yantsha, strike against each other, as swords.
13005  Yantshanya ——v.t——., pft. yantshantse, caus. of yantshana, cause swords, etc., to strike against each other ;  engage, as swordsmen in a duel.
13006  Yarata ——n.——, pl. diyarata, A yard, or compound (for.).
13007  Yayarega ——v.i——., pft. yayaregile, be in a rage ; rage with anger.
13008  Yayarego ——n.——, from yayarega, furious anger ; rage.
13009  Ye / le——pron——., used with nouns of le class, This.
13010  Yecwe / jetswe——v.——, pft. pass. of yala / jala, is sown.
13011  Yega / jega——v.i——., pft. yegile / jegile, consume away ; be eaten, or worn away ; v., used as adj., Eatable.
13012  Yegela / jegela——v.——, pft. yegetse / jegetse, prep...
13013  Yela / jela——v.——, pft. yetse / jetse, prep. form...
        se yelang,  that which is used in connection with eating...
13014  Yele ——pron——. of nouns of le class, That yo...
13015  Yelwa / jelwa——v.——, pass. of yela / jela, pft...
13016  Yelwe / jelwe——v.——, pft. pass. of ya / ja, is...
13017  Yeno ——pron——., used with nouns of le class,...
13018  Yeosi ——adj——., used with nouns of le class, Only...
13019  Yesa / jesa——v.——, pft. yesitse / jesitse, caus...
13020  Yetse / jetse——v.——, pft. of yela / jela, has...
13021  Yeuo ——pron——. of nouns of le class, That.
13022  Yewa / jewa——v.——, pass. of ya, pft. yelwe / je...
13023  Yo / bo——pron——. of nouns of bo class, This. ex...
13024  Yoa / jwa——poss. part. of nouns of bo cl...
13025  Yokwe ——n.——, pl. boyokwe, A yoke (for.).
13026  Yotlhe / botlhe——adj——., used with nouns of bo cla...
13027  Youo / boo——pron——. of nouns of bo class. Th...
```

TSNextracted.Ogodiseng.xls - OpenOffice.org Calc

File Edit View Insert Format Tools Data Window Help

C7

	A	B	C	D
1	NOTE: The Setswana words are all NOUNS			
2	Please mark in Column C:			
3	If the word in Column A and the definition in column D IS A MATCH: y			
4	If the word in Column A and the definition in column D IS NOT A MATCH: n			
5				
6	Setswana	English	YES/NO	ID and definition
7	dikgomo	cattle		ENG20-02315126-n: domesticated bovine animals as a group regardless of sex or age
8	mochwari / motshwari	catcher		ENG20-09270162-n: (baseball) the person who plays the position of catcher
9	sensera	censer		ENG20-02886674-n: a container for burning incense (especially one that is swung on a chain in a religious ritual)
10	legare	centre		ENG20-08386915-n: a low-lying region in central France
