Artificial Intelligence (CSBP480)
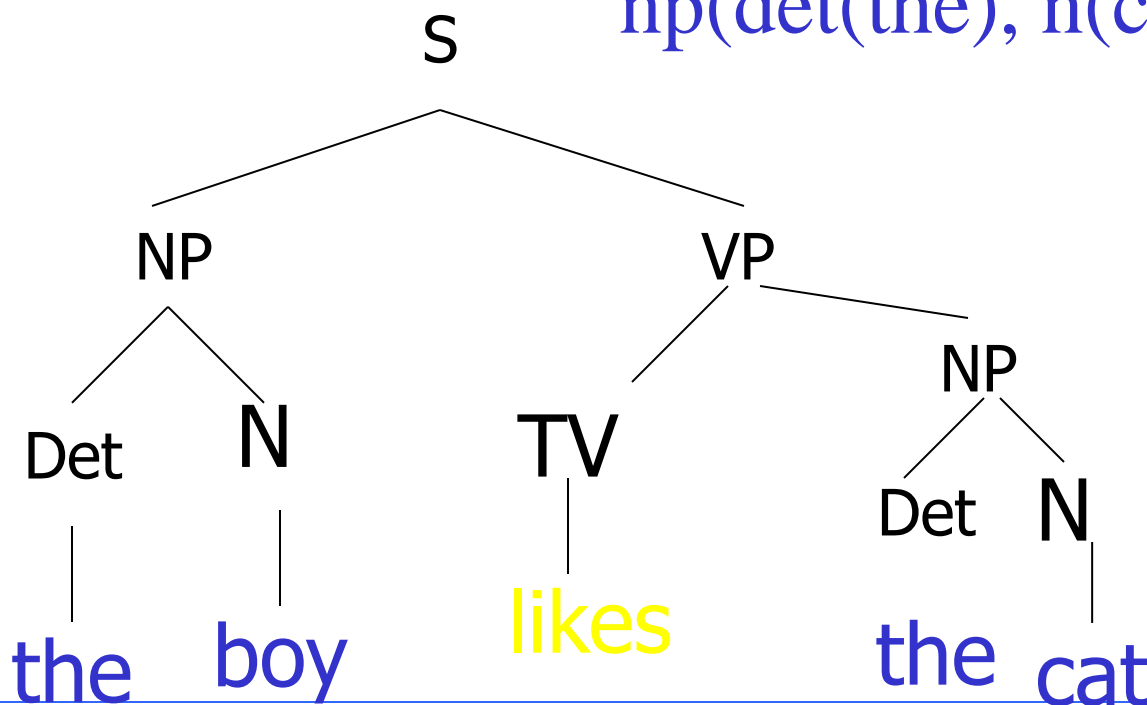
Introduction to
Natural Language Processing (3)

Building Syntax Trees

What is a syntax tree?

➢ A syntax tree is a structure that shows the internal representation of a sentence.

➢ We can use DCG arguments to capture this structure.

Syntax Tree

➢ s(np(det(the), n(boy)), vp(tv(likes), np(det(the), n(cat))))

```
                        s
              ┌─────────┴─────────┐
             NP                   VP
          ┌───┴───┐          ┌─────┴─────┐
         Det      N         TV           NP
          │       │          │        ┌───┴───┐
         the     boy       likes     Det      N
                                      │        │
                                     the      cat
```

Grammar rules in Prolog

➢ Prolog allows us to add arguments to the grammar rule.

➢ So, we can write the rules as:

```
s(s(NP,VP))-->  np(NP), vp(VP).
np(np(N)) -->  pronoun(N).
np(np(Det,N)) -->  det(Det), n(N).
vp(vp(V)) -->  itv(V).
 vp(vp(TV,NP))-->  tv(TV), np(NP).
```

Grammar rules in Prolog

➢ We can use this lexicon (dictionary)

```
pronoun(pn(i))-->[i].
det(det(the))-->[the].
n(n(cat))-->[cat].
n(n(boy))-->[boy].
n(n(ball))-->[ball].
tv(tv(hit))-->[hit].
tv(tv(likes))-->[likes].
itv(itv(run))-->[run].
```

Reading from the keyborad

➢ Prolog has a built in predicate called readln(S).

➢ It allows you to read a line and put it in a list.

➢ We can use it to read a sentence:

❖ **run :-**

        readln(S),

        s(Tree,S,[]),

        write("Syntax Tree: "),

        write(Tree).

Try the grammar

➢Now load your grammar and run it.

```
| ?-run.
```