

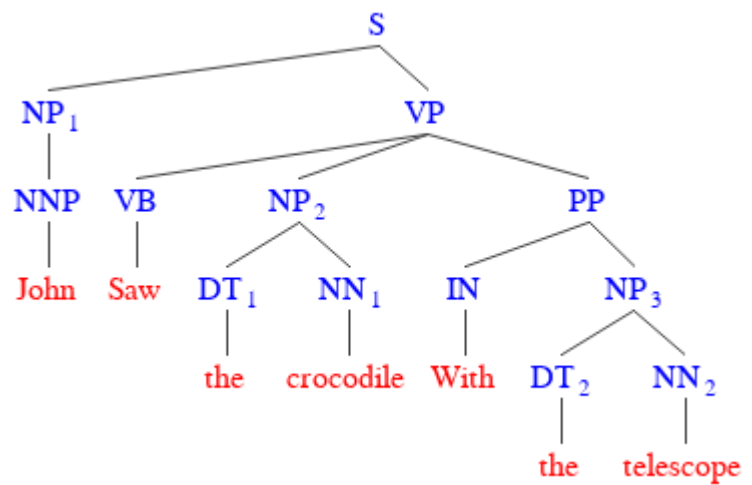
# *NLP Ex4*

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**1**

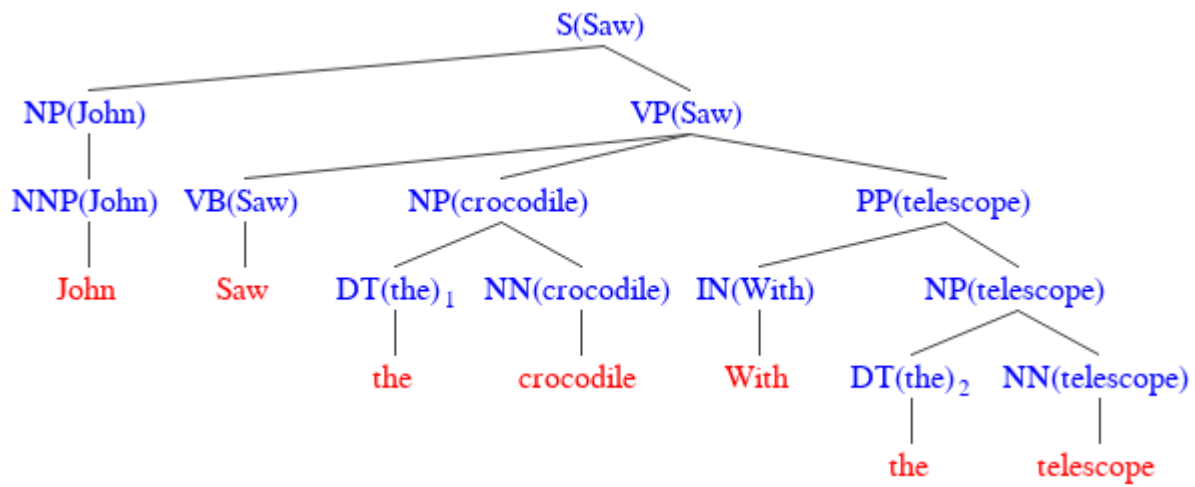
**1.1**



**1.2**

there is only 1 option to derivate the sentence under the given CFG.

1.3



1.4

John saw the crocodile with the telescope

## 2

### 2.1

```
C:\Users\Umer\anaconda3\python.exe C:/Users/Umer/rycnamrprojects/untitled13/vets.py
running arc standard with the following actions  SHIFT , SHIFT , LEFT nsubj, SHIFT , SHIFT , LEFT mark, RIGHT acl, SHIFT , SHIFT , LEFT cc, RIGHT conj, RIGHT obj, RIGHT root
stack: ['root'] buffer: ['John', 'likes', 'balloons', 'that', 'pop', 'and', 'eggs']
arcs: []
---- SHIFT ----
stack: ['root', 'John'] buffer: ['likes', 'balloons', 'that', 'pop', 'and', 'eggs']
arcs: []
---- SHIFT ----
stack: ['root', 'John', 'likes'] buffer: ['balloons', 'that', 'pop', 'and', 'eggs']
arcs: []
---- LEFT nsubj----
stack: ['root', 'likes'] buffer: ['balloons', 'that', 'pop', 'and', 'eggs']
arcs: [['likes', 'John']]
---- SHIFT ----
stack: ['root', 'likes', 'balloons'] buffer: ['that', 'pop', 'and', 'eggs']
arcs: [['likes', 'John']]
---- SHIFT ----
stack: ['root', 'likes', 'balloons', 'that'] buffer: ['pop', 'and', 'eggs']
arcs: [['likes', 'John']]
---- SHIFT ----
stack: ['root', 'likes', 'balloons', 'that', 'pop'] buffer: ['and', 'eggs']
arcs: [['likes', 'John']]
---- LEFT mark----
stack: ['root', 'likes', 'balloons', 'pop'] buffer: ['and', 'eggs']
arcs: [['likes', 'John'], ('pop', 'that'), ('balloons', 'pop')]
---- RIGHT acl----
stack: ['root', 'likes', 'balloons'] buffer: ['and', 'eggs']
arcs: [['likes', 'John'], ('pop', 'that'), ('balloons', 'pop')]
---- SHIFT ----
stack: ['root', 'likes', 'balloons', 'and'] buffer: ['eggs']
arcs: [['likes', 'John'], ('pop', 'that'), ('balloons', 'pop')]
---- SHIFT ----
stack: ['root', 'likes', 'balloons', 'and', 'eggs'] buffer: []
arcs: [['likes', 'John'], ('pop', 'that'), ('balloons', 'pop')]
---- LEFT cc----
stack: ['root', 'likes', 'balloons', 'eggs'] buffer: []
arcs: [['likes', 'John'], ('pop', 'that'), ('balloons', 'pop'), ('eggs', 'and')]
---- RIGHT conj----
stack: ['root', 'likes', 'balloons'] buffer: []
arcs: [['likes', 'John'], ('pop', 'that'), ('balloons', 'pop'), ('eggs', 'and'), ('balloons', 'eggs')]
---- RIGHT obj----
stack: ['root', 'likes'] buffer: []
arcs: [['likes', 'John'], ('pop', 'that'), ('balloons', 'pop'), ('eggs', 'and'), ('balloons', 'eggs'), ('likes', 'balloons')]
---- RIGHT root----
stack: ['root'] buffer: []
arcs: [['likes', 'John'], ('pop', 'that'), ('balloons', 'pop'), ('eggs', 'and'), ('balloons', 'eggs'), ('likes', 'balloons'), ('root', 'likes')]
```