11	mmoko	chaff		ENG20-13962575-n: material consisting of seed coverings and small pieces of stem or leaves that have been separated from the seeds
12	ketane	chain		ENG20-07866336-n: a series of things depending on each other as if linked together
13	bompolokwane	chains		ENG20-03452934-n: metal shackles; for hands or legs
14	sepora	chair		ENG20-02894344-n: a seat for one person, with a support for the back
15	seruha	chamber		ENG20-02896126-n: a natural or artificial enclosed space
16	lobobu	chameleon		ENG20-09275064-n: a changeable or inconstant person
17	seganka	champion		ENG20-09275301-n: someone who has won first place in a competition
18	sedimogo	chance		ENG20-13660635-n: a possibility due to a favorable combination of circumstances
19	kgopana	chaplet		ENG20-04427188-n: flower arrangement consisting of a circular band of foliage or flowers for ornamental purposes
20	pheko	charm		ENG20-04492995-n: attractiveness that interests or pleases or stimulates
21	lehelepa	cheat		ENG20-11378023-n: weedy annual grass often occurs in grainfields and other cultivated land; seeds sometimes considered poisonous
22	lerama	cheek		ENG20-05282822-n: either side of the face below the eyes
23	kase	cheese		ENG20-07376222-n: a solid food prepared from the pressed curd of milk
24	lengau	cheetah		ENG20-02046147-n: long-legged spotted cat of Africa and southwestern Asia having nonretractile claws; the swiftest mammal; can be trained to...
		chief		
		child		
		chip		
		chopper		
		circle		
		clasp		
		class		

Sum=0

Setswana WN - Mozilla Firefox

puk.ac.za https://afrwordnet.puk.ac.za:9001/editor/

SYNSET.ID=wneng:El   Search   Search in all

[n] seatla:2

Preview   Tree   Revtree   Edit   Xml

POS: n ID: ENG20-05246212-n BCS: 3
Synonyms: seatla :2
Definition: serwe sa mmele se se tshwarang kana se go dirwang ka sone
Usage: tshwara ka seatla sa moja fa
Domain: anatomy
SUMO/MILO: BodyPart
-->> [holo_part] motho:7
-->> [holo_part] letsôgô:1, lebôgô:1
-->> [hypernym] diphêlêlô:1, karolo ya tôkôlôlô e e kgakala le mmele:1
<<-- [hyponym] go huna letswele:1, letswele:1
<<-- [mero_part] monwana:4
<<-- [mero_part] kgolokwe:3, kgwele:8
<<-- [hyponym] seatla sa moja:1, moja:2

STAMP: tsn1 2011-08-03 10:12:39 /

Transferring data from afrwordnet.puk.ac.za...   Item(s): 1

English WN - Mozilla Firefox

puk.ac.za https://afrwordnet.puk.ac.za:9001/editor/

hand   Search   Search in all

[n] bridge player:1, hand:11
[n] hand:1, manus:1, mitt:1, paw:2

Preview   Tree   Revtree   Edit   Xml

