

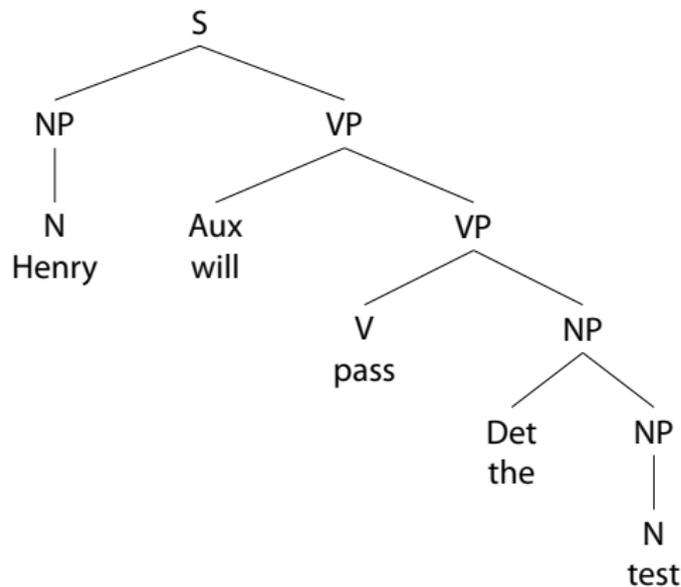
# Syntax III

**Andrew Murphy**  
andrew.murphy@uChicago.edu

Week 7

05.11.22

LING 20001: Introduction to Linguistics



## Phrase Structure Rules

$S \rightarrow NP VP$

$VP \rightarrow V NP$

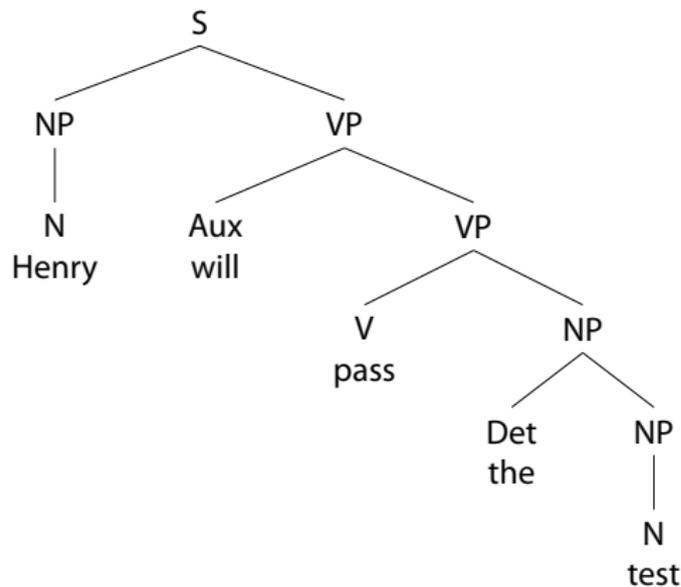
$VP \rightarrow Aux VP$

$NP \rightarrow Det NP$

$NP \rightarrow N$

$PP \rightarrow P NP$

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## Phrase Structure Rules

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- Right now, we have a set of rules that can describe sentences with a **transitive** verb like *chase*:

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The dog chased the cat

Subject + Verb + Object

**transitive**

# Argument structure

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Subject + Verb + Object

**transitive**

The dog barked

Subject + Verb

**intransitive**

# Argument structure

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The dog chased the cat

Subject + Verb + Object

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The dog barked

Subject + Verb

**intransitive**

She gave the dog a treat

Subject + Verb + 2 Objects

**ditransitive**

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| The dog chased the cat      | Subject + Verb + Object    | <b>transitive</b>   |
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| She gave a treat to the dog | Subject + Verb + 2 Objects | <b>ditransitive</b> |

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- What rules do we need to add to account for these sentences?

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- What rules do we need to add to account for these sentences?

The dog barked

S

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$VP \rightarrow V NP PP$

$NP \rightarrow Det NP$

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The dog barked

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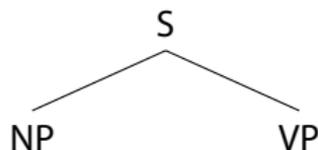
$VP \rightarrow V NP PP$

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The dog barked

## Phrase Structure Rules

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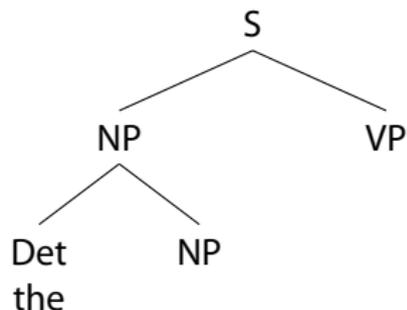
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The dog barked

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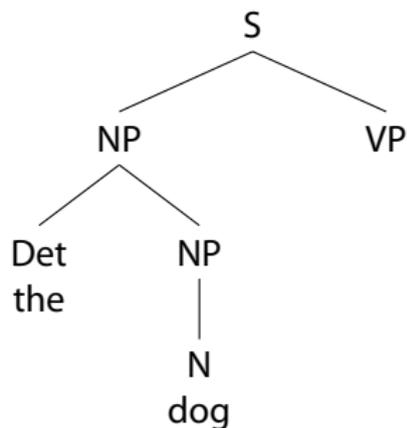
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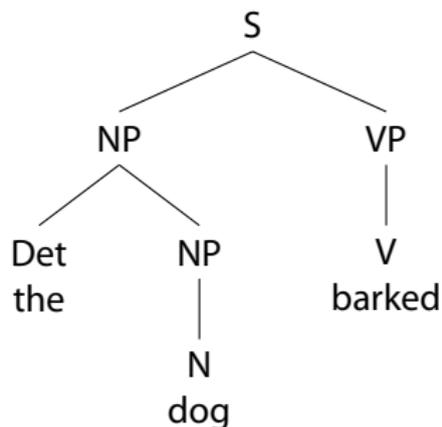
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She gave the dog a treat

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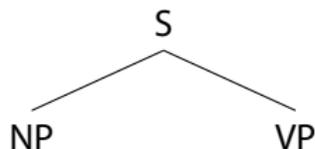
$VP \rightarrow V NP$

