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AILO
All Ireland Linguistics Olympiad
The Problem Solvers' Challenge

An Roinn Turasóireachta, Cultúir, Ealaíon, Gaeltachta, Spóirt agus Meán
Department of Tourism, Culture, Arts, Gaeltacht, Sport and Media

A World Leading SFI Research Centre

Science Foundation Ireland sfi For what's next

AILO Workshop 2022/3

Prof Harold Somers and Dr Cara Greene

ADAPT Research Centre, Dublin City University

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Linguistics Module (funded by Post-Primary Languages Ireland (PPLI)

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Teangacha Iar-bhunscoile Éireann
Post-Primary Languages Ireland

Delivering
Languages Connect

The benefits of doing linguistics

An Roinn Turasóireachta, Cultúir, Ealaíon, Gaeltachta, Spóirt agus Meán
Department of Tourism, Culture, Arts, Gaeltacht, Sport and Media

- Develop language awareness
- Increase uptake of Modern Foreign Languages
- Improve Modern Foreign Languages learning
- Improve reading and writing skills
- Cross- cultural understanding
- Critical thinking abilities
- Improve team-working and communication skills

Aims of the AILO Programme and workshop aim

- Accompanying video:
- Introduce you to logic, linguistics and language technology
- Enhance key STEM problem-solving skills
  - Machine Translation

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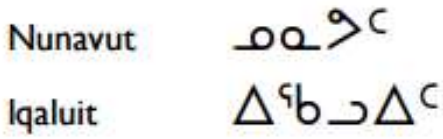
- Encourage you to take Science, Technology, Engineering (STEM) courses in University
- **Workshop aim**
  - To learn how to go about solving these problems in pairs if possible (not check solutions are correct)

Overview – Online AILO

- Monthly Samples and AILO Online site
- First Round end Jan 2023 in your own school (5 Qs, 2.5 hours)
- Online Answer Booklet
- 100 qualify for the national final in March (DCU)

- Trophies and prizes for Junior (under 16) and Senior (16 and over) categories.
- Four students qualify for the International Linguistics Olympiad (Bansko, Bulgaria July 2023 →)
- 3-day team training before IOL 2022

Types of problems in Round One



- Writing systems e.g. Inuit
  - A writing system is any conventional method of visually representing verbal communication
- Morphology
  - The study of the structure of words
- Morphonemics
  - the interaction between morphological and phonological or phonetic processes
- Syntax
  - The set of rules that govern the structure of sentences in a given language

bottom!
to
even top
right or
left to
always
Not

Tips for the Preliminary Round (Jan)

- Write down everything you notice about the language structure in a systematic way
- We do not want you to recap the steps you took in finding the answer
- The fine detail matters, look for patterns
- Look for clues in the title and the description
- Build on what you already know

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Sami Time

Rositsa Dekova, Ivan Derzhanski & Anastasia Puchkova

Snow Time in Sami (Rositsa Dekova, Ivan Derzhanski & Anastasia Puchkova (2017)

- The Sami languages are a group of Uralic languages spoken by the indigenous people of the same name in parts of northern Finland, Norway, Sweden and extreme north-western Russia.

- Sami languages have some official status in Finland, Norway, and Sweden , though not in Russia.

Snow Time in Sami

- The following clock times are written in Sami:

- 3.40 *diibmu lea logi badjel beal njeallje*
- 4.50 *diibmu lea logi váile vihtta*
- 1.10 *diibmu lea logi badjel okta*
- 9.25 *diibmu lea vihtta váile beal logi*
- 7.05 *diibmu lea vihtta badjel čieža*
- 12.30 *diibmu lea beal okta*

- How do you say in Sami (a) 3.55 (b) 4.20 (c) 6.35 (d) 10.10 ?

How we tackle Sami time?

- The following clock times are written in Sami:

- 3.40 *diibmu lea logi badjel beal njeallje*
- 4.50 *diibmu lea logi váile vihtta*
- 1.10 *diibmu lea logi badjel okta*
- 9.25 *diibmu lea vihtta váile beal logi*
- 7.05 *diibmu lea vihtta badjel čieža*
- 12.30 *diibmu lea beal okta*

The time is

Write down everything you know about Sami systematically.

- How do you say in Sami (a) 3.55 (b) 4.20 (c) 6.35 (d) 10.10 ?

How to tackle Sami Time

- The following clock times are written in Sami:

- 3.40 *diibmu lea logi badjel beal njeallje*
- 4.50 *diibmu lea logi váile vihtta*
- 1.10 *diibmu lea logi badjel okta*
- 9.25 *diibmu lea vihtta váile beal logi*
- 7.05 *diibmu lea vihtta badjel čieža*
- 12.30 *diibmu lea beal okta*

In what way could the same word “okta” appear in both 1.10 and 12:30?

- How do you say in Sami (a) 3.55 (b) 4.20 (c) 6.35 (d) 10.10 ?