POS: n ID: ENG20-05246212-n BCS: 3
Synonyms: hand :1, manus :1, mitt :1, paw :2
Definition: the (prehensile) extremity of the superior limb
Usage: he had the hands of a surgeon
Usage: he extended his mitt
Domain: anatomy
SUMO/MILO: + BodyPart
-->> [hypernym] extremity:5
-->> [holo_part] homo:2, man:5, human being:1, human:2
-->> [holo_part] arm:1
-->> [eng_derivative] paw:2
-->> [eng_derivative] pass:5, hand:1, reach:8, pass on:1, turn over:1, give:17
<<-- [mero_part] digital arteries:1, arteria digitalis:1
<<-- [hyponym] fist:1, clenched fist:1
<<-- [derived] manual:1
<<-- [eng_derivative] pass:5, hand:1, reach:8, pass on:1, turn over:1, give:17
<<-- [mero_part] metacarpal artery:1, arteria metacarpea:1
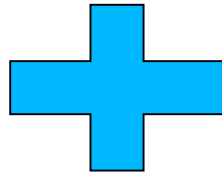<<-- [mero_part] finger:1

Querying a dictionary is complete   Transferring data from afrwordnet.puk.ac.za...

Current strategy: SILCAWL list and translations (1)

- An African alternative to Eurocentric seed lists can be found in the SIL Comparative African Wordlist (SILCAWL), compiled by Keith Snider and James Roberts (2006)
  - It is a list of lexical data (1700 words with both English and French glosses) resulting from linguistic research in Africa
  - The items are organized semantically under twelve main headings from man's physical being to animals and grammatical items

- The hypothesis: Creating a more localised (South African) English source text and then translating this into all 9 South African languages not only fast-tracks development of new synsets, but also forms a multilingual parallel sub-corpus of commonly used concepts

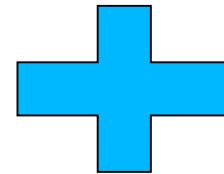# Current strategy: SILCAWL list and translations (2)

Current strategy: SILCAWL list and translations (3)

	A	B	C	D	E	F	G	H	I
1		**English Synonym**	**PWN ID**	**POS**	**NSO Synonym**	**English Definition**	**NSO Definition**	**English Usage**	**NSO Usage**
2	1	body	ENG20-05232131-n	n	setoto	the body excluding the head and neck and limbs	mmele go sa akaretšwe hlogo le molala le maoto	the dancers moved their bodies to the music	babini ba sepedišitše mebele ya bona ba binela mmino
3	2	skin (of man)	ENG20-04936703-n	n	letlalo	a natural protective covering of the body; site of the sense of touch	selo sa tlhago seo se pipilego mmele; lehlakore la sekwi sa go kgongwa	your skin is sensitive to the sun	letlalo la gago le tšhaba letšatši