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She gave the dog a treat



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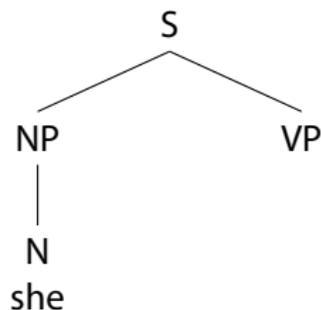
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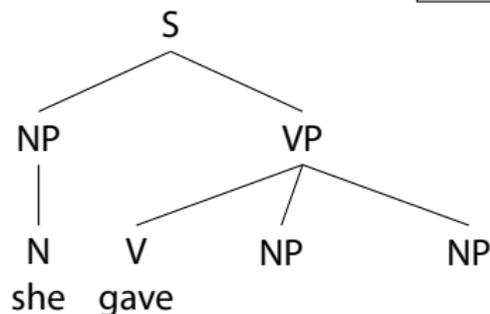
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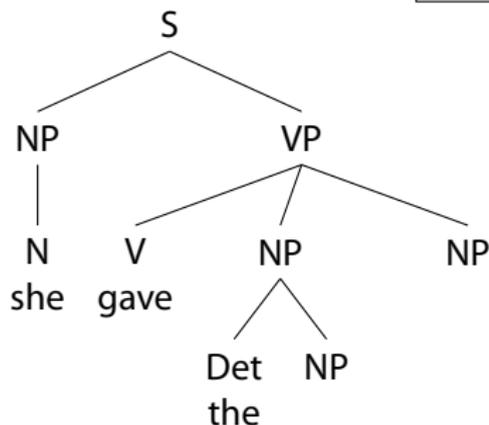
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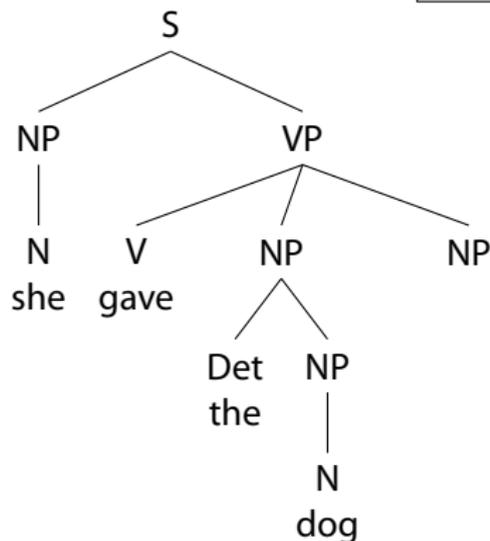
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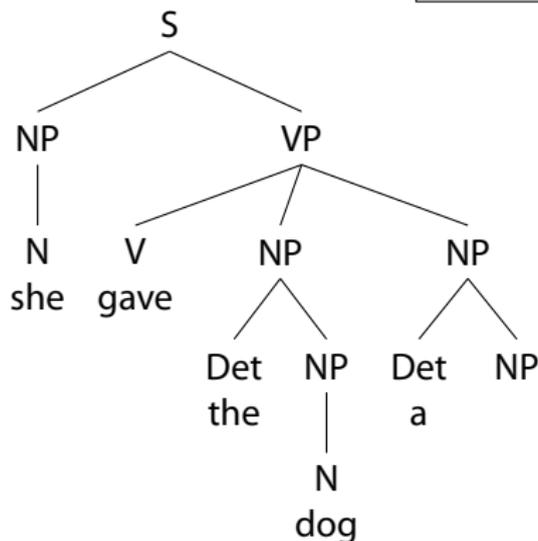
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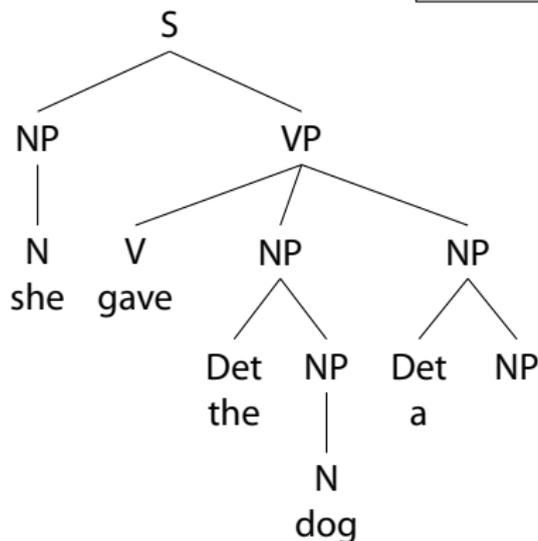
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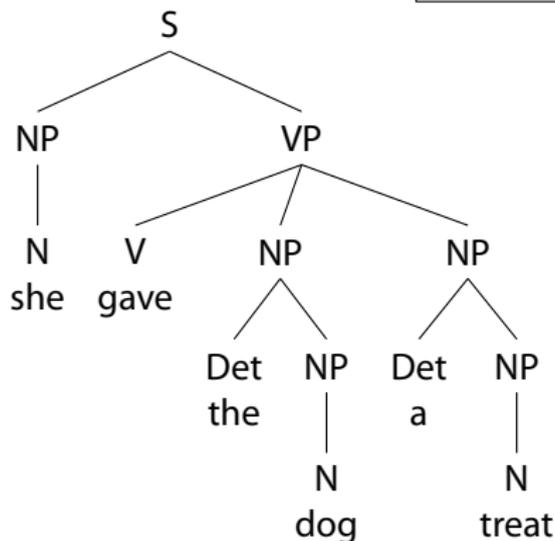
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She gave the dog a treat



She gave a treat to the dog

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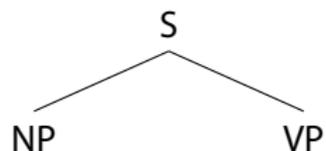
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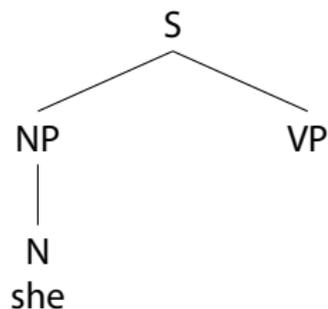
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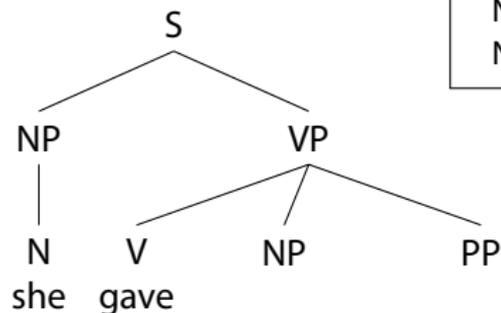
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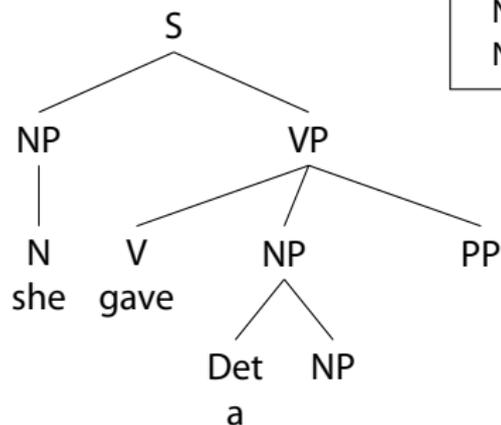
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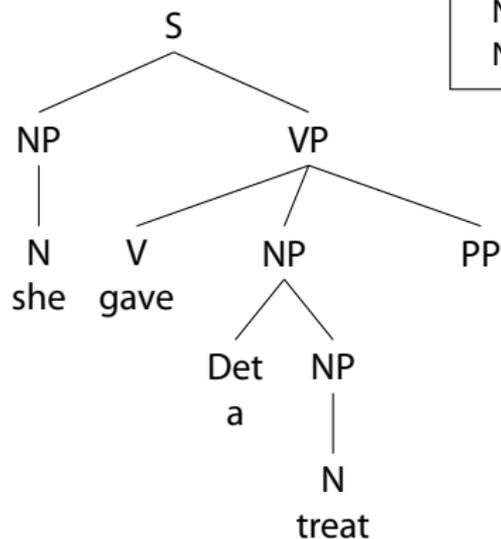
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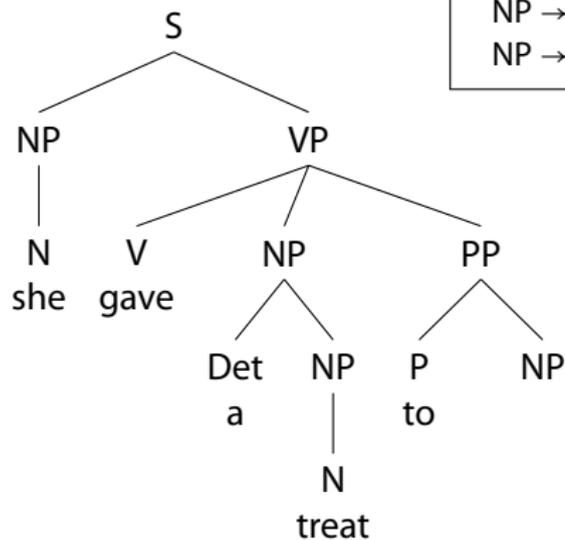
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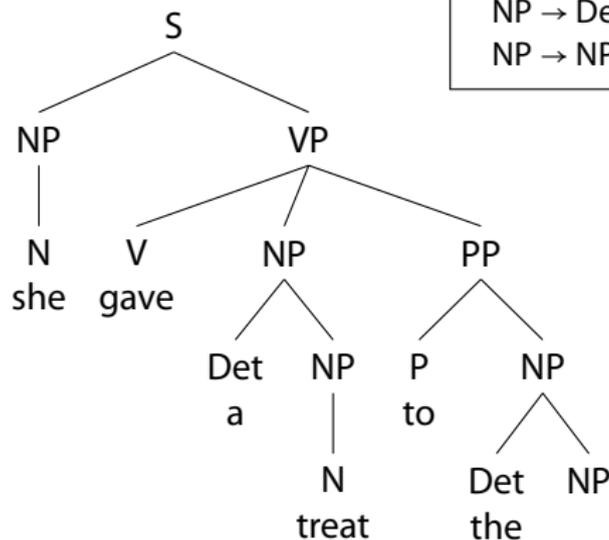
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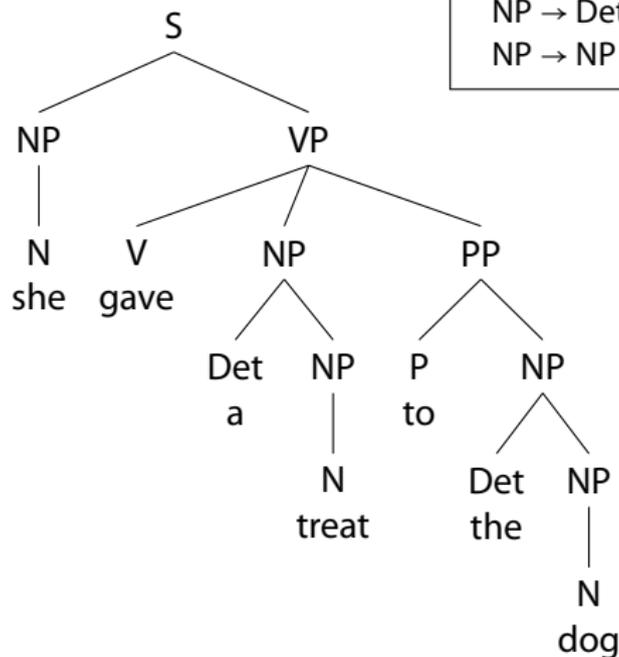
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The cute cat

