

# Small intro to Constraint grammar

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June 27, 2017

## Constraint Grammar – background

- ▶ Karlsson (1990), Karlsson (1995) (cg)
- ▶ Tapanainen (1996) (cg2)
- ▶ Bick (2000) (vislcg)
  - ▶ <http://sourceforge.net/projects/vislcg/>
  - ▶ [http://visl.sdu.dk/constraint\\_grammar.html](http://visl.sdu.dk/constraint_grammar.html)

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- ▶ BEFORE-SECTIONS, SECTION (x N), AFTER-SECTIONS
  - ▶ SELECT (remove other readings)
  - ▶ REMOVE (remove this reading)
  - ▶ MAP (add this tag to the reading, on no more tags)
  - ▶ ADD (add this tag to the reading, and possible more tags)



## Operators

- ▶ REMOVE, SELECT, MAP, ADD
  - ▶ IF, LINK, BARRIER
- ▶ MAP, ADD
  - ▶ TARGET

## What can we use it for?

- ▶ disambiguation
  - ▶ SELECT, REMOVE
- ▶ adding function tags
  - ▶ MAP, ADD
- ▶ adding dependency numbers
  - ▶ SETPARENT, SETCHILD
- ▶ grammar checking
- ▶ question-answering drills
- ▶ lexical selection for MT

## Analysers: Saami languages

Analyser	Languages				
<b>Lexicon/ morph.</b>	North S transd.	Lule S transd.	South S transd.	Inari S transd.	Kolta S transd.
<b>Disam- biguator</b>	North S	Lule S	South S	North S, ajusted	North S
<b>Functions</b>	Common Saami analysator				
<b>Depen- dency</b>	Common Saami analysator				

Table : Modul interaction

## Lexical selection with Constraint Grammar

```
SELECT ("rein"i) (0 ("<heagga>"i) LINK -1 num - ("okta")) ;
```

```
SELECT:fallback ("liv"i) (0 ("<heagga>"i)) ;
```

## Feedback on grammar error with Constraint Grammar

Gean deivet gáffádagas? Mun **deaivat** suohtas skibir .

Mun deivet suohtas skihpára



Iskka vástádusaid

Remember **agreement between subject and verbal.**

Du čuoggát

The verb is conjugated to correlate for person and number of the subject, e.g. Mun boađán. Click to read more.

'Who did you meet at the cafe?' 'I **meet, funny, friend**'

## Analysis

```

"<Gean>"
  "gii" Pron Interr Sg Acc
"<deivet>"
  "deaivat" V TV Imprt Pl2
  "deaivat" V TV Ind Prt Sg2
"<gáffádagas>"
  "gáffádat" Org N Sg Loc
"<^vastas>"
  "^vastas" QDL
  "deaivat" V
  "suohtas" A
  "skibir" N
"<Mun>"
  "mun" Pron Pers Sg1 Nom
"<deivet>"
  "deaivat" V TV Ind Prt Sg2 &grm-non-agr-subj-v
"<suohtas>"
  "suohtas" A Attr
"<skihpára>"
  "skibir" Hum N Sg Acc
"<.>"

```

## Rule for detecting grammar errors

```
MAP (&grm-non-agr-subj-v) TARGET VFIN IF  
(0 $$PERSON-NUMBER-TAG  
LINK -1 (Pers Nom) - $$PERSON-NUMBER-TAG  
LINK *-1 QDL) ;
```

```
LIST PERSON-NUMBER-TAG = Sg1 Sg2 Sg3 Du1 Du2 Du3 Pl1  
Pl2 Pl3 ;
```

## Meta comments with Constraint Grammar

```
LIST ADJ-LEMMA = (".*"r A) ;
```

```
MAP (&not-same-adj) TARGET $$ADJ-LEMMA  
(0 ("^vastas") LINK NOT *1 $$ADJ-LEMMA) ;
```

→ "You must use the given adjective."



## Implicit feedback

Buorre beaivi! Bures boahtin mu geahčai! Suohtas oaidnit du!

Dál moai gáfestalle. Manne go stohpui?

Juo, moai manne dohko

De manne stohpui.

Mun lean okto ruovttus odne.

Háliidat go gáfe vai deaja?

Mun háliidan deaja

Háliidat go honnega?

Vástádus

## Navigating with Constraint Grammar

```

"<Háliidat>"
  "háliidit" V TV Ind Prs Sg2
"<go>"
  "go" Qst Pcle
"<gáfe>"
  "gáffe" Plant N Sg Acc
"<vai>"
  "vai" CS
  "vai" CC
"<deaja>"
  "deadja" N Sg Acc
"<^sahka>"
  "^sahka" QDL Haliidat_go_gafe_vai_deaja &dia-pos
"<Mun>"
  "mun" Pron Pers Sg1 Nom
"<háliidan>"
  "háliidit" V TV Ind Prs Sg1
"<deaja>"
  "deadja" N Sg Acc &dia-target &dia-tea
"<.>"
  "." CLB

```

## Rules for navigating

```

ADD (&dia-target) TARGET NP-HEAD + Acc
IF (*-1 QDL BARRIER Neg
LINK *-1 TARGETQUESTION-ACC)
(NEGATE 0 Gen LINK 1 N) ;

```

```

ADD (&dia-tea) TARGET N
(0 ("deadja") OR ("teadja"))
LINK 0 (&dia-target)) ;

```

## Navigating to the relevant next question

```
<text>Háliidat go gáfe vai deaja?</text>  
<alt target="coffee" link="sugar_question"/>  
<alt target="tea" link="honey_question"/>  
<alt target="negative"  
link="drink_something_else_question"/>  
<alt target="default"> link="next_topic"/>
```