How to tackle Sami Time

- So the same number word can appear in both ‘ten past one’ and ‘half past twelve’
- It appears that in Sami instead of half **past** the last hour they count half **to** the next hour (something you may be familiar with if you know German or remember ‘Telling the time in Tallinn’ a few years ago!).
- So let’s assume *okta* is ‘one’, which means *logi badjel* is ‘ten past/after’ and *beal* is ‘half-before’.
- 1.10 *diibmu lea logi badjel okta* the time is ten past/after one
- 12:30 *diibmu lea beal okta* the time is half-before one

Sami time – what we have:

3.40	*diibmu lea logi badjel beal njeallje*	the time is ten after half-before *njeallje*
4.50	*diibmu lea logi váile vihtta*	the time is *logi váile vihtta*
1.10	*diibmu lea logi badjel okta*	the time is ten after one
9.25	*diibmu lea vihtta váile beal logi*	the time is *vihtta váile* half-before *logi*
7.05	*diibmu lea vihtta badjel čieža*	the time is *vihtta badjel čieža*
12.30	*diibmu lea beal ok*	the time is half-before one

Sami time – what we have:

3.40	*diibmu lea logi badjel beal njeallje*	the time is ten after half-before *njeallje*
4.50	*diibmu lea logi váile vihtta*	the time is *logi váile vihtta*
1.10	*diibmu lea logi badjel okta*	the time is ten after one
9.25	*diibmu lea vihtta váile beal logi*	the time is *vihtta váile* half-before *logi*
7.05	*diibmu lea vihtta badjel čieža*	the time is *vihtta badjel čieža*
12.30	*diibmu lea beal ok*	the time is half-before one

- *Logi badjel* is ‘ten after’, and looking at 9.25 it seems that *logi* is a number, presumably ‘ten’, and *badjel* ‘after’. So now we have:
- 3.40 the time is ten after half-before *njeallje*
- 4.50 the time is ten *váile vihtta*
- 1.10 the time is ten after one
- 9.25 the time is *vihtta váile* half-before ten
- 7.05 the time is *vihtta* after *čieža*
- 12.30 the time is half-before one

- 3.40 is ten minutes after 3.30, which would be ‘half-before four’ counting forwards, so *njeallje* must be ‘four’. The word *vihtta* appears three times, in ‘ten to five’, 9.25 and 7.05, so looks a good candidate for ‘five’.
- 3.40 the time is ten after half-before four
- 4.50 the time is ten *váile* five
- 1.10 the time is ten after one
- 9.25 the time is five *váile* half-before ten
- 7.05 the time is five after *čieža*
- 12.30 the time is half-before one

- It should be now clear that *váile* is ‘to’ or ‘before’, and *čieža* is ‘seven’:
- 3.40 the time is ten past half-before four
- 4.50 the time is ten to five
- 1.10 the time is ten past one
- 9.25 the time is five to half-before ten
- 7.05 the time is five past seven
- 12.30 the time is half-before one

What we know so far

- *Diebmu lea* = ‘The time is’
- Numbers
  - 1 *okta*
  - 4 *njeallje*
  - 5 *vihtta*
  - 7 *čieža*
  - 10 *logi*
- *badjel* = ‘past’
- *váile* = ‘to’
- *beal* = ‘half-before’

So now here are the answers:

3.55	five to four *diibmu lea vihtta váile njeallje*
4.20	we don't know how to say 20, so we have to compose something based on what we do know: 4.20 is ten minutes before 4.30, i.e. ten to half-before five *diibmu lea logi váile beal vihtta*
6.35	based on 9.25, this is probably five past half-before seven *diibmu lea vihtta badjel beal čieža*
10.10	ten past ten *diibmu lea logi badjel logi*

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Welsh Mutations

Babette Newsome

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Munster Technological University
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National University of Ireland Maynooth
OÉ Gaillimh
NUI Galway

Introduction

- Initial blurb explains about Welsh as “one of the surviving original Celtic languages” [sic] …
- … and about how all Celtic languages have what is known as “mutations” … you may be familiar with these from Irish where they are known as “lenition” and “eclipss”
- So really (if you know Irish grammar) this problem is about figuring out the rules for Welsh: the idea is familiar, just the details are different.

Problem summary

- You are given some vocabulary in Welsh in their plain (dictionary) form
- Then you are shown some Welsh sentences with their English translations. From these you are expected to figure out what's going on.
- Then you are given some English sentences and with each, four possible translations from which you have to choose the correct one. So you just have to apply your rules and hope one of the options meets them!
- Then you are asked to translate five further sentences, so this will further test your grasp of the Welsh grammar so far learned.

The given data

Vocabulary items in their unmarked (dictionary) form

Welsh	English	Welsh	English
ceffyl	horse	*darlun*	picture
tad	father	*beic*	bicycle
meddyg	doctor	*dyn*	man
bachgen	boy	*Cymru*	Wales
cath	cat	*draig*	dragon
ci	dog	*theatr*	theatre
dafas	sheep	*gardd*	garden
llyfr	book		

The given data

	Welsh	English
a	*Aeth Megan i Fangor*	Megan went to Bangor
b	*Aeth Emrys i Aberystwyth*	Emrys went to Aberystwyth
c	*Mae dafad yn yr ardd*	A sheep is in the garden
d	*Mae yn yr ardd ddafad*	In the garden is a sheep!
e	*Mae yn Aberystwyth dad*	In Aberystwyth is father!
f	*Mae yn Dolgellau Fegan*	In Dolgellau is Megan!
g	*Mae Megan yn Dolgellau*	Megan is in Dolgellau
h	*Gwelodd Megan ddarlun*	Megan saw a picture
i	*Gwelodd Emrys y lyfr*	Emrys saw the book
j	*Gwelodd y dyn gath*	The man saw a cat

What are the rules?