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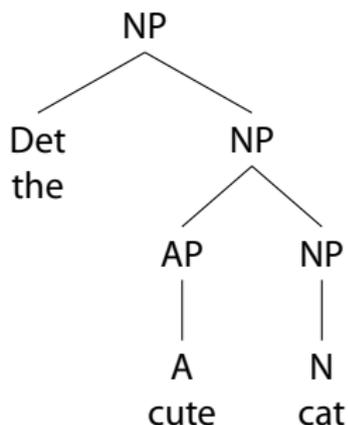
$NP \rightarrow Det NP$

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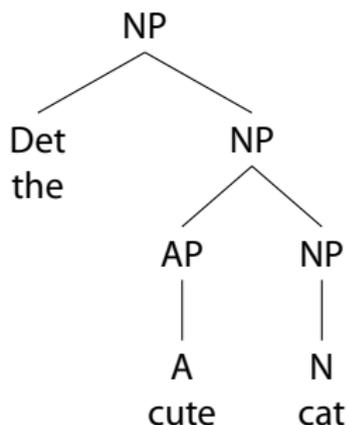
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The cute cat



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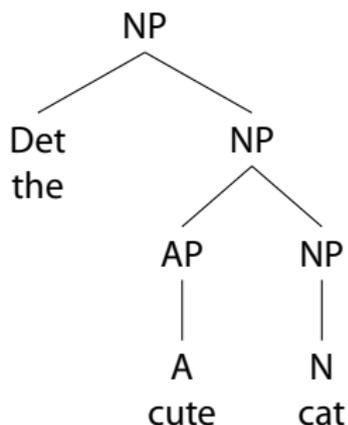
$NP \rightarrow N$

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$PP \rightarrow P NP$

$NP \rightarrow AP NP$

The cute cat



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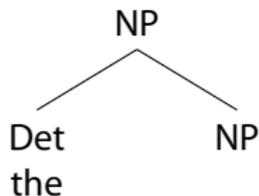
$PP \rightarrow P NP$

$NP \rightarrow AP NP$

$AP \rightarrow A$

# Adjectives

the cute fluffy adorable ... cat



## Phrase Structure Rules

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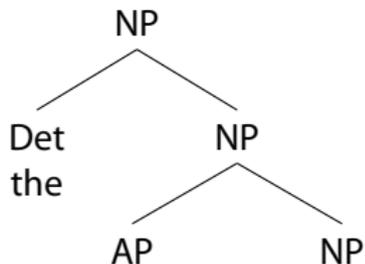
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# Adjectives

the cute fluffy adorable ... cat



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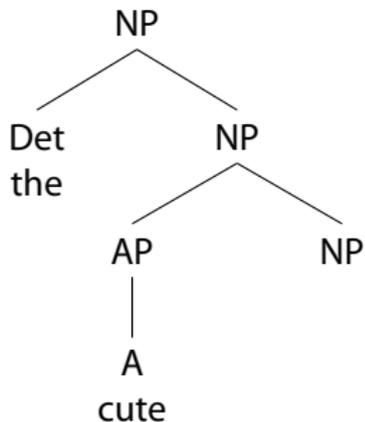
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# Adjectives

the cute fluffy adorable ... cat



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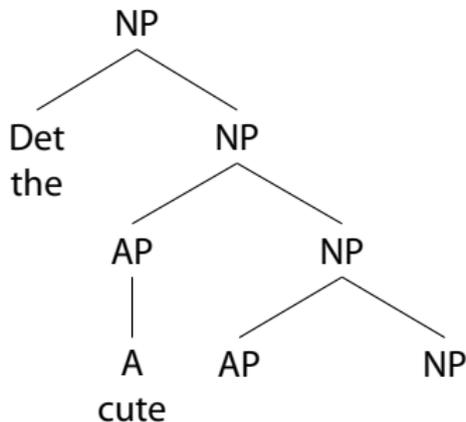
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the cute fluffy adorable ... cat



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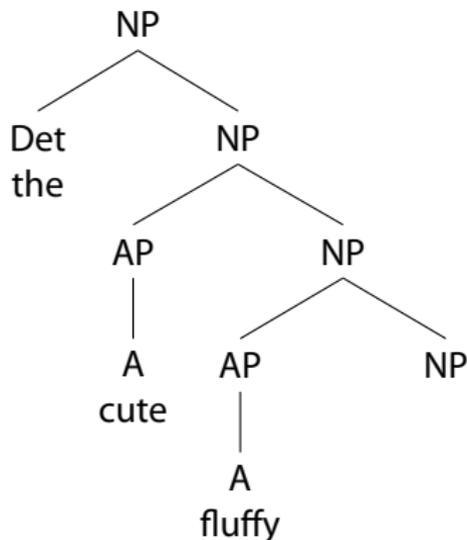
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# Adjectives