4	3	head	ENG20-05221598-n	n	hlogo	the upper part of the human body or the front part of the body in animals; contains the face and brains	karolo ya godingwana ya mmele wa motho goba karolo ya bokapele bja mmele goba karolo ya ka pele ya mmele wa diphoofolo; e na le sefahlego le mabjoko	he banged his head on the low door	o ile a bethiša hlogo ya gagwe lebating la fasana
5	4	forehead	ENG20-05282535-n	n	phatla	the part of the face between the hair and the eyes. [Definition from OERTB (http://oertb.tlterm.com/)]	karolo ya sefahlego gareng ga moriri le mahlo. [Tlhalošo e tšwa go OERTB (http://oertb.tlterm.com/)]	I have wrinkles on my forehead	ke na le mašošo phatleng ya ka
6	5	face	ENG20-05280660-n	n	sefahlego	the front of the human head from the forehead to the chin and ear to ear	karolo ya ka pele ya hlogo ya motho go tloga phatleng go ya setedung le go tloga tsebeng go ya go ye nngwe	I wish I had seen the look on his face when he got the news	ke duma ge nka be ke bone sefahlego sa gagwe ge a ekwa ditaba tšeo
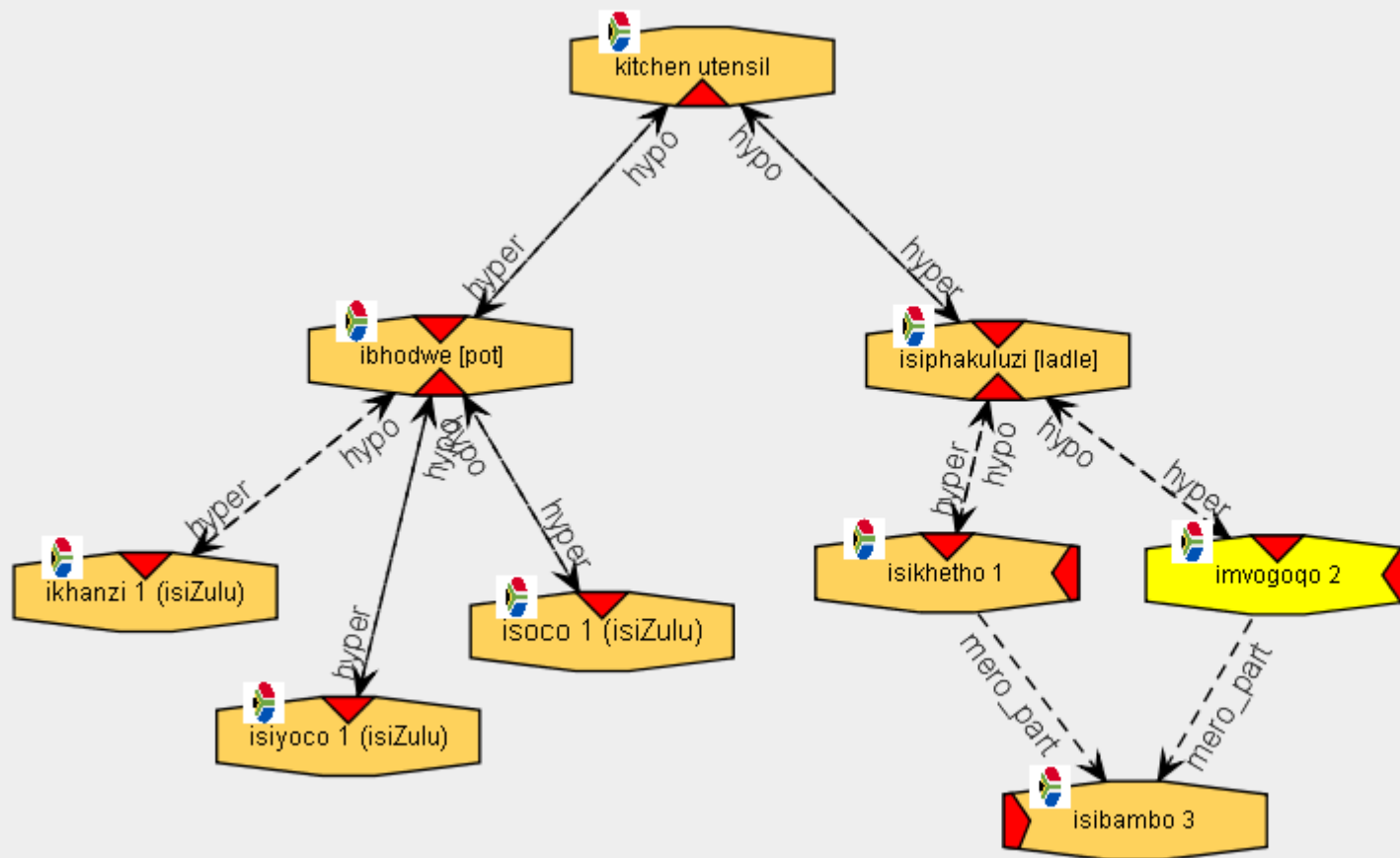
Lessons learnt: technical errors

- The existing AfWN data contains errors that can be identified and corrected (semi-) automatically

- Although the translators did an excellent job, many errors still occurred

- Language independent SQL scripts were developed to identify and correct these errors

  - Capital letters and punctuation;

  - Empty mandatory fields;

  - Invalid/incorrect information in fields with set values (POS and semantic relations for instance); etc.

Lessons learnt: language specific decisions (1)

- The South African English source text certainly made a difference but we soon realised that each language would also present unique challenges
  - Translation for wordnets was definitely a specialised activity due to the hierarchical nature and technical constraints
- African languages often use euphemisms to refer to taboo terms and are the preferred form in some languages
  - Xitsonga: the concept of "breaking wind/farting"
    - Biological translation = *tamba*
    - Preferred euphemism = *humesa moya* – literally translated as "to kill an insect"
- AfWN team decided to include both as synonyms with a tag to indicate the taboo term

Lessons learnt: language specific decisions (2)

WordNet Search - 3.1
- WordNet home page - Glossary - Help

Word to search for: plate | Search WordNet

Noun

Lexical gap: no distinction between plates for use by children or adults in (American) English

