

```
In [1]: from grammar import *
        from parser import *
        from util2 import *
```

The given PCFG:

```
In [2]: print str(timeFliesPCFG)

Noun => flies      | 0.4
Noun => arrow      | 0.4
Noun => time       | 0.2
TOP  => S          | 1.0
Det  => an         | 1.0
VP   => Verb NP    | 0.6
VP   => Verb PP    | 0.2
VP   => Verb       | 0.1
VP   => Verb NP_PP | 0.1
S    => VP | 0.2
S    => NP VP      | 0.5
S    => VP PP      | 0.1
S    => NP VP_PP   | 0.2
VP_PP=> VP PP     | 1.0
NP_PP=> NP PP     | 1.0
Prep => like      | 1.0
PP   => Prep NP   | 1.0
Verb => flies     | 0.5
Verb => like      | 0.2
Verb => time      | 0.3
NP   => Det Noun  | 0.7
NP   => Noun      | 0.3
```

The sentence we wish to parse:

```
In [3]: print timeFliesSent

['time', 'flies', 'like', 'an', 'arrow']
```

Expected output:

```
(TOP:
  (S:
    (NP: (Noun: 'time'))
    (VP:
      (Verb: 'flies')
      (PP: (Prep: 'like') (NP: (Det: 'an') (Noun: 'arrow'))))))
```

Actual output:

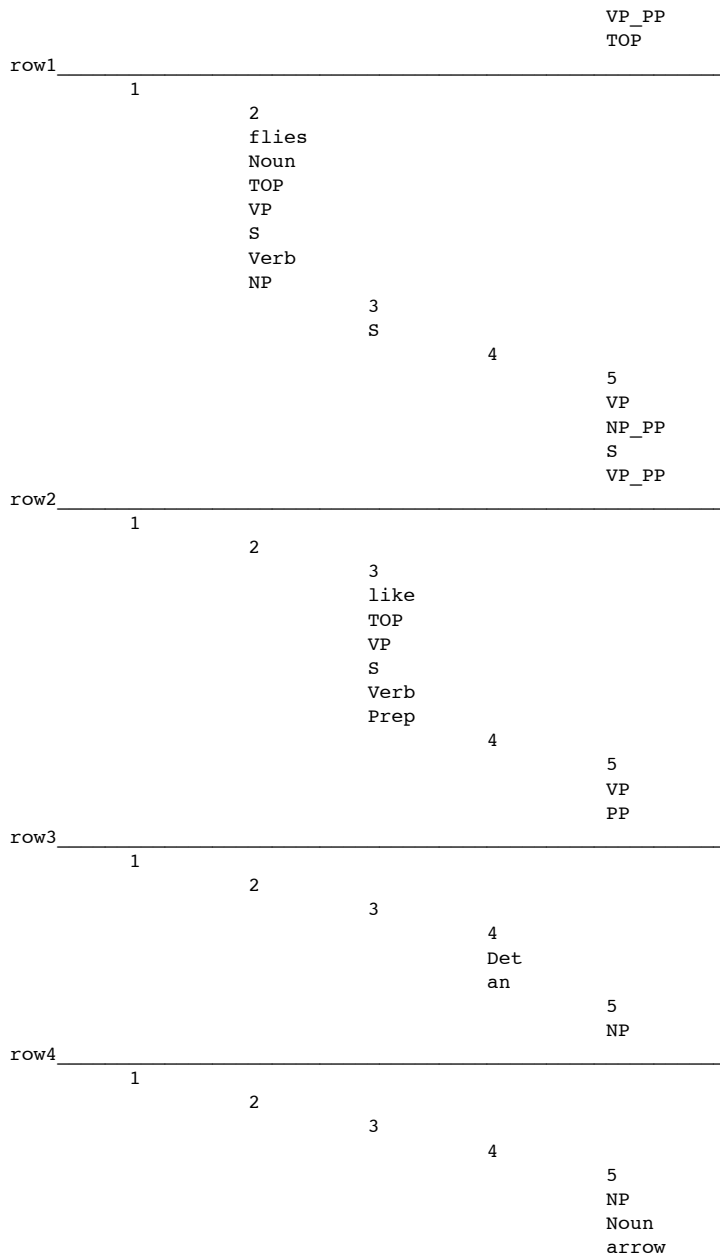
```
In [4]: print parse(timeFliesPCFG, timeFliesSent)

(TOP:
  (S:
    (NP: (Noun: 'time'))
    (VP:
      (Verb: 'flies')
      (PP: (Prep: 'like') (NP: (Det: 'an') (Noun: 'arrow'))))))
```

