Coping with variation in the Icelandic Diachronic Treebank

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The project

- **Viable Language Technology beyond English – Icelandic as a test case**
- A three year project funded by a grant of excellence from the Icelandic Research Fund (RANNÍS)
- **Objective:** Make it realistic to develop three particular types of LT modules with limited resources without sacrificing the quality of the work
- A parsed corpus is one of those three types of resources
- http://iceblark.wordpress.com/

Contents of the treebank

- Modern Icelandic written texts
  - of different genres
- Modern Icelandic spoken language
  - Spontaneous conversations
- Old Icelandic narrative texts
  - Icelandic Sagas, Heimskringla, Sturlunga saga, etc.
- Selected texts from the 16th - 20th centuries

Homework

- Are we ready to share our tools and data with others even if they might do brilliant things that we never thought of (Krauwer yesterday)?
- Absolutely
- (And we will try to use those brilliant results of others to do something even more brilliant)

Open source policy

- IceNLP (pos-tagger, shallow parser, lemmatizer, segmentizer, tokenizer, data format management etc.) was recently made open source (LGPL)
  - http://sourceforge.net/projects/icenlp/
  - http://nlp.ru.is/
- We use the output of IceNLP as an input to rule-based CorpusSearch (MPL) parsing
  - http://corpussearch.sourceforge.net/
- We run everything on Linux
  - still, Java, platform independent
- The data we create will be mostly free and open too
  - although this may not be possible for all the modern texts

Annotation process example

The sentence in (1) is from Sturlunga saga.

(1) Rannveig og Hergerður voru dætur þeirra
Rannveig and Hergerður were daughters their
‘Rannveig and Hergerður were their daughters’

Step I - Part-of-Speech tagging (IceTagger)

Input:

```
Rannveig og Hergerður voru dætur þeirra.
```

Output:

```
Rannveig nven-m
og c
Hergerður nven-m
voru sfg3fþ
dætur nvfn
þeirra fphfe
. .
```

Step II - Shallow parsing (IceParser)

Input:

```
Rannveig nven-m
og c
Hergerður nven-m
voru sfg3fþ
dætur nvfn
þeirra fphfe
. .
```

Output:

```
{*SUBJ> [NPs [NP Rannveig nven-m NP] [CP og c CP]
[NP Hergerður nven-m NP] NPs] *SUBJ>}
[VPb voru sfg3fþ VPb] {*COMP< [NP dætur nvfn NP] *COMP<}
{*QUAL [NP þeirra fphfe NP] *QUAL} . .
```

Step III - Lemmatize (Lemmald)

… and translate tagset and convert to labeled bracketing (Formald)

Input:

```
{*SUBJ> [NPs [NP Rannveig nven-m NP] [CP og c CP]
[NP Hergerður nven-m NP] NPs] *SUBJ>}
[VPb voru sfg3fþ VPb] {*COMP< [NP dætur nvfn NP] *COMP<}
{*QUAL [NP þeirra fphfe NP] *QUAL} . .
```

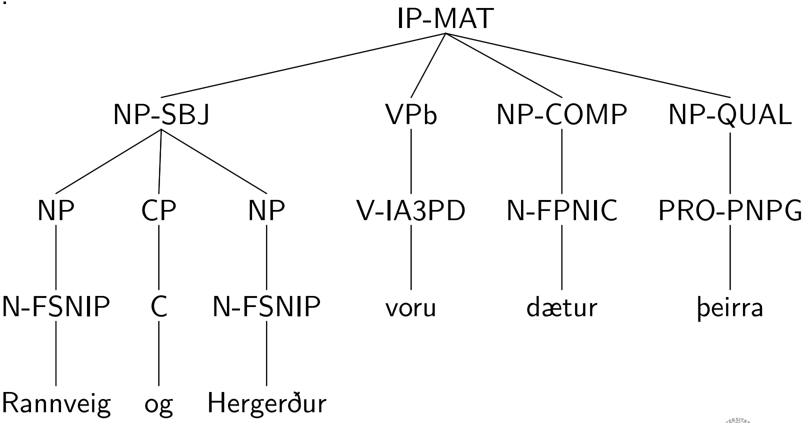
Output:

```
( (IP-MAT (NP-SBJ (NP (N-FSNIP Rannveig-rannveig) )
(CP (C og-og) ) (NP (N-FSNIP Hergerður-hergerður) ) )
(VPb (V-IA3PD voru-vera) )
(NP-COMP (N-FPNIC dætur-dóttir) )
(NP-QUAL (PRO-PNPG þeirra-það) ) (; .-.) ) )
```