- S: (n) home plate, home base, home, slab where the batter stands; it must b
- S: (n) **plate** (a sheet of metal or wood or glass or plastic)
- S: (n) **plate** (a full-page illustration (usually on slick paper))
- S: (n) **plate** (dish on which food is served or from which food is eaten)
  - *direct hyponym* / *full hyponym*
    - S: (n) dessert plate (a small plate on which dessert can be served)
    - S: (n) dinner plate (a plate from which a diner eats during the main course of a meal)
    - S: (n) paper plate (a disposable plate made of cardboard)
    - S: (n) salad plate, salad bowl (a plate or bowl for individual servings of salad)
    - S: (n) soup plate (a deep plate with a wide rim)
    - S: (n) steel plate (a plate of steel)
  - *direct hypernym* / *inherited hypernym* / *sister term*
- S: (n) **plate**, platoful (the quantity contained in a plate)
- S: (n) **plate**, crustal plate (a rigid layer of the Earth's crust that is believed to drift slowly)

Lessons learnt: language specific decisions (3)

WordNet Search - 3.1
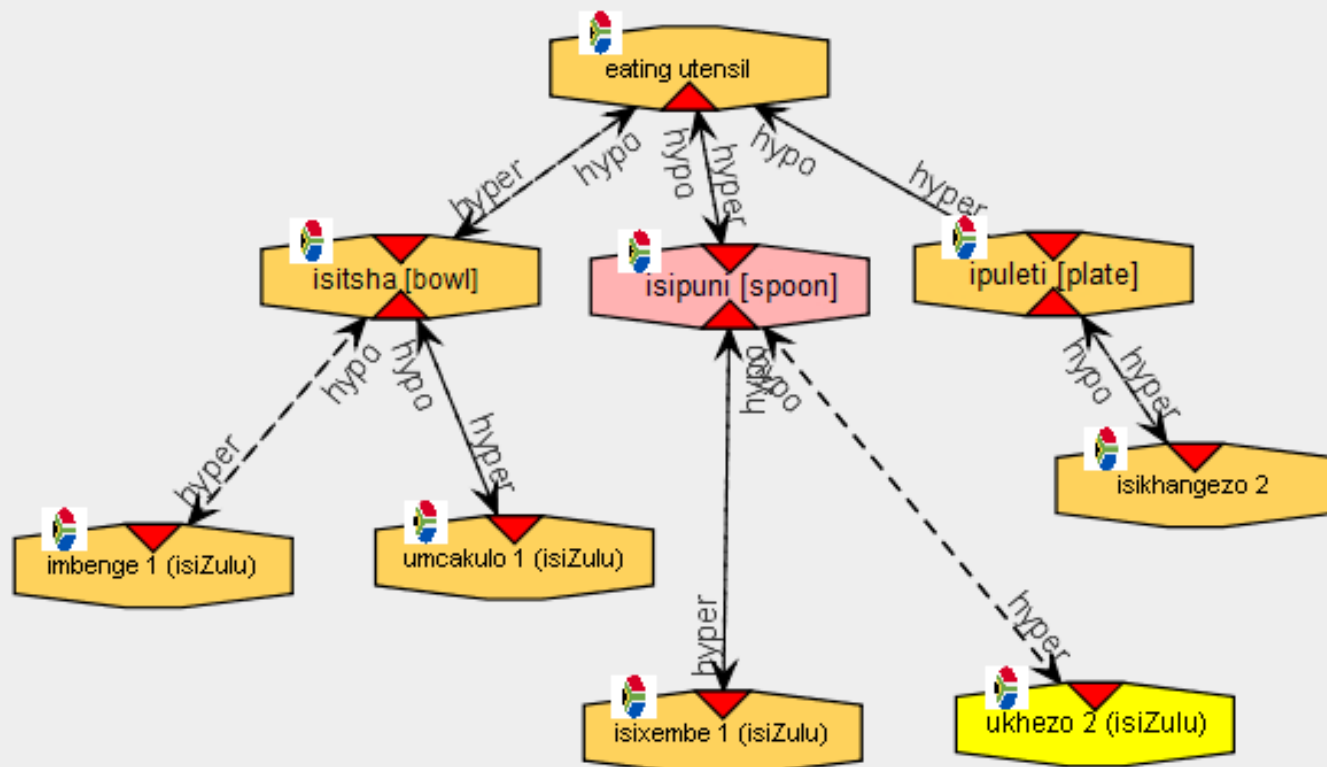- [WordNet home page](#) - [Glossary](#) - [Help](#)

Word to search for: gourd   [Search]

Lexical gap: no distinction between *gourd* and *calabash* in (American) English

Noun

- S: (n) **gourd**, calabash (bottle made from the dried shell of a bottle gourd)
  - *direct hypernym* / *inherited hypernym* / *sister term*
    - S: (n) bottle (a glass or plastic vessel used for storing drinks or other liquids; typically cylindrical without handles and with a narrow neck that can be plugged or capped)
- S: (n) **gourd** (any of numerous inedible fruits with hard rinds)
- S: (n) **gourd**, gourd vine (any vine of the family Cucurbitaceae that bears fruits with hard rinds)

Term banks in a nutshell

Open Educational
Resource Term
Bank - UP
(http://oertb.tlterm.com/)

Background

- Need for standardisation of terms in African languages

- Different source language for students meant confusion

- Freely available, editable and standardised term bank with linguistic terminology needed
  - To be used in classrooms from a very early age

Process

- Initially the plan was to perform (semi-) automatic term extraction after digitisation of old study guides
  - Strange fonts and other technical problems meant this was impossible
- Setting up a manual term list by team of experts was the only way
- Loosely based on terms used in guides
- Multilingual is NB
- Difference – not focussed on English base meaning