the cute fluffy adorable ... cat

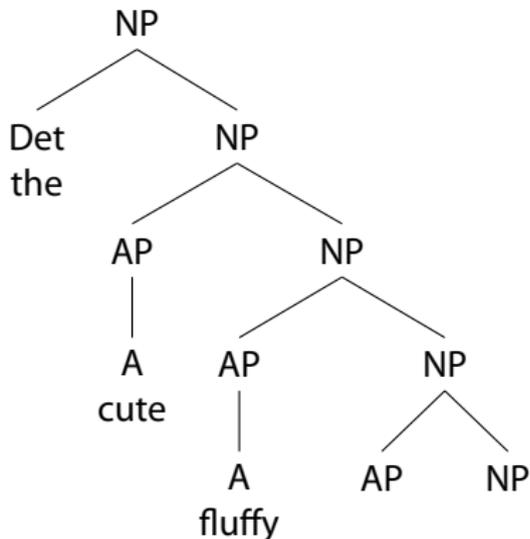


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$VP \rightarrow V NP NP$

$VP \rightarrow Aux VP$

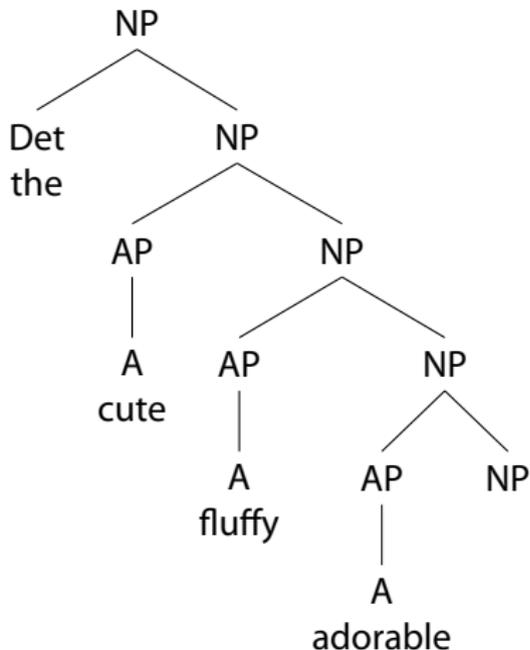
$NP \rightarrow N$

$PP \rightarrow P NP$

$AP \rightarrow A$

# Adjectives

the cute fluffy adorable ... cat

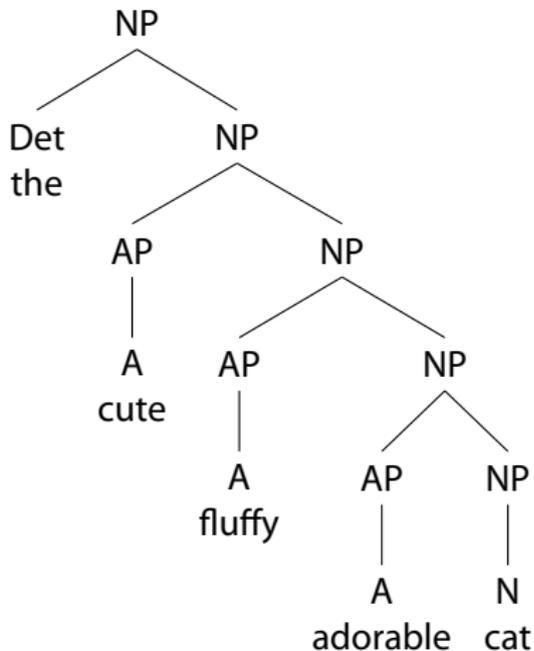


## Phrase Structure Rules

|                          |                          |
|--------------------------|--------------------------|
| $S \rightarrow NP VP$    | $VP \rightarrow V NP$    |
| $VP \rightarrow V$       | $VP \rightarrow V NP NP$ |
| $VP \rightarrow V NP PP$ | $VP \rightarrow Aux VP$  |
| $NP \rightarrow Det NP$  | $NP \rightarrow N$       |
| $NP \rightarrow NP PP$   | $PP \rightarrow P NP$    |
| $NP \rightarrow AP NP$   | $AP \rightarrow A$       |

# Adjectives

the cute fluffy adorable ... cat



## Phrase Structure Rules

$S \rightarrow NP VP$

$VP \rightarrow V$

$VP \rightarrow V NP PP$

$NP \rightarrow Det NP$

$NP \rightarrow NP PP$

$NP \rightarrow AP NP$

$VP \rightarrow V NP$

$VP \rightarrow V NP NP$

$VP \rightarrow Aux VP$

$NP \rightarrow N$

$PP \rightarrow P NP$

$AP \rightarrow A$

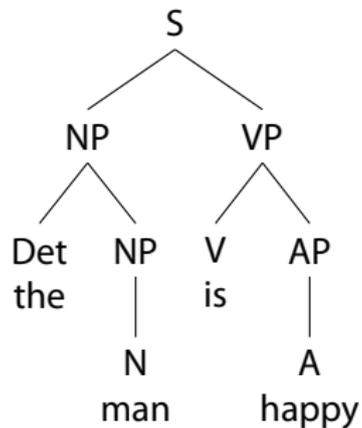
The man is happy

## Phrase Structure Rules

|                          |                          |
|--------------------------|--------------------------|
| $S \rightarrow NP VP$    | $VP \rightarrow V NP$    |
| $VP \rightarrow V$       | $VP \rightarrow V NP NP$ |
| $VP \rightarrow V NP PP$ | $VP \rightarrow Aux VP$  |
| $NP \rightarrow Det NP$  | $NP \rightarrow N$       |
| $NP \rightarrow NP PP$   | $PP \rightarrow P NP$    |
| $NP \rightarrow AP NP$   | $AP \rightarrow A$       |

# Adjectives

The man is happy



## Phrase Structure Rules

$S \rightarrow NP VP$

$VP \rightarrow V$

$VP \rightarrow V NP PP$

$VP \rightarrow V NP$

$VP \rightarrow V NP NP$

$VP \rightarrow Aux VP$

$NP \rightarrow Det NP$

$NP \rightarrow NP PP$

$NP \rightarrow AP NP$

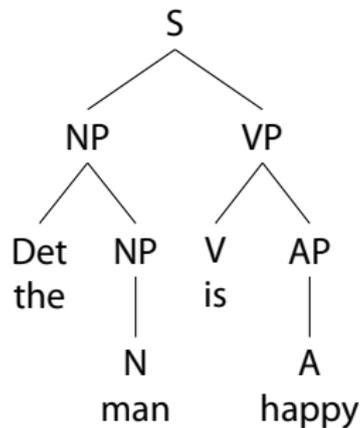
$NP \rightarrow N$

$PP \rightarrow P NP$

$AP \rightarrow A$

# Adjectives

The man is happy



## Phrase Structure Rules

$S \rightarrow NP VP$

$VP \rightarrow V$

$VP \rightarrow V NP PP$

$VP \rightarrow V AP$

$NP \rightarrow Det NP$

$NP \rightarrow NP PP$

$NP \rightarrow AP NP$

$VP \rightarrow V NP$

$VP \rightarrow V NP NP$

$VP \rightarrow Aux VP$

$NP \rightarrow N$

$PP \rightarrow P NP$

$AP \rightarrow A$

# Embedded clauses

We explained **that** Jane is smart

## Phrase Structure Rules

$S \rightarrow NP VP$

$VP \rightarrow V NP$

$VP \rightarrow V NP NP$

$VP \rightarrow Aux VP$

$VP \rightarrow V$

$VP \rightarrow V NP PP$

$VP \rightarrow V AP$

$NP \rightarrow Det NP$

$NP \rightarrow NP PP$

$NP \rightarrow AP NP$

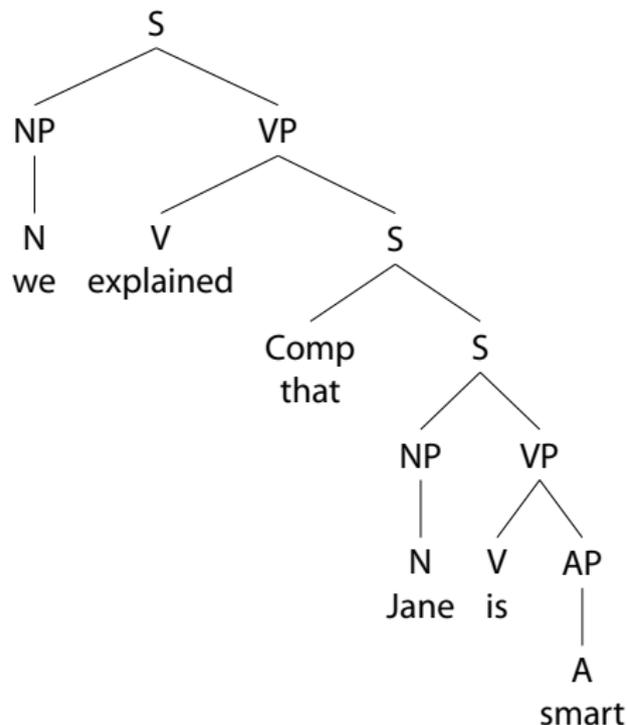
$NP \rightarrow N$

$PP \rightarrow P NP$

$AP \rightarrow A$

# Embedded clauses

We explained **that** Jane is smart



## Phrase Structure Rules

$S \rightarrow NP VP$

$VP \rightarrow V NP$

$VP \rightarrow V NP NP$

$VP \rightarrow Aux VP$

$VP \rightarrow V$

$VP \rightarrow V NP PP$

$VP \rightarrow V AP$

$NP \rightarrow Det NP$

$NP \rightarrow NP PP$

$NP \rightarrow AP NP$

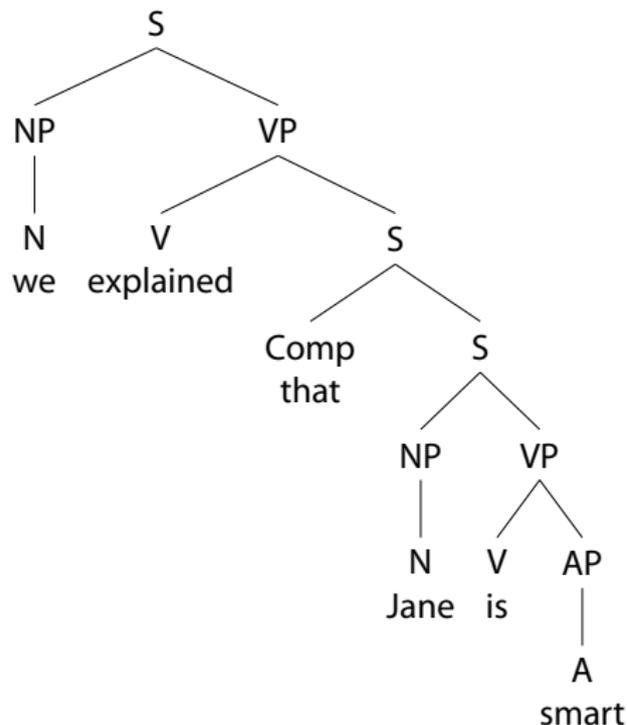
$NP \rightarrow N$

$PP \rightarrow P NP$

$AP \rightarrow A$

# Embedded clauses

We explained **that** Jane is smart



## Phrase Structure Rules

|                          |                          |
|--------------------------|--------------------------|
| $S \rightarrow NP VP$    | $S \rightarrow Comp S$   |
| $VP \rightarrow V NP$    | $VP \rightarrow V$       |
| $VP \rightarrow V NP NP$ | $VP \rightarrow V NP PP$ |
| $VP \rightarrow Aux VP$  | $VP \rightarrow V AP$    |
| $VP \rightarrow V S$     |                          |
| $NP \rightarrow Det NP$  | $NP \rightarrow N$       |
| $NP \rightarrow NP PP$   | $PP \rightarrow P NP$    |
| $NP \rightarrow AP NP$   | $AP \rightarrow A$       |

