

Assignment 2 — Feature grammars

Project Exam Help

CSC485/2501 – Fall 2017

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Computer Science

UNIVERSITY OF TORONTO

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Slides are based on ALE user's guide by Carpenter & Penn

http://www.ale.cs.toronto.edu/docs/man/ale_trale_manual.pdf

Getting started (1)

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- Use tcsh.
- Remove the default virtual memory limit.
- Starting **TRALE** (ssh with the -X flag):

`limit vmemoryuse unlimited`

`path to trale/trale -fsg`

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Getting started (2)

- Load grammar:

```
?- compile_gram(grammar).
```

- Check lexical entries:

```
?- lex(puppies).
```

- Check rules:

```
?- rule(srule)
```

- Input to the parser:

```
?- rec[john,walks]
```

- Other lexical entries, rules, parses:

```
ANOTHER? y.
```

- Lines starting with % are comments.
- The **fullstop** is necessary with all commands.

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Types

- Every feature structure has a type.
- Types have subtypes (more specific instances of the type).
- Type names must be lower-cased.
- The most general type is bot.
- Everything is a sub-type of bot.
- A simple type specification: the name of the type, followed by the keyword sub, followed by a list of its subtypes, e.g.,

```
bot sub [a, c].  
  b sub [d, e].  
    d sub [].  
    e sub [].  
  c sub [].
```

Feature structure

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- A collection of feature/value pairs.
- E.g., type vp (with no subtypes) has a feature subj with value np:

```
vp sub []  
    intro [subj:np].
```

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Type system

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- Appropriateness: each type must specify:

- which features it can be defined for
- which type of values such features can take.

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Lexicon

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- Adding lexicon:

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john — — —> np.
walked — — —> vp.

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Grammar rules

- Name of the rule: srule.
- Atom rule specifies type of info for ALE compiler.
- Nonterminal of the mother: s (nonterminals are lower-cased)
- Daughter categories indicated by cat>.
- Order is important.
- Add comments to explain what your grammar does.

*% Grammar Rule allowing the combination of
% np category with a vp type category*

srule rule

s

===>

cat> np,

cat> vp.

Simple grammar

```
% Type Hierarchy
bot sub [s,np,vp]. % Three sub-types of bot
s sub []. % Each with no sub-types
np sub [].
vp sub [].
% Lexical Entries
john ---> np.
walked ---> vp.
% Grammar Rules
srule rule
s
===>
cat> np,
cat> vp.
```

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Simple grammar

```
bot sub [pp,p,np].
```

```
pp sub [].
```

```
p sub [].
```

```
np sub [].
```

```
with ---> o.
```

```
sam ---> np.
```

```
srule rule
```

```
pp
```

```
===>
```

```
cat> p,
```

```
cat> np.
```

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Variables

- Start with **upper-case** letters.
- Variables with the same name must unify.

```
cat sub [s,np,vp].  
np sub []  
    intro [index:index].  
vp sub []  
    intro [subj:np].  
s sub []  
srule rule  
s  
==>  
cat> (np,index:Ind),  
cat> (vp,subj:index:Ind).
```

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INDEX feature

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- Takes the type index as its value.
- Contains agreement features, gender, number, and person.

```
index sub []  
  intro [p:person, num:number, g:gend].
```

```
person sub [first, second, third].
```

```
number sub [sing, plural].
```

```
gend sub [m, f, n].
```

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Exercise (1)

- Modify this grammar in a way that parses *I walk*.

```
bot sub [s, np, vp].
```

```
s sub [].
```

```
np sub [].
```

```
vp sub [].
```

```
john --> np.
```

```
walks ---> vp.
```

```
srule rule
```

```
s
```

```
==>
```

```
cat> np,
```

```
cat> vp.
```

- Does it parse *I walks*? or *John walk*? How can you avoid it?

Exercise (2)

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- Modify the previous grammar in a way that parses *John walks with Sam.*

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