	number	term	definition of the term	source of the definition of the term	ENG	example of use	source of example	creation date	notes	see also	intern
67	66	maadingwa	mantšu a a tšerwego polelong ye nngwe a tlišwa ka go ye nngwe go tlo šoma bjalo ka mantšu a polelo yeo ye mpsha		borrowings	Mantšu a Sesotho sa Leboa a go swana le 'lelepola' le 'sepikiri' ke maadingwa					
68	67	tšhutišo ya dikgoro	go theošwa ga maemo, bjalo ka ge madiri a theoga ka maemo go ba mathušl		category shifting	Go dumelwa gore mabopi a '-ka-, -sa- le -tlo-' a thomile e le madiri a go ikema					
69	68	lediriši	lediri le le nago le moselana wa -iš-		causative	Katološo ya lediriši e na le go hlola diphetogomedumo					
70	69	moselana wa lediriši	moselana wa lediriši '-iš-' o laetša gore yo mongwe goba se sengwe se dirišwa tiro goba go thušwa go dira se sengwe		causative extension	Lentšu le 'ngwadiša' le na le moselana wa '-iš-' go laetša go diriša yo mongwe tiro goba go mo thuša go e dira					
71	70	tlhatlamanomabaka	tatelano ya ditiragalo go ya ka madiri mo lefokong		chronological succession	Re fihlile gae, ra hlapa, ra ja, ra robala' ke mohlala wa tlhatlamanomabaka mo lefokong					
72	71	legoro	karolo yeo maina a a swanago ka dihlogo, a bile a na le ditlhalošo tša go sepelelana, a hlopšhago ka go yona		class	Maina a maleme a Batho a hlopšha go ya ka magoro			mohlala, *moxa* ke leina le le welago legorong la 3.		
73	72	tlhopho	peakanyo ya mantšu go ya ka go swana ga ona ka popego, tšhomišo le tlhalošo		classification	Ye nngwe ya dipharologantšho tše bohlokwa tša maleme a Batho ke tlhopho ya maina ka magoro					
74	73	thabe	seripa sa polelo se se fetago lentšu eupša se fetwago ke lefoko		clause	Dithabe tše dingwe di kgona go ikema mola tše dingwe di ithekga ka tše dingwe				lefokwana	
75	74	sethathapi	modumo wa go kwagatšwa ka mokgwa wa go thathapa		click sound	Maleme a Senguni a na le dithathapi mola Sesotho sa Leboa se se natšo					Na 'x' ga se
76	75	leithekgi	karolo ya polelo ye e swanago le lentšu eupša e ka se kgone go ikemela e nnoši poledišanong		clitic	Dikarolo tša go swana le: *hle, ge, etla hle* goba *etla ge* ke maithekgi					
77	76	momagano	tshepetšo yeo mantšu a mabedi a kopanago go bopa lentšu letee		coalescence	Mo go '*Ke rato ja*' rato ke momagano ya *rata le go*					
78	77	sedirwa-setšwalediring'	seo ka sebopego se laetšago gore se tšwa lediring ebile tlhalošo ya sona e šetše e le gona ka lediring		cognate object	Lefoko le '*Pula e na mono wa go šiiša*' le na le mohlala wa sedirwa-setšwalediring e lego mono					