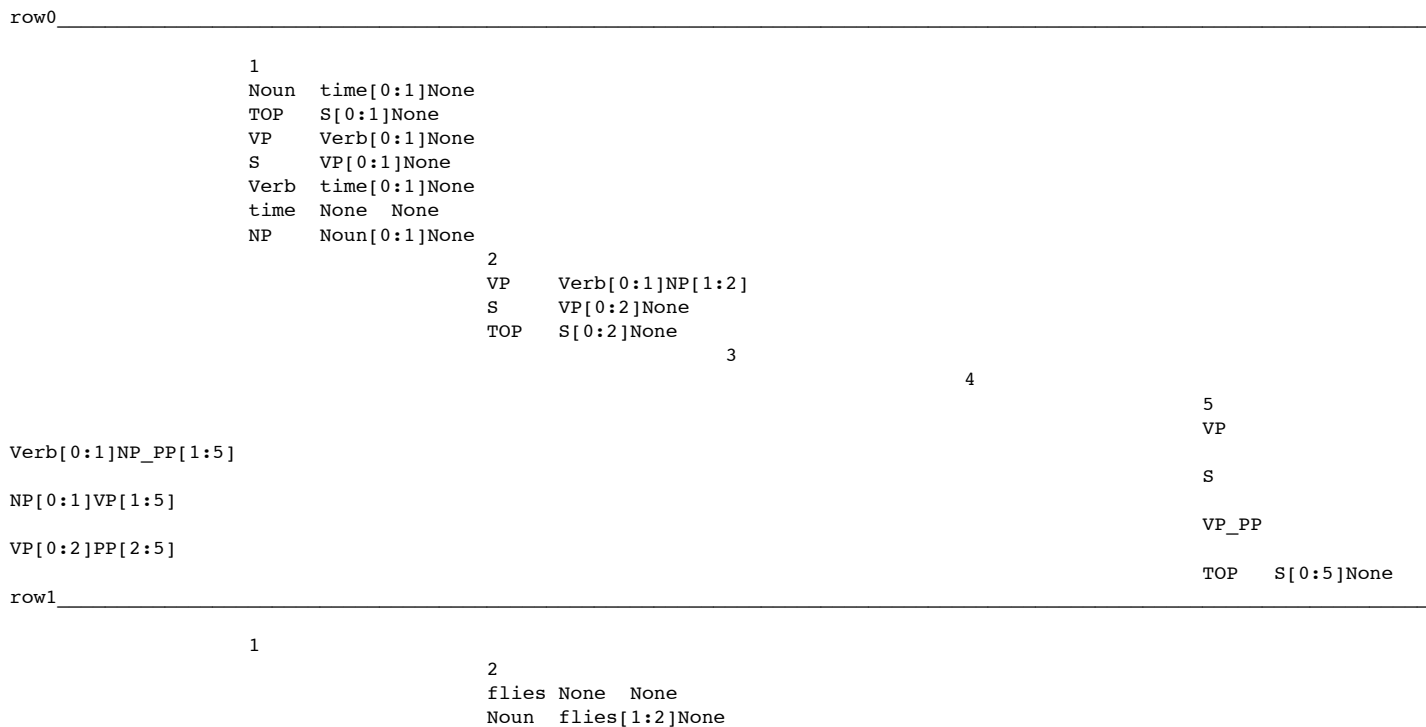
The chart produced:

```
In [8]: chart = cky(timeFliesPCFG, timeFliesSent, pruningPercent=None)
        printChart(chart,timeFliesSent,columnWidth=10, printBackPointers=False)
```

```
row0 _____
      1
      Noun
      TOP
      VP
      S
      Verb
      time
      NP
          2
          VP
          S
          TOP
              3
                  4
                      5
                      VP
                      S
```



```
In [10]: printChart(chart,timeFliesSent,columnWidth=20, printBackPointers=True)
```



TOP S[1:2]None
VP Verb[1:2]None
S VP[1:2]None
Verb flies[1:2]None
NP Noun[1:2]None
3
S NP[1:2]VP[2:3]
4

5
VP
NP_PP
S
VP_PP

Verb[1:2]PP[2:5]
NP[1:2]PP[2:5]
NP[1:2]VP[2:5]
VP[1:2]PP[2:5]
row2

1
2
3
like None None
TOP S[2:3]None
VP Verb[2:3]None
S VP[2:3]None
Verb like[2:3]None
Prep like[2:3]None
4

5
VP
PP

Verb[2:3]NP[3:5]
Prep[2:3]NP[3:5]
row3

1
2
3
4
Det an[3:4]None
an None None

5
NP

Det[3:4]Noun[4:5]
row4

1
2
3
4

5
NP
Noun
arrow None None

Noun[4:5]None
arrow[4:5]None

In []: