

Computational Linguistics

Exercises: Syntax

1 CFG

Give the rewrite rules that starting from the lexicon in a) recognize as grammatical the sentences listed in b).

a) Lexicon:

```
pn --> jim ; noam
det --> a
n --> book ; boy
prep --> with ; to
adv --> often
iv --> dreams; plays
tv --> meets; hates
dtv --> dedicates
vsentcom --> thinks
```

b) Sentences

1. Jim plays
2. Jim dreams often
3. Jim meets noam
4. Jim dedicates a book to noam
5. Jim speaks with a boy
6. Jim thinks noam hates a boy

Build the parse trees of the sentences in b) generated by your grammar.

Does your grammar overgenerate? If so, give an example of a ungrammatical sentence recognized by your grammar (and not listed in b).)

2 Features

```
s --> np(subj), vp.
```

```
np(_) --> det, n.
```

```
np(_) --> pn.
```

```
np(CASE) --> pro(CASE).
```

```
vp --> vi.
```

```
vp --> vt, np(obj).
```

```
%% Lexicon
```

```
det --> a
```

```
det --> the
```

```
n --> bride
```

```

n --> nurse
n --> yakuza
n --> whiskey

pn --> bill
pn --> gogo

pro(subj) --> he
pro(subj) --> she
pro(obj) --> him
pro(obj) --> her

vi --> whistles
vi --> fights

vt --> drinks
vt --> kills

```

1. Add further words to the lexicon.
2. Extend the grammar so that it can also handle ditransitive verbs of the form: “the barkeeper gives her a sword”

3 Subcategorization

This exercise focuses on the different ways verbs may subcategorize. (a) Give a CFG able to recognize the sentences below as grammatical and the ones marked with * as ungrammatical.

1. I disappeared
2. I prefer a pizza
3. I gave you a pizza
4. You said I disappeared
5. He told me I disappeared
6. I want to leave
7. I left on Thursday
8. I left Boston in the morning
9. I traveled from Boston to New York
10. *You said me john left
11. *I disappear Boston
12. *I prefer
13. *I gave you
14. *I gave you on Thursday
15. *I gave from Boston to New York

- (b) Build the syntactic tree for each of them following the CFG rules you have found.