79	78	tlhalošokgopolo	lereo le le šomišwago ka thutatlhalošo go šupa tlhalošotheo ya lentšu goba tlhalogišo ya polelo		cognitive meaning	Tlhalošokgopolo e hlalošišwa ka dipharologantšho tše di thulanago bjalo ka [±bophelo] moo leswika e tla bago [-bophelo] mola khudu e tla ba [+bophelo]					
80	79	leinakgoboko	leinantšupalego le le šupago sehlopha sa dilo		collective noun	Maina a bjalo ka mohlape le ngata ke mainakgoboko					

Lexonomy

https://www.lexonomy.eu/

Multilingual Linguistic Termbank test   Edit   Configure   Entry structure   Download   Upload   griesel.marissa@gmail.com ▼

Save★   Cancel   Use your own schema...

<entry>
    <english_term>
    <english_definition>
    <zulu_translation>
      <zul_term>
      <zul_definition>
      <zul_definition_source>
      <zul_usage>
      <zul_seealso>
      <zul_notes>
    <nsotho_translation>
      <nso_term>
      <nso_definition>
      <nso_definition_source>
      <nso_usage>
      <nso_seealso>
      <nso_notes>
    <xhosa_translation>
    <tswana_translation>
    <venda_translation>

○ Child elements   ○ Text   ○ Text with markup   ○ Value from list   ○ Empty   ○ Media

Child elements

Element		min		max				
<english_term>	min	1	max	1		↓	✖
<english_definition>	min	1	max	1	↑	↓	✖
<zulu_translation>	min		max		↑	↓	✖
<nsotho_translation>	min		max		↑	↓	✖
<xhosa_translation>	min		max		↑	↓	✖
<tswana_translation>	min		max		↑	↓	✖
<venda_translation>	min		max		↑	↓	✖
<ndebele_translation>	min		max		↑	↓	✖
<tsonga_translation>	min		max		↑	↓	✖
<swati_translation>	min		max		↑	↓	✖
<sotho_translation>	min		max		↑		✖

Ready.

Inbox (2) - griesel.marissa@gmail ✕ | Google Calendar - Week of Septe ✕ | {} Multilingual Linguistic Termbank ✕ +

← → C 🔒 lexonomy.eu/MLTerm/edit/entry

⬛ Apps 〰 myUnisa 👍 Facebook {} Multilingual Linguis... 🅢 SADiLaR-UNISA 🄳 Carpentry Connect... | 📙 Other bookmarks ▦ Reading list

Multilingual Linguistic Termbank test   Edit Configure Download Upload   griesel.marissa@gmail.com ▼

🔍 497   ≣

starts like this ▼

- absolute pronoun
- absolute pronoun
- abstract noun
- acoustic phonetics
- acronym
- active articulators
- active sentence
- actuality
- adaptation
- addressee; second person
- adjectival concord
- adjectival phrase
- adjectival phrase
- adjunct
- adoptive
- **advebial phrase**

⚡ New   ID 1406 ▶   💾 Save*   ⬅ Cancel   ⚡ Clone   ⛔ Delete   📄 🔗 🕐