What is the word order?

What do you notice changes?

Note: Megan and Emrys are person's names. Aberystwyth and Dolgellau are places in Wales

The given data

	Welsh	English
a	*Aeth Megan i Fangor*	Megan went to Bangor
b	*Aeth Emrys i Aberystwyth*	Emrys went to Aberystwyth
c	*Mae dafad yn yr ardd*	A sheep is in the garden
d	*Mae yn yr ardd ddafad*	In the garden is a sheep!
e	*Mae yn Aberystwyth dad*	In Aberystwyth is father!
f	*Mae yn Dolgellau Fegan*	In Dolgellau is Megan!
g	*Mae Megan yn Dolgellau*	Megan is in Dolgellau
h	*Gwelodd Megan ddarlun*	Megan saw a picture
i	*Gwelodd Emrys y lyfr*	Emrys saw the book
j	*Gwelodd y dyn gath*	The man saw a cat

What are the rules?

Verb-initial followed by subject/object/adverb

Order of these can be swopped for emphasis (stress) as long as verb is first

Other than that, the issue is mutation, as we were warned

Note: Megan and Emrys are person's names. Aberystwyth and Dolgellau are places in Wales

Mutation: What changes?

	Welsh	English
a	*Aeth Megan i Fangor*	Megan went to Bangor
b	*Aeth Emrys i Aberystwyth*	Emrys went to Aberystwyth
c	*Mae dafad yn yr ardd*	A sheep is in the garden
d	*Mae yn yr ardd ddafad*	In the garden is a sheep!
e	*Mae yn Aberystwyth dad*	In Aberystwyth is father!
f	*Mae yn Dolgellau Fegan*	In Dolgellau is Megan!
g	*Mae Megan yn Dolgellau*	Megan is in Dolgellau
h	*Gwelodd Megan ddarlun*	Megan saw a picture
i	*Gwelodd Emrys y lyfr*	Emrys saw the book
j	*Gwelodd y dyn gath*	The man saw a cat

(1) After *i* 'to'

B → F, (in Irish I gCorcaigh)

vowel unchanged

Mutation: What changes?

	Welsh	English
a	*Aeth Megan i Fangor*	Megan went to Bangor
b	*Aeth Emrys i Aberystwyth*	Emrys went to Aberystwyth
c	*Mae dafad yn yr ardd*	A sheep is in the garden
d	*Mae yn yr ardd ddafad*	In the garden is a sheep!
e	*Mae yn Aberystwyth dad*	In Aberystwyth is father! Plain form is *tad*
f	*Mae yn Dolgellau Fegan*	In Dolgellau is Megan!
g	*Mae Megan yn Dolgellau*	Megan is in Dolgellau
h	*Gwelodd Megan ddarlun*	Megan saw a picture
i	*Gwelodd Emrys y lyfr*	Emrys saw the book
j	*Gwelodd y dyn gath*	The man saw a cat

(1) After *i* 'to'

B → F,

vowel unchanged

(2) Difference between stressed and unstressed position

d → dd

t → d

M → F

Stressed form of subject is mutated

Mutation: What changes?

	Welsh	English
a	*Aeth Megan i Fangor*	Megan went to Bangor
b	*Aeth Emrys i Aberystwyth*	Emrys went to Aberystwyth
c	*Mae dafad yn yr ardd*	A sheep is in the garden
d	*Mae yn yr ardd ddafad*	In the garden is a sheep!
e	*Mae yn Aberystwyth dad*	In Aberystwyth is father!
f	*Mae yn Dolgellau Fegan*	In Dolgellau is Megan!
g	*Mae Megan yn Dolgellau*	Megan is in Dolgellau
h	*Gwelodd Megan ddarlun*	Megan saw a picture
i	*Gwelodd Emrys y lyfr*	Emrys saw the book
j	*Gwelodd y dyn gath*	The man saw a cat

Plain form is *darlun*

Plain form is *llyfr*

Plain form is *cath*

(1) After *i* 'to'

B → F,

vowel unchanged

(2) Difference between stressed and unstressed position

d → dd

t → d

M → F

Stressed form of subject is mutated

(3) Direct object undergoes mutation

d → dd

ll → l

c → g

Mutation: summary so far

- We can assume that we have been shown the “same” mutation, which operates under various circumstances as listed on previous slide(s):
  1. After preposition *i* ‘to’
  2. When moving subject to end-of-sentence (for emphasis)
  3. As direct object
- And we can assume the rules apply in each case
  1. t → d
  2. d → dd (pronounced [ð] like ‘th’ in ‘those’)
  3. c → g
  4. m → f (single ‘f’ is always pronounced [v])
  5. b → f
  6. ll → l (‘ll’ is the lateral fricative [ɬ]: if you try to say [hl] you’ll be close)
  7. There are others, including one which we will point out later!