Structure now looks like this

(lemmas and the final period omitted from picture)

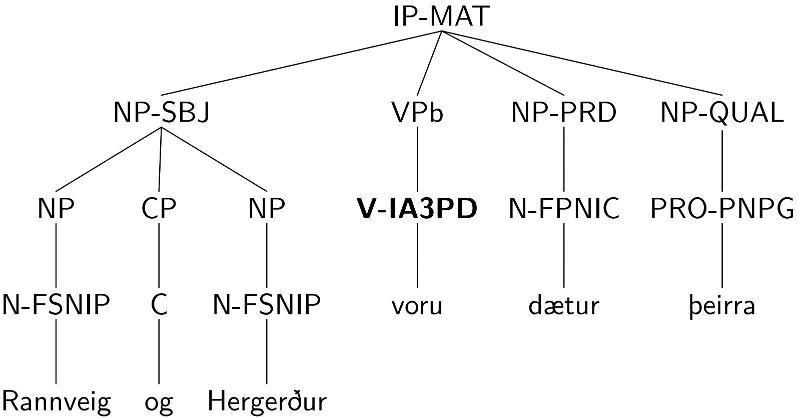
.



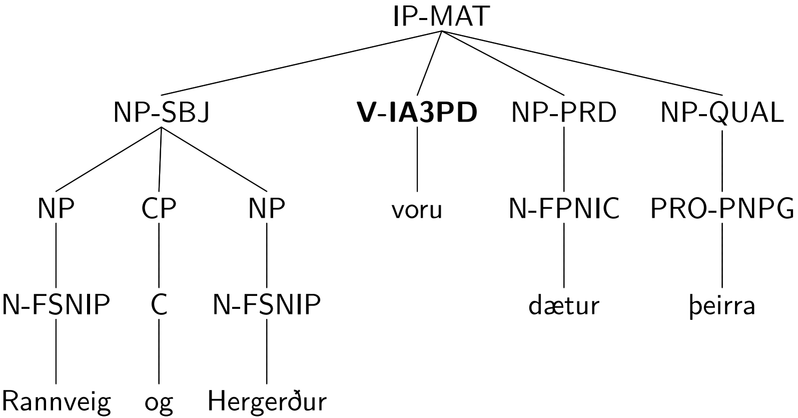
Step IV - CorpusSearch revision queries

- Minor revisions of labeling conventions
- Build more structure (by referring to structure)
  - CorpusSearch is designed for linguists
  - precedes, iPrecedes, dominates, iDominates, hasSister, cCommands, ...
- Correct mistakes based on structure
  - IP should dominate only one subject
- Some of this functionality may (and should) end up in other modules
- Example revisions on following slides