```xml
<⚠ entry>
    <english_term>adverbial phrase</english_term>
    <zulu_translation>
        <zul_term>ibinzana lesandiso</zul_term>
        <zul_definition>ingxenye yomusho esebenza njengesandiso </zul_definition>
        <zul_definition_source> </zul_definition_source>
        <zul_usage>Emshweni othi Ubaba uhamba ngebhasi elisuka kusempondozankomo uma eya emsebenzini
            ibinzana elithi ngebhasi elisuka kusempondozankomo lisebenza njengesandiso.</zul_usage>
        <⚠ zul_notes></zul_notes>
        <⚠ zul_seealso> </zul_seealso>
    </zulu_translation>
</entry>
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absolute pronoun	···
absolute pronoun	···
abstract noun	···
acoustic phonetics	···
acronym	···
active articulators	···
active sentence	···
actuality	···
adaptation	···
addressee; second person	···
adjectival concord	···
adjectival phrase	···
adjectival phrase	···
adjunct	···
adoptive	···
adverb	···

⚡ New | ID 1406 ▶ | ✏ Edit   ⚡ Clone   ⛔ Delete   🔗 🕐

adverbial phrase

an adverbial phrase is a group of words that functions as an adverb.

isiZulu **ibinzana lesandiso**

■ ingxenye yomusho esebenza njengesandiso
▶ *Emshweni othi Ubaba uhamba ngebhasi elisuka kusempondozankomo uma eya emsebenzini ibinzana elithi ngebhasi elisuka kusempondozankomo lisebenza njengesandiso.*

Sesotho sa Leboa **sekafoko sa lehlathi**

■ sekafoko se se tlaleletšago tiro ya lediri
▶ *sekafoko sa lehlathi ke se bjalo ka godimo ga magala mo lefokong le: Bana ba dutše godimo ga magala*

Ready.

Suggestions (1)

- Some improvements could be implemented immediately:

  - Better understanding of the use of the translations by both the English lexicographer and the African language translators is essential;

  - The style guide was updated to include more detailed instructions with examples in various languages;

  - Where possible, closely related languages such as isiZulu and isiXhosa could benefit from shared translations.

Suggestions (2)

- Other measures will take some more work to implement:

  - AfWN: Adding morphological analysis or as a minimum lemmatisation to the quality assurance pipeline to check that the lemma is used in the usage example, for instance, will reduce the amount of confusing sentences;

  - Both projects: Including quality assurance measures such as spell checking, checking for mandatory fields left open or invalid values for some fields directly into the development interface is a long-term goal.

Conclusion

- All data developed in the project will be made available under a Creative Commons license via the SADiLaR language resource repository
  - Hope to increase NLP development particularly for the African languages;
  - All users have to be aware of certain linguistic and technical decisions made during development so that they can also make provision for certain aspects in their systems;

- Nothing beats a good old round table discussion to sort out some of the standardisation problems or find more creative solutions.
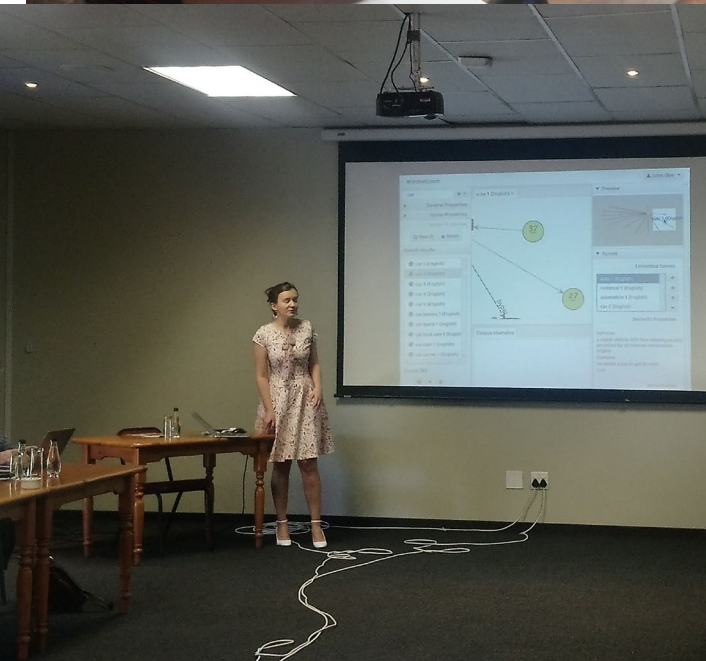
Thank you

This presentation is based on previously published work. For a full list of research outputs in the project, please see https://africanwordnet.wordpress.com/research/

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