Task 1: Choose the correct translation (1)

	English sentence	Welsh
1	In the theatre she saw a horse	a Gwelodd yn y theatr geffyl. b Gwelodd ceffyl yn y theatr. c Gwelodd yn y theatr ceffyl. d Gwelodd geffyl yn y theatr.
2	In the street, he saw a bicycle!	a Gwelodd yn y stryd beic. b Gwelodd beic yn y stryd. c Gwelodd yn y stryd feic. d Gwelodd feic yn y stryd
3	He saw a bicycle in the street.	a. Gwelodd beic yn y stryd. b Gwelodd feic yn y stryd. c Gwelodd yn y stryd beic. d Gwelodd yn y stryd feic.
4	The father saw a dog.	a Gwelodd dad gi. b Gwelodd tad gi. c Gwelodd tad ci. d Gwelodd dad ci.

- Looking first at (1), there are two issues:
  - Word order (a/c or b/d)
  - Mutation: *ceffyl* (b/c) or *geffyl* (a/d)?

The given data

	Welsh	English
a	*Aeth Megan i Fangor*	Megan went to Bangor
b	*Aeth Emrys i Aberystwyth*	Emrys went to Aberystwyth
c	*Mae dafad yn yr ardd*	A sheep is in the garden
d	*Mae yn yr ardd ddafad*	In the garden is a sheep!
e	*Mae yn Aberystwyth dad*	In Aberystwyth is father!
f	*Mae yn Dolgellau Fegan*	In Dolgellau is Megan!
g	*Mae Megan yn Dolgellau*	Megan is in Dolgellau
h	*Gwelodd Megan ddarlun*	Megan saw a picture
i	*Gwelodd Emrys y lyfr*	Emrys saw the book
j	*Gwelodd y dyn gath*	The man saw a cat

- Looking first at (1), there are two issues:
  - Word order (a/c or b/d)
  - Mutation: *ceffyl* (b/c) or *geffyl* (a/d)?
- Models are d, e and f for stressed adverb
- And h, i and j for direct object

Note: Megan and Emrys are person's names. Aberystwyth and Dolgellau are places in Wales

Task 1: Choose the correct translation (1)

	English sentence	Welsh
1	In the theatre she saw a horse	a Gwelodd yn y theatr geffyl. b Gwelodd ceffyl yn y theatr. c Gwelodd yn y theatr ceffyl. d Gwelodd geffyl yn y theatr.
2	In the street, he saw a bicycle!	a Gwelodd yn y stryd beic. b Gwelodd beic yn y stryd. c Gwelodd yn y stryd feic. d Gwelodd feic yn y stryd
3	He saw a bicycle in the street.	a. Gwelodd beic yn y stryd. b Gwelodd feic yn y stryd. c Gwelodd yn y stryd beic. d Gwelodd yn y stryd feic.
4	The father saw a dog.	a Gwelodd dad gi. b Gwelodd tad gi. c Gwelodd tad ci. d Gwelodd dad ci.

- Looking first at (1), there are two issues:
  - Word order (a/c or b/d)
  - Mutation: *ceffyl* (b/c) or *geffyl* (a/d)?
- Models are d, e and f for stressed adverb
- So word order is a or c
- Whichever one has the mutated form *geffyl*

Task 1: Choose the correct translation (2)

	English sentence	Welsh
1	In the theatre she saw a horse	a Gwelodd yn y theatr geffyl. b Gwelodd ceffyl yn y theatr. c Gwelodd yn y theatr ceffyl. d Gwelodd geffyl yn y theatr.
2	In the street, he saw a bicycle!	a Gwelodd yn y stryd beic. b Gwelodd beic yn y stryd. c Gwelodd yn y stryd feic. d Gwelodd feic yn y stryd
3	He saw a bicycle in the street.	a. Gwelodd beic yn y stryd. b Gwelodd feic yn y stryd. c Gwelodd yn y stryd beic. d Gwelodd yn y stryd feic.
4	The father saw a dog.	a Gwelodd dad gi. b Gwelodd tad gi. c Gwelodd tad ci. d Gwelodd dad ci.

- Same questions for (2):
  - Word order (a/c or b/d)
  - Mutation *beic* (a/b) or *feic* (c/d)?
- Models are again d, e and f
- So word order is again a or c
- And mutation is again yes – but this time it's c

Task 1: Choose the correct translation (3)

	English sentence	Welsh
1	In the theatre she saw a horse	a Gwelodd yn y theatr geffyl. b Gwelodd ceffyl yn y theatr. c Gwelodd yn y theatr ceffyl. d Gwelodd geffyl yn y theatr.
2	In the street, he saw a bicycle!	a Gwelodd yn y stryd beic. b Gwelodd beic yn y stryd. c Gwelodd yn y stryd feic. d Gwelodd feic yn y stryd
3	He saw a bicycle in the street.	a. Gwelodd beic yn y stryd. b Gwelodd feic yn y stryd. c Gwelodd yn y stryd beic. d Gwelodd yn y stryd feic.
4	The father saw a dog.	a Gwelodd dad gi. b Gwelodd tad gi. c Gwelodd tad ci. d Gwelodd dad ci.

- (3) is the unstressed version of (2), but the alternatives have been rearranged
  - Word order (a/b or c/d)
  - Mutation *beic* (a/c) or *feic* (b/d)
- So we want the adverb at the end (a or b)
- With mutation *feic*

Task 1: Choose the correct translation (4)

	English sentence	Welsh
1	In the theatre she saw a horse	a Gwelodd yn y theatr geffyl. b Gwelodd ceffyl yn y theatr. c Gwelodd yn y theatr ceffyl. d Gwelodd geffyl yn y theatr.
2	In the street, he saw a bicycle!	a Gwelodd yn y stryd beic. b Gwelodd beic yn y stryd. c Gwelodd yn y stryd feic. d Gwelodd feic yn y stryd
3	He saw a bicycle in the street.	a. Gwelodd beic yn y stryd. b Gwelodd feic yn y stryd. c Gwelodd yn y stryd beic. d Gwelodd yn y stryd feic.
4	The father saw a dog.	a Gwelodd dad gi. b Gwelodd tad gi. c Gwelodd tad ci. d Gwelodd dad ci.

- What is the model for (4)?

The given data

	Welsh	English
a	*Aeth Megan i Fangor*	Megan went to Bangor
b	*Aeth Emrys i Aberystwyth*	Emrys went to Aberystwyth
c	*Mae dafad yn yr ardd*	A sheep is in the garden
d	*Mae yn yr ardd ddafad*	In the garden is a sheep!
e	*Mae yn Aberystwyth dad*	In Aberystwyth is father!
f	*Mae yn Dolgellau Fegan*	In Dolgellau is Megan!
g	*Mae Megan yn Dolgellau*	Megan is in Dolgellau
h	*Gwelodd Megan ddarlun*	Megan saw a picture
i	*Gwelodd Emrys y lyfr*	Emrys saw the book
j	*Gwelodd y dyn gath*	The man saw a cat

- What is the model for (4)?
- Plain SVO with definite S and indefinite O is most like j
- Word order VSO
- Mutation: no for Subject, yes for Object

Note: Megan and Emrys are person's names. Aberystwyth and Dolgellau are places in Wales

Task 1: Choose the correct translation (4)

	English sentence	Welsh
1	In the theatre she saw a horse	a Gwelodd yn y theatr geffyl. b Gwelodd ceffyl yn y theatr. c Gwelodd yn y theatr ceffyl. d Gwelodd geffyl yn y theatr.
2	In the street, he saw a bicycle!	a Gwelodd yn y stryd beic. b Gwelodd beic yn y stryd. c Gwelodd yn y stryd feic. d Gwelodd feic yn y stryd
3	He saw a bicycle in the street.	a. Gwelodd beic yn y stryd. b Gwelodd feic yn y stryd. c Gwelodd yn y stryd beic. d Gwelodd yn y stryd feic.
4	The father saw a dog.	a Gwelodd dad gi. b Gwelodd tad gi. c Gwelodd tad ci. d Gwelodd dad ci.

- What is the model for (4)?
  - Word order VSO (applies to all four)
  - No mutation on subject (b or c)
  - Mutation on object *gi*

Task 2: Translate into Welsh (1)

1. In the garden is [a] dragon!	1. *Mae yn yr ardd ddraig.*
2. The boy saw [a] cat.	2.
3. The man saw [a] doctor.	3.
4. [A] doctor went to Wales.	4.
5. [A] dragon saw [a] doctor.	5.
6. [A] garden is in the book.	6.

- Model is (d) **In the garden is a sheep! = *Mae yn yr ardd ~~ddafad~~***
- change *ddafad* 'sheep' to appropriate word.
  - 'dragon' *draig* + mutation = *ddraig*

Task 2: Translate into Welsh (2)

1. In the garden is [a] dragon!
2. The boy saw [a] cat.
3. The man saw [a] doctor.
4. [A] doctor went to Wales.
5. [A] dragon saw [a] doctor.
6. [A] garden is in the book.

1. *Mae yn yr ardd ddraig.*
2. *Gwelodd y bachgen gath.*
3.
4.
5.
6.

- Model is (j) **The man saw a cat = *Gwelodd y ~~dyn~~ gath***
- change *dyn* ‘man’ to appropriate word:
  - ‘boy’ *bachgen* but no mutation

Task 2: Translate into Welsh (3)

1. In the garden is [a] dragon!
2. The boy saw [a] cat.
3. The man saw [a] doctor.
4. [A] doctor went to Wales.
5. [A] dragon saw [a] doctor.
6. [A] garden is in the book.

1. *Mae yn yr ardd ddraig.*
2. *Gwelodd y bachgen gath.*
3. *Gwelodd y dyn feddyg.*
4.
5.
6.

- Model is again (j) **The man saw a cat = *Gwelodd y dyn ~~gath~~***
- change *gath* to appropriate word:
  - 'doctor' *meddyg* + mutation = *feddyg*

Task 2: Translate into Welsh (4)

1. In the garden is [a] dragon!
2. The boy saw [a] cat.
3. The man saw [a] doctor.
4. [A] doctor went to Wales.
5. [A] dragon saw [a] doctor.
6. [A] garden is in the book.

1. *Mae yn yr ardd ddraig.*
2. *Gwelodd y bachgen gath.*
3. *Gwelodd y dyn feddyg*.
4. *Aeth meddyg i Gymru.*
5.
6.