Finite verb should be the head of IP-MAT



Finite verb should be the head of IP-MAT

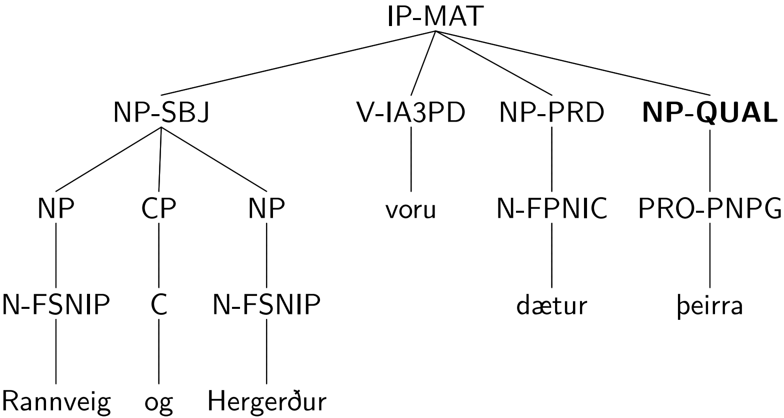


The actual revision query

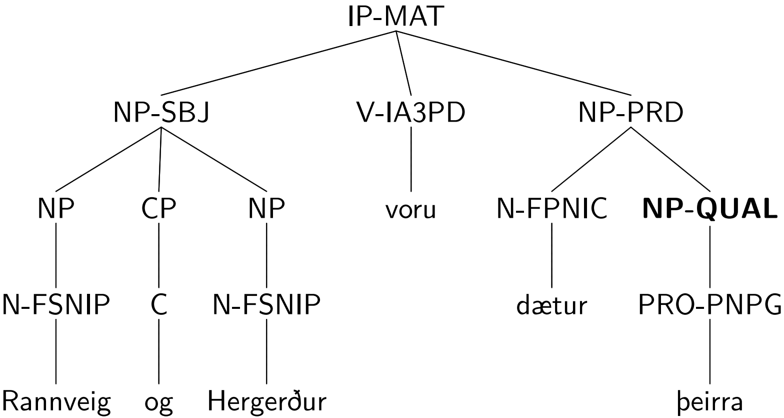
```
query: (IP-MAT iDoms {1}[1]VP*)
   AND ([1]VP* iDoms finiteVerb)

delete_node{1}:
```

finiteVerb is defined as any tag that matches: V-I*|V-S*|V-M*
(I=indicative, S=subjunctive, M=imperative)

Move NP-QUAL under immediately preceding NP



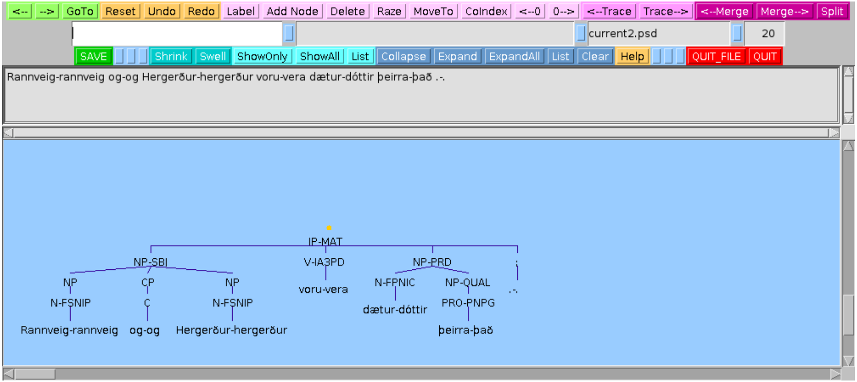
Move NP-QUAL under immediately preceding NP



The actual revision query

```
query: ({1}[1]NP* hasSister {2}[2]NP-QUAL)
       AND ([1]NP* iPrecedes [2]NP-QUAL)

extend_span{1, 2}:
```

Step V - Manual correction using CorpusDraw


<-- --> GoTo Reset Undo Redo Label Add Node Delete Raze MoveTo CoIndex <--0 0--> <--Trace Trace--> <--Merge Merge--> Split
current2.psd
20
SAVE Shrink Swell ShowOnly ShowAll List Collapse Expand ExpandAll List Clear Help QUIT_FILE QUIT
IP-MAT
NP-SBJ
V-IA3PD
NP-PRD
.
NP
CP
NP
voru-vera
N-FPNIC
NP-QUAL
.-.
N-FSNIP
C
N-FSNIP
dætur-dóttir
PRO-PNPG
Rannveig-rannveig
og-og
Hergerður-hergerður
þeirra-það

Rannveig-rannveig og-og Hergerður-hergerður voru-vera dætur-dóttir þeirra-það .-.

(this tree doesn't actually need manual corrections)

Variation as a problem for Generative Syntax

- Real world data is not as clear cut as one might expect if one believes in Principles and Parameters
- We aim to test recent theories on language acquisition, variation and productivity against our diachronic data (e.g. [Yang2009])
  - Is the successful acquisition of a UG parameter value based on the ratio of unambigous evidence of the relevant pattern? (token frequency)
  - Does the acquisition of other productive patterns rest on a rule having a relatively low rate of exceptions? (type frequency)
- Treebank statistics! (Quirky Subjects, New Passive, etc.)

The New Passive

Canonical passive:

(2)

Það	var	barinn	lítill
it	was	beaten.M.SG.NOM	little.M.SG.NOM
strákur			
boy.M.SG.NOM			

‘A little boy was beaten’

The New Passive:

(3)

Það	var	barið	lítinn	strák
it	was	beaten.N.SG	little.ACC	boy.ACC

The New Passive

The New Passive with accusative objects:

- Contains *vera* ‘be’ or *verða* ‘will, become’
- The finite verb is 3sg
- Contains a past participle
- Contains an object
- The object is in accusative case
- The past participle c-commands the object

The New Passive

```
node: IP*

query: (IP* iDoms [1]V-IA3SD )
       AND ([1]V-IA3SD iDoms [2]*-vera)
       AND (IP* doms VPP)
       AND (VPP iDoms [4]V-DANSN)
       AND (IP* doms [3]NP-OBJ)
       AND ([2]*-vera precedes [3]NP-OBJ)
       AND ([3]NP-OBJ iDoms N-..A..)
       AND ([4]V-DANSN hasSister [3]NP-OBJ)
```

The New Passive

- [Eythórsson2008] suggests a parametric variation: case feature [+/- accusative] assignment
- Increased frequency of the expletive *það* 'it, there' in the first half of the 19th century ([Hróarsdóttir1998], [Rögnvaldsson2002])
- Why does a child reanalyse passive data in the 20th century (but not the 19th ...)?
- With other words: what are the origins of the New Passive?

The New Passive

- How did it emerge?
- Some proposals:
  - Reanalysis of the passive of intransitive verbs; the first step after that being among inherently reflexive verbs ([Maling and Sigurjónsdottir2002])
  - “The New Passive is [...] closely related to the highly frequent and productive impersonal P[repositional]-passive” ([Sigurðsson2009]; cf. also Kjartansson 1991)
  - Lack of Definiteness Effect ([Guðmundsdóttir2000])
  - “Weakening”(or non-agreement, cf. DAT-NOM verbs) of the past participle ([Árnadóttir and Sigurðsson2008])
- We need (more) empirical evidence!

Quirky subjects

- Found in Modern Icelandic but not in Old Icelandic?
- Word order: an indication of the subject
- Statistics should show different results for the 12th than the 20th century

Quirky subjects

[Rögnvaldsson1996]; Gísla saga Súrssonar:

(4)

Hún	sýndist	honum	ríða	grám	hesti
she.NOM	seemed	him.DAT	ride	grey	horse

‘It looked like to him she was riding a grey horse’

(5)

Honum	sýndist	hún	ríða	grám	hesti
him.DAT	seemed	she.NOM	ride	grey	horse

Conclusion

- The Icelandic treebank will contain a lot of variation, both synchronic and diachronic
- In order to study this variation thoroughly, we need a properly annotated phrase structure
- We build the treebank by combining and re-using existing open source tools
- A sophisticated query language and search software enables us to deal with the variation
- The treebank will open up new possibilities in the study of Icelandic syntax

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