### 2.2

```
running arc eager with the following actions  SHIFT , LEFT nsubj, RIGHT root, RIGHT obj, SHIFT , LEFT mark, RIGHT acl, REDUCE , SHIFT , LEFT cc, RIGHT conj
stack: ['root'] buffer: ['John', 'likes', 'balloons', 'that', 'pop', 'and', 'eggs']
arcs: []
--Shift--
stack: ['root', 'John'] buffer: ['likes', 'balloons', 'that', 'pop', 'and', 'eggs']
arcs: []
--Left arc nsubj--
arcs: [['likes', 'John']]
stack: ['root'] buffer: ['likes', 'balloons', 'that', 'pop', 'and', 'eggs']
arcs: [['likes', 'John']]
--Right arc root--
arcs: [['likes', 'John'], ('root', 'likes')]
stack: ['root', 'likes'] buffer: ['balloons', 'that', 'pop', 'and', 'eggs']
arcs: [['likes', 'John'], ('root', 'likes')]
--Right arc obj--
arcs: [['likes', 'John'], ('root', 'likes'), ('likes', 'balloons')]
stack: ['root', 'likes', 'balloons'] buffer: ['that', 'pop', 'and', 'eggs']
arcs: [['likes', 'John'], ('root', 'likes'), ('likes', 'balloons')]
--Shift--
stack: ['root', 'likes', 'balloons', 'that'] buffer: ['pop', 'and', 'eggs']
arcs: [['likes', 'John'], ('root', 'likes'), ('likes', 'balloons')]
--Left arc mark--
arcs: [['likes', 'John'], ('root', 'likes'), ('likes', 'balloons'), ('pop', 'that')]
stack: ['root', 'likes', 'balloons'] buffer: ['pop', 'and', 'eggs']
arcs: [['likes', 'John'], ('root', 'likes'), ('likes', 'balloons'), ('pop', 'that')]
--Right arc acl--
arcs: [['likes', 'John'], ('root', 'likes'), ('likes', 'balloons'), ('pop', 'that'), ('balloons', 'pop')]
stack: ['root', 'likes', 'balloons', 'pop'] buffer: ['and', 'eggs']
arcs: [['likes', 'John'], ('root', 'likes'), ('likes', 'balloons'), ('pop', 'that'), ('balloons', 'pop')]
--Reduce--
stack: ['root', 'likes', 'balloons'] buffer: ['and', 'eggs']
arcs: [['likes', 'John'], ('root', 'likes'), ('likes', 'balloons'), ('pop', 'that'), ('balloons', 'pop')]
--Shift--
stack: ['root', 'likes', 'balloons', 'and'] buffer: ['eggs']
arcs: [['likes', 'John'], ('root', 'likes'), ('likes', 'balloons'), ('pop', 'that'), ('balloons', 'pop')]
--Left arc cc--
arcs: [['likes', 'John'], ('root', 'likes'), ('likes', 'balloons'), ('pop', 'that'), ('balloons', 'pop'), ('eggs', 'and')]
stack: ['root', 'likes', 'balloons'] buffer: ['eggs']
arcs: [['likes', 'John'], ('root', 'likes'), ('likes', 'balloons'), ('pop', 'that'), ('balloons', 'pop'), ('eggs', 'and')]
--Right arc conj--
arcs: [['likes', 'John'], ('root', 'likes'), ('likes', 'balloons'), ('pop', 'that'), ('balloons', 'pop'), ('eggs', 'and'), ('balloons', 'eggs')]
stack: ['root', 'likes', 'balloons', 'eggs'] buffer: []
```