- Model is (a) **Megan went to Bangor = *Aeth ~~Megan~~ i ~~Fangor~~***
- change *Megan* to appropriate word:
  - ‘doctor’ *meddyg* but no mutation
- change *Bangor* to appropriate word:
  - ‘Wales’ *Cymru* + mutation = *Gymru*

Task 2: Translate into Welsh (5)

1. In the garden is [a] dragon!
2. The boy saw [a] cat.
3. The man saw [a] doctor.
4. [A] doctor went to Wales.
5. [A] dragon saw [a] doctor.
6. [A] garden is in the book.

1. *Mae yn yr ardd ddraig.*
2. *Gwelodd y bachgen gath.*
3. *Gwelodd y dyn feddyg*.
4. *Aeth meddyg i Gymru.*
5. *Gwelodd draig feddyg.*
6.

- Model is (h) **Megan saw a picture = *Gwelodd ~~Megan~~ ~~ddarlun~~***
- change *Megan* to appropriate word:
  - 'dragon' *draig* but no mutation
- change *ddarlun* to appropriate word:
  - 'doctor' *meddyg*+ mutation = *feddyg*

Task 2: Translate into Welsh (6)

1. In the garden is [a] dragon!
2. The boy saw [a] cat.
3. The man saw [a] doctor.
4. [A] doctor went to Wales.
5. [A] dragon saw [a] doctor.
6. [A] garden is in the book.

1. *Mae yn yr ardd ddraig.*
2. *Gwelodd y bachgen gath.*
3. *Gwelodd y dyn feddyg*.
4. *Aeth meddyg i Gymru.*
5. *Gwelodd draig feddyg.*
6.

- Model is (c) **A sheep is in the garden** = ***Mae ~~dafad~~ yn yr ardd***
- change *dafad* in model to the non-mutated (plain) form of 'garden'
  - as seen on the 'dictionary' slide, it's *gardd*.
  - So that's the promised additional mutation rule g → Ø [this symbol means 'nothing']

Task 2: Translate into Welsh (6)

1. In the garden is [a] dragon!
2. The boy saw [a] cat.
3. The man saw [a] doctor.
4. [A] doctor went to Wales.
5. [A] dragon saw [a] doctor.
6. [A] garden is in the book.

1. *Mae yn yr ardd ddraig.*
2. *Gwelodd y bachgen gath.*
3. *Gwelodd y dyn feddyg*.
4. *Aeth meddyg i Gymru.*
5. *Gwelodd draig feddyg.*
6. *Mae gardd yn y llyfr.*

- Model is (c) **A sheep is in the garden** = ***Mae ~~dafad~~ yn yr ~~ardd~~***
- change *dafad* in model to the non-mutated (plain) form of 'garden'
  - as seen on the 'dictionary' slide, it's *gardd*.
  - So that's the promised additional mutation rule g → Ø [this symbol means 'nothing']
- change *ardd* (with mutation) to *lyfr* + mutation and add 'the'
  - while the word for 'the' is *yr* with *ardd,* we can see in (i) that it is *y* with *lyfr* for reasons you can guess
  - so = *y llyfr*

Bonus question

- Translate into Welsh ‘To Dolgellau went Megan!’
- We saw that the preposition *i* causes mutation (*i Fangor*) as does the emphatic word order, so in this task both nouns should show mutation:
- *Aeth i DDolgellau Fegan*.
- Fun fact: in Welsh *dd* is a’single’ letter called [eð], the upper-case version of which is *DD* as seen here.
- Same is true of CH, LL and a few others.
- In fact the Welsh alphabet is as follows
  - A B C CH D DD E F FF G NG H I J L LL M N O P PH R RH S T TH U W Y
  - Some letters missing as well as the ‘extra’ letters

Examples of Lenition in Irish (*Séimhiú)*

- **After the definite article**
- a feminine noun with ‘the’ (the nominative singular)
  - *bean* → *an* ***bh****ean* ‘the woman’
- a masculine noun in the genitive singular (ownership)
  - *fir* → *an* ***fh****ir* ‘of the man’ e.g. *carr an fhir*, ‘the man’s car’ (= car of the man)

- **A noun when the article follows one of the prepositions *de* ‘from’, *do* ‘to’ or *i* ‘in’**
  - *do* + *an* = *don*: *don* ***fh****ear* ‘to the man’
  - *de* + *an* = *den*: *den* ***bh****ean* ‘from the woman’

- *Crann* → *i* + *an* = *sa(n)*: *sa* ***ch****rann* ‘in the tree’; *san* ***fh****ómhar* ‘in the autumn’

Examples of Lenition in Irish (*Séimhiú)*

After the vocative particle *a*
- *a **Bh**rída* ‘Bríd!’
- *a **Sh**eáin*‘Seán!’
- *a **ch**airde* ‘my friends!’

Vocative case (Calling someone)
If the name is a man’s name and ends in a broad consonant (that is, if the final consonant is preceded by the letters ‘a’, ‘o’, or ‘u’), the letter ‘I’ is inserted before that consonant. This is referred to as “slenderizing the ending.”

After possessive pronouns
The possessive pronouns that trigger lenition are *mo* ‘my’, *do* ‘your’ (sg.), *a* ‘his’
- *mac* → *mo **mh**ac* ‘my son’
- *teach* → *do **th**each* ‘your house’
- *peann* → *a **ph**eann* ‘his pen’

After certain prepositions
- *crann* → *de **ch**rann* ‘out of a tree’
- *faoi **ch**rann* ‘under a tree’
- *duine* → *mar **dh**uine* ‘as a person’

Engaging Content
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The Problem Solvers' Challenge

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A little Tshiluba

Tom McCoy

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Munster Technological University
TUS
Maynooth University
National University of Ireland Maynooth
OÉ Gaillimh
NUI Galway

Problem summary

- Tshiluba, spoken by about 6 million people, is one of the official languages of the Democratic Republic of the Congo.
- Below are some sentences in Tshiluba, along with their English translations.

Problem data

	Tshiluba	English
1	mukaji uvwa mumona muana.	The woman saw the child.
2	bakaji bavwa bamona muana.	The women saw the child.
3	muluma uvwa mumona bakaji.	The man saw the women.
4	muluma uvwa mumona bambuji.	The man saw the goats.
5	banzolu bavwa bamona bantambwe.	The chickens saw the lions.
6	tubambwa tuvwa tumona baluma.	The small dogs saw the men.
7	mbwa uvwa mumona ntambwe.	The dog saw the lion.
8	ntambwe uvwa mumona tubanzolu.	The lion saw the small chickens.
9	kanzolu kavwa kamona tubantambwe.	The small chicken saw the small lions.
10	tubakulu tuvwa tumona mbwa.	The small adults saw the dog.
11	kamuntu kavwa kapeta kantambwe.	The small person found the small lion.

- First task is to extract the vocabulary and see if we can figure out the grammar rules
- With problems like this a good place to start is to look for very similar sentences, ideally ‘minimal pairs’ (ie sentences that differ in only one word)

Problem data

	Tshiluba	English
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10	tubakulu tuvwa tumona mbwa.	The small adults saw the dog.
11	kamuntu kavwa kapeta kantambwe.	The small person found the small lion.

- All the sentences have the verb 'saw' except the last one, 'found'
- In the Tshiluba there is a repeated pattern of *–vwa* with various different prefixes (*u-*, *ba-*, *tu-*, *ka-*) in every sentence
- And all but the last have *-mona* with the same prefixes; #11 has *kapeta*.
- The words before and after this pattern differ from sentence to sentence, and so probably represent the subject and object

Problem data – agreement in the verb phrase

	Tshiluba	English
1	mukaji uvwa mumona muana.	The woman saw the child.
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3	muluma uvwa mumona bakaji.	The man saw the women.
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- The two words are together forming the verb
- They are showing some sort of agreement (concord) in their prefixes
- It is reasonable to assume that the first word, *-vwa*, which also occurs in #11 is some sort of auxiliary, perhaps a tense marker
- So we have two vocabulary items:

  -mona 'see'
  -peta 'find'

Problem data – agreement in the verb phrase

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11	kamuntu kavwa kapeta kantambwe.	The small person found the small lion.

- It's fairly easy to spot that the prefixes on the auxiliary and verb more or less match the prefixes on the first word
- An exception is that the expected *muvwa* is actually *uvwa*
- We will confirm later what the prefixes mean

Extracting the vocabulary – minimal pairs

	Tshiluba	English
1	mukaji uvwa mumona muana.	The woman saw the child.
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10	tubakulu tuvwa tumona mbwa.	The small adults saw the dog.
11	kamuntu kavwa kapeta kantambwe.	The small person found the small lion.

1 & 2 are a minimal pair: 'woman' vs 'women': singular vs plural
The obvious difference is *mukaji* (sing) vs *bakaji* (plur)
And bearing in mind that we have seen systematic agreement of prefixes, we can conclude that the verb is agreeing with the subject

Extracting the vocabulary – vocabulary

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11	kamuntu kavwa kapeta kantambwe.	The small person found the small lion.

Stem	Meaning	Sing/plur
-kaji	woman	mu / ba
-ana	child	mu / ?
-luma	man	mu /ba
-mbuji	goat	? / ba
-nzolu	chicken	? / ba
-ntambwe	lion	? / ba

- But when we get to #6 onwards, we see that there is something else going on

Extracting the vocabulary – vocabulary

	Tshiluba	English
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10	tubakulu tuvwa tumona mbwa.	The small adults saw the dog.
11	kamuntu kavwa kapeta kantambwe.	The small person found the small lion.

- The adjective ‘small’ is expressed by a further prefix *tu-* before plural *ba-*
- With corresponding agreement (when subject) in the verb
- But with singular the prefix *ka-* **replaces** the *mu-* in *kanzolu* and *kantambwe*, though not in *ka**mu**ntu*

Full vocabulary list

Stem	Meaning	Sing	Plur	Small sing	Small plur
-kaji	woman	mu	ba		
-ana	child	mu			
-luma	man	mu	ba		
-mbuji	goat		ba		
-nzolu	chicken		ba	ka	tuba
-ntambwe	lion	∅	ba		tuba
-mbwa	dog	∅			tuba
-kulu	adult				tuba
-ntu	person	} ?		kamu	
-muntu	person			ka	

There are some problems with this analysis:

1. Why do the words for 'lion' and 'dog' in the singular not start with *mu*-? Note that they begin with a nasal sound (m or n)
2. What is the word for 'person'? If it is *muntu*, then the form *kamuntu* fits the pattern. But as we will see, *–ntu* also makes sense. Perhaps we won't have to decide.

Task 1

Translate the following into Tshiluba:

1. Dog — *mbwa*
2. The man saw the child. — *Muluma uvwa mumona muana.*
3. The chicken saw the dogs.
4. The adult found the goat.
5. The small goats found the small child.

1 is straightforward, just look it up in our vocabulary list

For 2 ‘The man’ (singular) is *muluma* and the auxiliary and verb will both have the corresponding prefix *uvwa mumona.* And ‘child’ is *muana.*

Another way to do this, if you prefer, is to take sentence #3 ‘The man saw the women’ as a model, and just change ‘the women’ to ‘the child’:

muluma uvwa mumona muana

Task 1

Translate the following into Tshiluba:

1. Dog — *mbwa*
2. The man saw the child. — *Muluma uvwa mumona muana.*
3. The chicken saw the dogs. — *Nzolu uvwa mumona bambwa.*
4. The adult found the goat.
5. The small goats found the small child.

For 3, we could again find a model, or else apply our rules. In either case, we have not yet seen ‘the chicken’ (stem -*nzolu*) in the singular.

Now we are faced with a dilemma: do we prefix *mu-* as with some of the words, or have no prefix like some of the others? In fact, the rule is that because *nzolu* begins with a nasal, it does NOT require a prefix (though if you put *munzolu*, you would probably not be penalised)

The verb forms are the same as in 2, and for ‘the dogs’, we have seen ‘the small dogs’ as *tubambwa*, and we know to simply remove the *tu-*

Task 1

Translate the following into Tshiluba:

1. Dog — *mbwa*
2. The man saw the child. — *Muluma uvwa mumona muana.*
3. The chicken saw the dogs. — *Nzolu uvwa mumona bambwa.*
4. The adult found the goat. — *Mukulu uvwa mupeta mbuji.*
5. The small goats found the small child.

For 4, we have first to find the singular form of 'adult', based on *tubakulu* 'small adults' (plural). Applying the rules that should be *mukulu*.

We have seen 'found' only in #11 (*kavwa kapeta*) with the prefix *ka-*. But we can assume that the correct form here is with *mu-*, remembering that the auxiliary is *uvwa* not *muvwa*.

For 'the goat' we need to form the singular equivalent of *bambuji*. Again *mumbuji* might seem possible, but because it begins with a nasal, it should actually be just *mbuji*.

Task 1

Translate the following into Tshiluba:

1. Dog — *mbwa*
2. The man saw the child. — *Muluma uvwa mumona muana.*
3. The chicken saw the dogs. — *Nzolu uvwa mumona bambwa.*
4. The adult found the goat. — *Mukulu uvwa mupeta mbuji.*
5. The small goats found the small child. — *Tubambuji tuvwa tupeta kamuana.*

For 5, we have first to find the small plural form of 'goat', based on *bambuji* 'goats' (plural): we simply prefix *tu-* to give *tubambuji*.

The verb prefixes for small plural can be seen in #10: *tu-* giving (*tuvwa tupeta*).

We have seen *muana* for 'the child' and the 'small' prefix is ka- in the singular.

Task 2

Tshiluba belongs to a group of languages known as the Bantu languages. What does *bantu* mean in Tshiluba?

Recall the final rows of our vocabulary table:

Stem	Meaning	Sing	Plur	Small sing	Small plur
		mu / Ø	ba	ka	tuba
-ntu	person	} ?		kamu	
-muntu	person			ka	

This question suggests an answer to that dilemma.

If we assume the *ba-* of bantu is the plural prefix, then the stem is indeed –ntu, and the answer is that *bantu* means ‘the people’

Task 3

The Tshiluba word for “fruit” is *cimuma*, and the Tshiluba word for “fruits” is *bimuma*. Translate the following into English:

1. cimuma civwa cimona ntambwe.
2. ntambwe uvwa mumona tubimuma.

This new piece of information appears to introduce a new noun group, where the singular marker is *ci-*, with corresponding prefixes on the verb.

1 is straightforward: ‘The fruit saw the lion’ [sic]

In 2 we have *ntambwe* ‘the lion saw …’ and the object is the plural ‘fruits’ with the ‘small’ prefix, so ‘The lion saw the small fruits’ .

FYI

- Tshiluba is closely related to Swahili, one of the most widely spoken languages in Africa.
- A feature of Swahili is the extensive agreement between nouns and verbs, which also extends to adjectives, all done with prefixes which are sometimes the same, though not always.
- The examples we have seen here – apart from ‘fruit’ – all follow the same patterns; but in reality there are a large number of different agreement patterns corresponding to different noun classes, loosely based on meaning, rather like genders in languages you are more familiar with.

And an apology of sorts

- There was one part of this question which you could not answer with certainty, because you were not given enough data:
- You had to guess which of two patterns were appropriate for *nzolu* ‘chicken’.
- There was some logic to the correct answer (to do with nasal consonants), but the alternative answer was also consistent with the data.
- This happens (hopefully rarely) and the ‘examiners’ will always give credit for an incorrect but plausible answer.

- Solutions
- https://ailo.adaptcentre.ie/puzzles/
- Questions?
- ailo@adaptcentre.ie