# Embedded clauses

We explained **that** Jane is smart

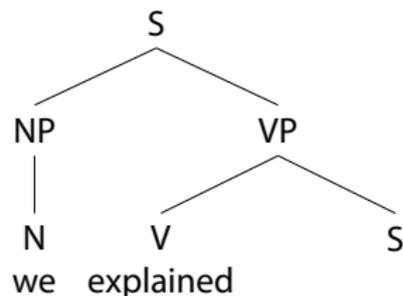
S

## Phrase Structure Rules

|                          |                          |
|--------------------------|--------------------------|
| $S \rightarrow NP VP$    | $S \rightarrow Comp S$   |
| $VP \rightarrow V NP$    | $VP \rightarrow V$       |
| $VP \rightarrow V NP NP$ | $VP \rightarrow V NP PP$ |
| $VP \rightarrow Aux VP$  | $VP \rightarrow V AP$    |
| $VP \rightarrow V S$     |                          |
| $NP \rightarrow Det NP$  | $NP \rightarrow N$       |
| $NP \rightarrow NP PP$   | $PP \rightarrow P NP$    |
| $NP \rightarrow AP NP$   | $AP \rightarrow A$       |

# Embedded clauses

We explained **that** Jane is smart

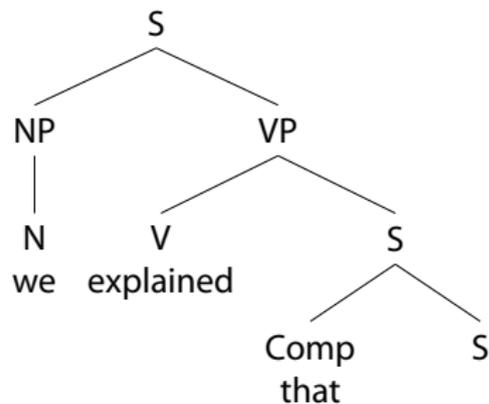


## Phrase Structure Rules

|                          |                          |
|--------------------------|--------------------------|
| $S \rightarrow NP VP$    | $S \rightarrow Comp S$   |
| $VP \rightarrow V NP$    | $VP \rightarrow V$       |
| $VP \rightarrow V NP NP$ | $VP \rightarrow V NP PP$ |
| $VP \rightarrow Aux VP$  | $VP \rightarrow V AP$    |
| $VP \rightarrow V S$     |                          |
| $NP \rightarrow Det NP$  | $NP \rightarrow N$       |
| $NP \rightarrow NP PP$   | $PP \rightarrow P NP$    |
| $NP \rightarrow AP NP$   | $AP \rightarrow A$       |

# Embedded clauses

We explained **that** Jane is smart

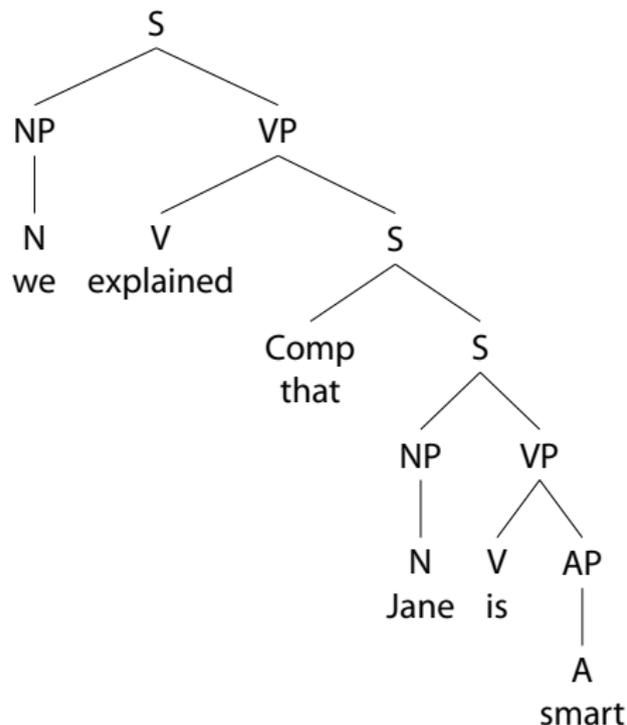


## Phrase Structure Rules

|                          |                          |
|--------------------------|--------------------------|
| $S \rightarrow NP VP$    | $S \rightarrow Comp S$   |
| $VP \rightarrow V NP$    | $VP \rightarrow V$       |
| $VP \rightarrow V NP NP$ | $VP \rightarrow V NP PP$ |
| $VP \rightarrow Aux VP$  | $VP \rightarrow V AP$    |
| $VP \rightarrow V S$     |                          |
| $NP \rightarrow Det NP$  | $NP \rightarrow N$       |
| $NP \rightarrow NP PP$   | $PP \rightarrow P NP$    |
| $NP \rightarrow AP NP$   | $AP \rightarrow A$       |

# Embedded clauses

We explained **that** Jane is smart



## Phrase Structure Rules

|                          |                          |
|--------------------------|--------------------------|
| $S \rightarrow NP VP$    | $S \rightarrow Comp S$   |
| $VP \rightarrow V NP$    | $VP \rightarrow V$       |
| $VP \rightarrow V NP NP$ | $VP \rightarrow V NP PP$ |
| $VP \rightarrow Aux VP$  | $VP \rightarrow V AP$    |
| $VP \rightarrow V S$     |                          |
| $NP \rightarrow Det NP$  | $NP \rightarrow N$       |
| $NP \rightarrow NP PP$   | $PP \rightarrow P NP$    |
| $NP \rightarrow AP NP$   | $AP \rightarrow A$       |

# Embedded clauses

Clausal embedding is recursive:

I said that we explained that Jane is smart

## Phrase Structure Rules

|                          |                          |
|--------------------------|--------------------------|
| $S \rightarrow NP VP$    | $S \rightarrow Comp S$   |
| $VP \rightarrow V NP$    | $VP \rightarrow V$       |
| $VP \rightarrow V NP NP$ | $VP \rightarrow V NP PP$ |
| $VP \rightarrow Aux VP$  | $VP \rightarrow V AP$    |
| $VP \rightarrow V S$     |                          |
| $NP \rightarrow Det NP$  | $NP \rightarrow N$       |
| $NP \rightarrow NP PP$   | $NP \rightarrow AP NP$   |
| $AP \rightarrow A$       | $PP \rightarrow P NP$    |

# Embedded clauses

I said that we explained that Jane is smart

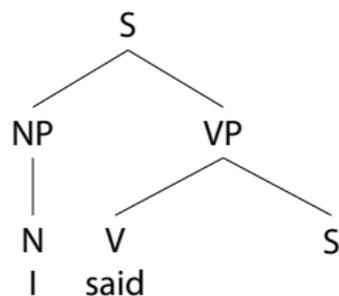
S

## Phrase Structure Rules

|                          |                          |
|--------------------------|--------------------------|
| $S \rightarrow NP VP$    | $S \rightarrow Comp S$   |
| $VP \rightarrow V NP$    | $VP \rightarrow V$       |
| $VP \rightarrow V NP NP$ | $VP \rightarrow V NP PP$ |
| $VP \rightarrow Aux VP$  | $VP \rightarrow V AP$    |
| $VP \rightarrow V S$     |                          |
| $NP \rightarrow Det NP$  | $NP \rightarrow N$       |
| $NP \rightarrow NP PP$   | $NP \rightarrow AP NP$   |
| $AP \rightarrow A$       | $PP \rightarrow P NP$    |

# Embedded clauses

I said that we explained that Jane is smart

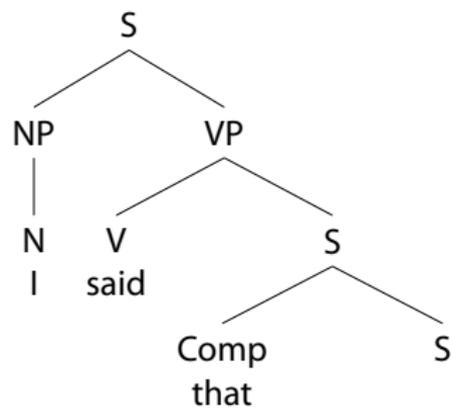


## Phrase Structure Rules

|                          |                          |
|--------------------------|--------------------------|
| $S \rightarrow NP VP$    | $S \rightarrow Comp S$   |
| $VP \rightarrow V NP$    | $VP \rightarrow V$       |
| $VP \rightarrow V NP NP$ | $VP \rightarrow V NP PP$ |
| $VP \rightarrow Aux VP$  | $VP \rightarrow V AP$    |
| $VP \rightarrow V S$     |                          |
| $NP \rightarrow Det NP$  | $NP \rightarrow N$       |
| $NP \rightarrow NP PP$   | $NP \rightarrow AP NP$   |
| $AP \rightarrow A$       | $PP \rightarrow P NP$    |

# Embedded clauses

I said that we explained that Jane is smart

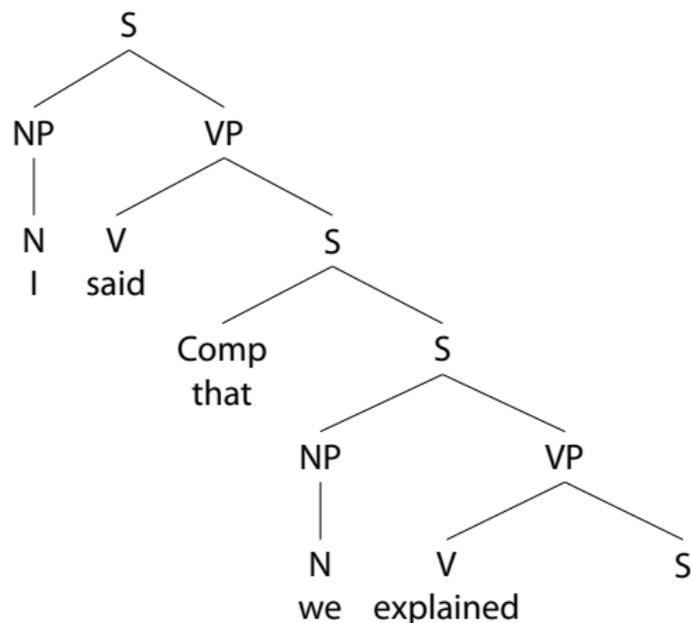


## Phrase Structure Rules

|                          |                          |
|--------------------------|--------------------------|
| $S \rightarrow NP VP$    | $S \rightarrow Comp S$   |
| $VP \rightarrow V NP$    | $VP \rightarrow V$       |
| $VP \rightarrow V NP NP$ | $VP \rightarrow V NP PP$ |
| $VP \rightarrow Aux VP$  | $VP \rightarrow V AP$    |
| $VP \rightarrow V S$     |                          |
| $NP \rightarrow Det NP$  | $NP \rightarrow N$       |
| $NP \rightarrow NP PP$   | $NP \rightarrow AP NP$   |
| $AP \rightarrow A$       | $PP \rightarrow P NP$    |

# Embedded clauses

I said that we explained that Jane is smart

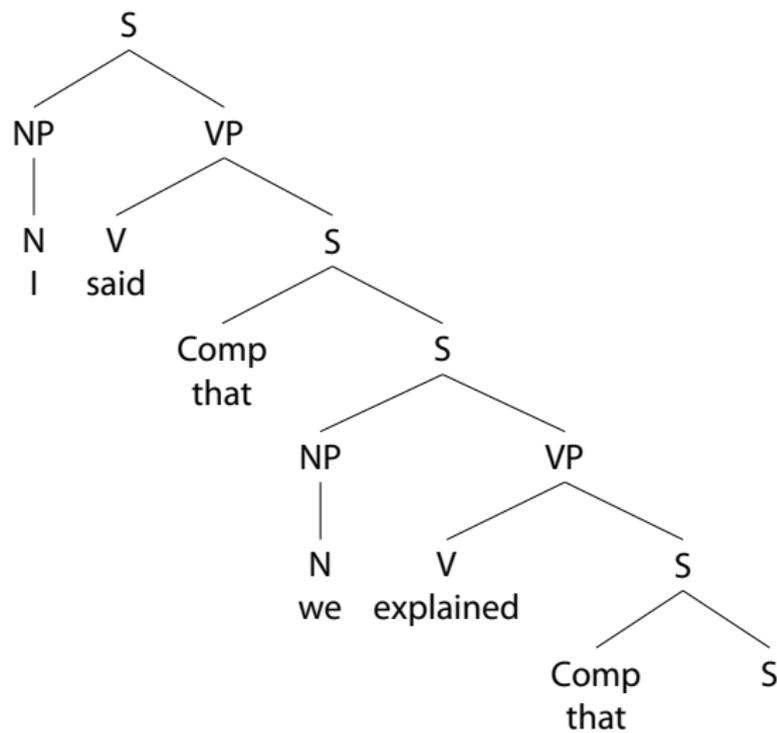


## Phrase Structure Rules

|                          |                          |
|--------------------------|--------------------------|
| $S \rightarrow NP VP$    | $S \rightarrow Comp S$   |
| $VP \rightarrow V NP$    | $VP \rightarrow V$       |
| $VP \rightarrow V NP NP$ | $VP \rightarrow V NP PP$ |
| $VP \rightarrow Aux VP$  | $VP \rightarrow V AP$    |
| $VP \rightarrow V S$     |                          |
| $NP \rightarrow Det NP$  | $NP \rightarrow N$       |
| $NP \rightarrow NP PP$   | $NP \rightarrow AP NP$   |
| $AP \rightarrow A$       | $PP \rightarrow P NP$    |

# Embedded clauses

I said that we explained that Jane is smart

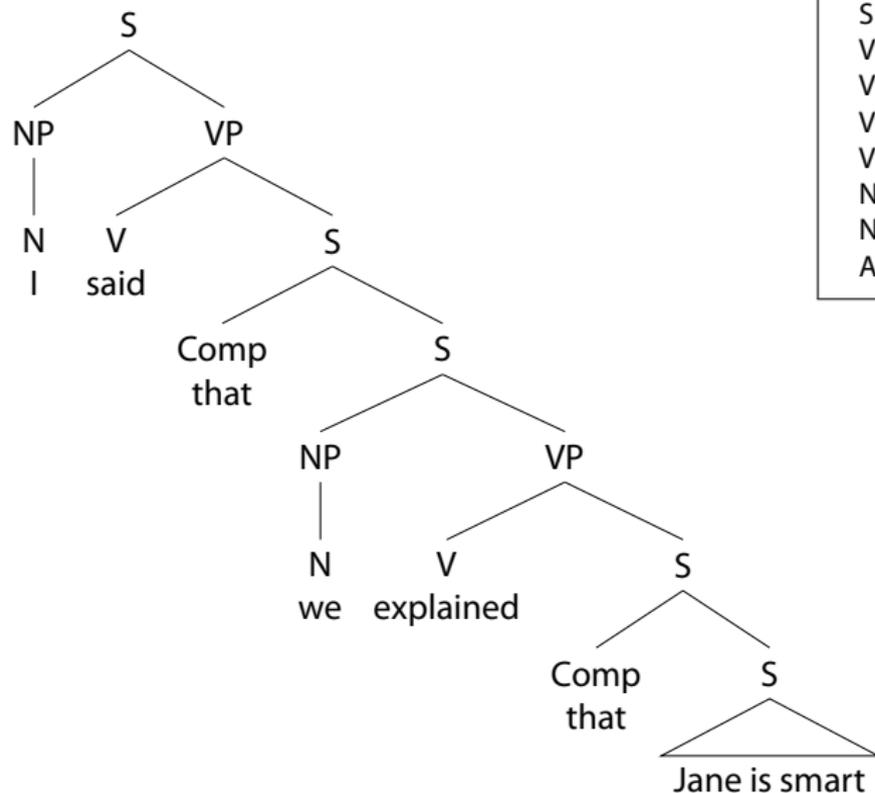


## Phrase Structure Rules

|                          |                          |
|--------------------------|--------------------------|
| $S \rightarrow NP VP$    | $S \rightarrow Comp S$   |
| $VP \rightarrow V NP$    | $VP \rightarrow V$       |
| $VP \rightarrow V NP NP$ | $VP \rightarrow V NP PP$ |
| $VP \rightarrow Aux VP$  | $VP \rightarrow V AP$    |
| $VP \rightarrow V S$     |                          |
| $NP \rightarrow Det NP$  | $NP \rightarrow N$       |
| $NP \rightarrow NP PP$   | $NP \rightarrow AP NP$   |
| $AP \rightarrow A$       | $PP \rightarrow P NP$    |

# Embedded clauses

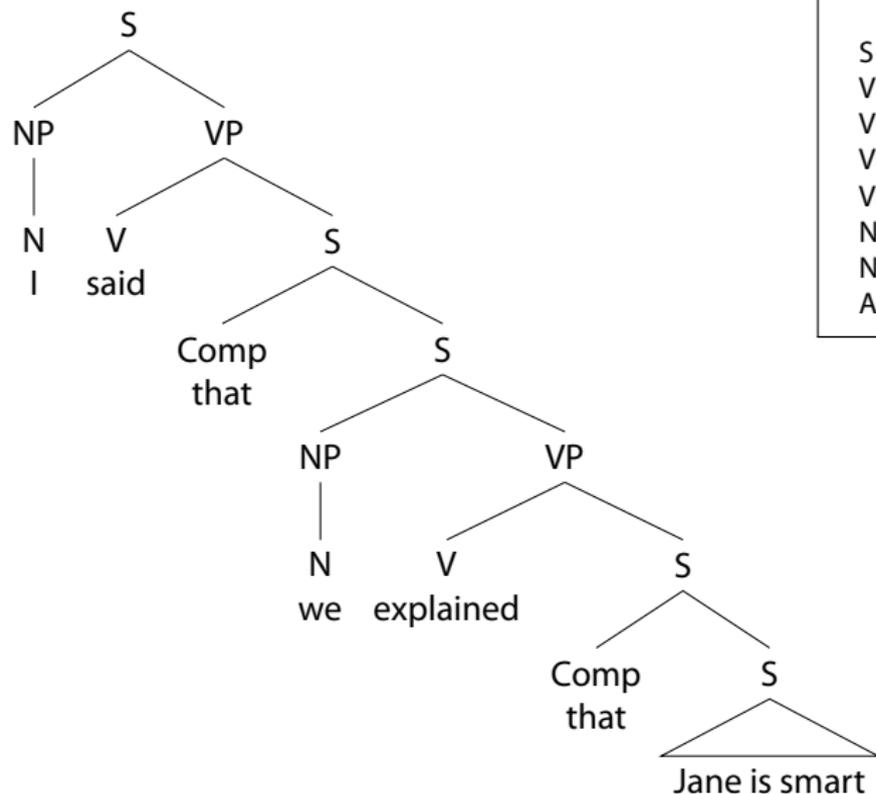
I said that we explained that Jane is smart



## Phrase Structure Rules

|                          |                          |
|--------------------------|--------------------------|
| $S \rightarrow NP VP$    | $S \rightarrow Comp S$   |
| $VP \rightarrow V NP$    | $VP \rightarrow V$       |
| $VP \rightarrow V NP NP$ | $VP \rightarrow V NP PP$ |
| $VP \rightarrow Aux VP$  | $VP \rightarrow V AP$    |
| $VP \rightarrow V S$     |                          |
| $NP \rightarrow Det NP$  | $NP \rightarrow N$       |
| $NP \rightarrow NP PP$   | $NP \rightarrow AP NP$   |
| $AP \rightarrow A$       | $PP \rightarrow P NP$    |

# Embedded clauses

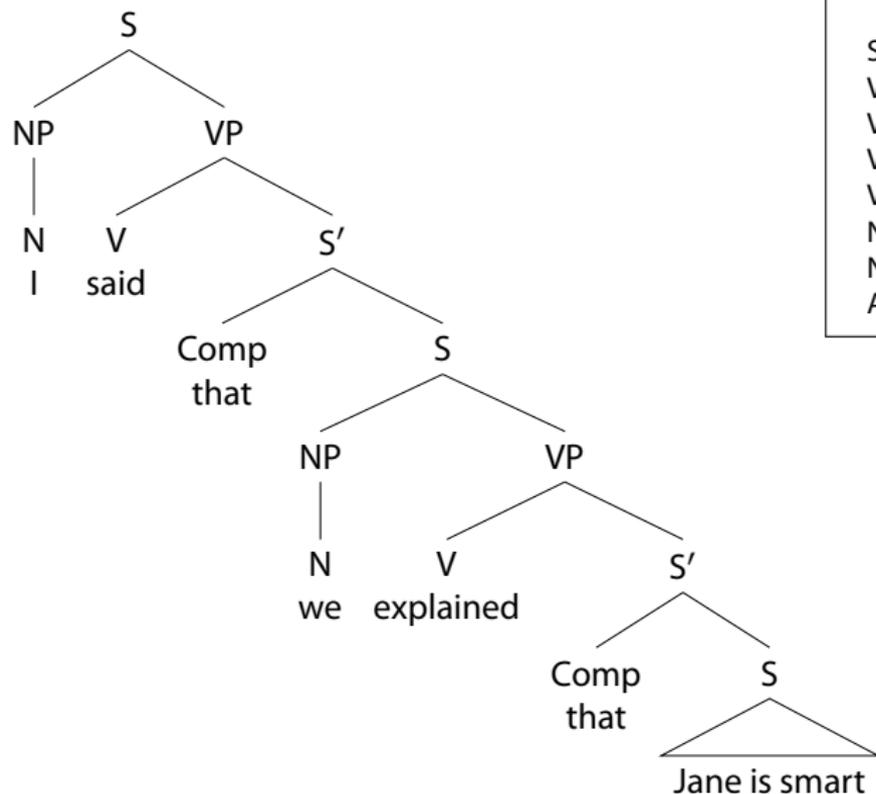


## Phrase Structure Rules

|                          |                          |
|--------------------------|--------------------------|
| $S \rightarrow NP VP$    | $S \rightarrow Comp S$   |
| $VP \rightarrow V NP$    | $VP \rightarrow V$       |
| $VP \rightarrow V NP NP$ | $VP \rightarrow V NP PP$ |
| $VP \rightarrow Aux VP$  | $VP \rightarrow V AP$    |
| $VP \rightarrow V S$     |                          |
| $NP \rightarrow Det NP$  | $NP \rightarrow N$       |
| $NP \rightarrow NP PP$   | $NP \rightarrow AP NP$   |
| $AP \rightarrow A$       | $PP \rightarrow P NP$    |

We don't want "I said **that that that ...**" (recursive application of  $S \rightarrow Comp S$ )

# Embedded clauses



## Phrase Structure Rules

$S \rightarrow NP VP$

$VP \rightarrow V NP$

$VP \rightarrow V NP NP$

$VP \rightarrow Aux VP$

$VP \rightarrow V S'$

$NP \rightarrow Det NP$

$NP \rightarrow NP PP$

$AP \rightarrow A$

$S' \rightarrow Comp S$

$VP \rightarrow V$

$VP \rightarrow V NP PP$

$VP \rightarrow V AP$

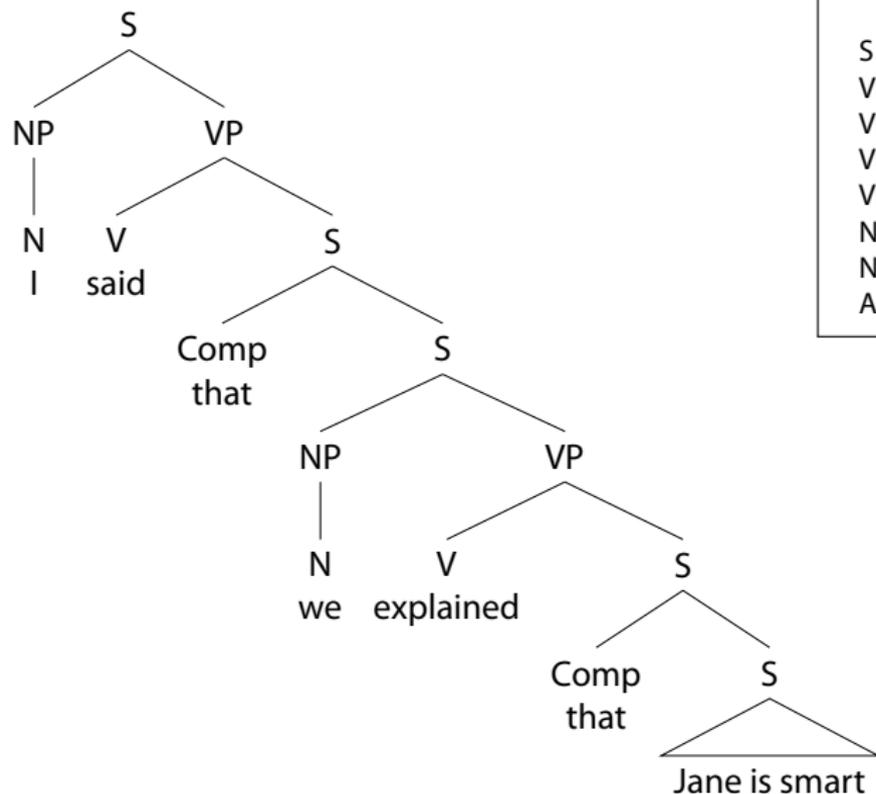
$(VP \rightarrow V S)$

$NP \rightarrow N$

$NP \rightarrow AP NP$

$PP \rightarrow P NP$

# Embedded clauses



## Phrase Structure Rules

|                          |                          |
|--------------------------|--------------------------|
| $S \rightarrow NP VP$    | $S \rightarrow Comp S$   |
| $VP \rightarrow V NP$    | $VP \rightarrow V$       |
| $VP \rightarrow V NP NP$ | $VP \rightarrow V NP PP$ |
| $VP \rightarrow Aux VP$  | $VP \rightarrow V AP$    |
| $VP \rightarrow V S$     |                          |
| $NP \rightarrow Det NP$  | $NP \rightarrow N$       |
| $NP \rightarrow NP PP$   | $NP \rightarrow AP NP$   |
| $AP \rightarrow A$       | $PP \rightarrow P NP$    |

For present purposes, let's not worry about this problem though.

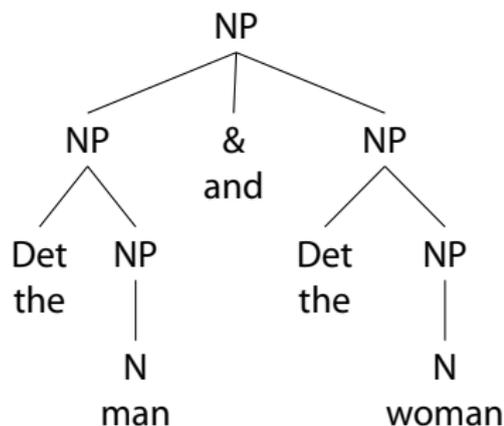
We can also coordinate different kinds of phrase:

## Phrase Structure Rules

|                          |                          |
|--------------------------|--------------------------|
| $S \rightarrow NP VP$    | $S \rightarrow Comp S$   |
| $VP \rightarrow V NP$    | $VP \rightarrow V$       |
| $VP \rightarrow V NP NP$ | $VP \rightarrow V NP PP$ |
| $VP \rightarrow Aux VP$  | $VP \rightarrow V AP$    |
| $VP \rightarrow V S$     |                          |
| $NP \rightarrow Det NP$  | $NP \rightarrow N$       |
| $NP \rightarrow NP PP$   | $NP \rightarrow AP NP$   |
| $AP \rightarrow A$       | $PP \rightarrow P NP$    |

We can also coordinate different kinds of phrase:

**the man** and **the woman**

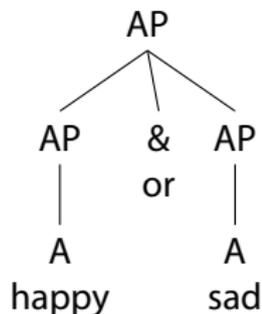


## Phrase Structure Rules

|                          |                          |
|--------------------------|--------------------------|
| $S \rightarrow NP VP$    | $S \rightarrow Comp S$   |
| $VP \rightarrow V NP$    | $VP \rightarrow V$       |
| $VP \rightarrow V NP NP$ | $VP \rightarrow V NP PP$ |
| $VP \rightarrow Aux VP$  | $VP \rightarrow V AP$    |
| $VP \rightarrow V S$     |                          |
| $NP \rightarrow Det NP$  | $NP \rightarrow N$       |
| $NP \rightarrow NP PP$   | $NP \rightarrow AP NP$   |
| $AP \rightarrow A$       | $PP \rightarrow P NP$    |

We can also coordinate different kinds of phrase:

**happy** or **sad**



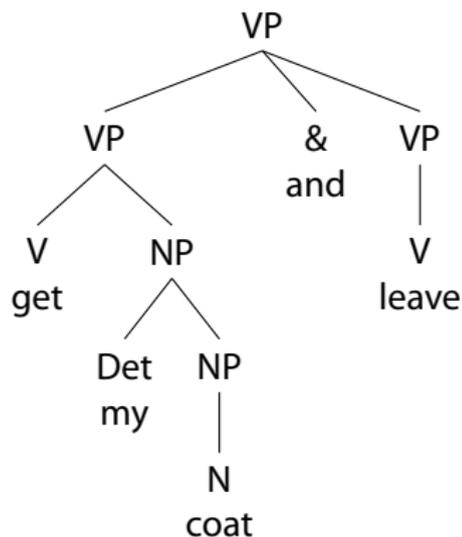
## Phrase Structure Rules

|                          |                          |
|--------------------------|--------------------------|
| $S \rightarrow NP VP$    | $S \rightarrow Comp S$   |
| $VP \rightarrow V NP$    | $VP \rightarrow V$       |
| $VP \rightarrow V NP NP$ | $VP \rightarrow V NP PP$ |
| $VP \rightarrow Aux VP$  | $VP \rightarrow V AP$    |
| $VP \rightarrow V S$     |                          |
| $NP \rightarrow Det NP$  | $NP \rightarrow N$       |
| $NP \rightarrow NP PP$   | $NP \rightarrow AP NP$   |
| $AP \rightarrow A$       | $PP \rightarrow P NP$    |

# Coordination

We can also coordinate different kinds of phrase:

I will **get my coat** and **leave**

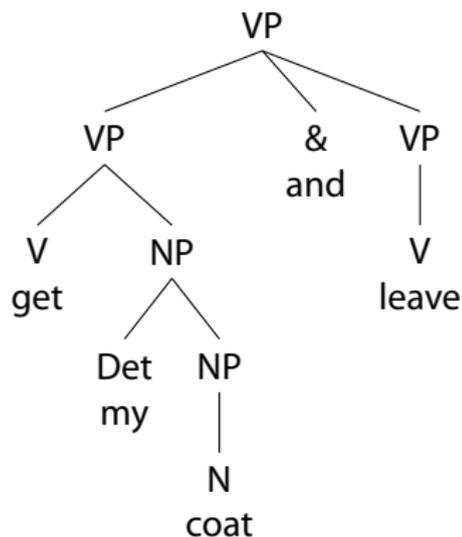


## Phrase Structure Rules

|                          |                          |
|--------------------------|--------------------------|
| $S \rightarrow NP VP$    | $S \rightarrow Comp S$   |
| $VP \rightarrow V NP$    | $VP \rightarrow V$       |
| $VP \rightarrow V NP NP$ | $VP \rightarrow V NP PP$ |
| $VP \rightarrow Aux VP$  | $VP \rightarrow V AP$    |
| $VP \rightarrow V S$     |                          |
| $NP \rightarrow Det NP$  | $NP \rightarrow N$       |
| $NP \rightarrow NP PP$   | $NP \rightarrow AP NP$   |
| $AP \rightarrow A$       | $PP \rightarrow P NP$    |

We can also coordinate different kinds of phrase:

I will **get my coat** and **leave**



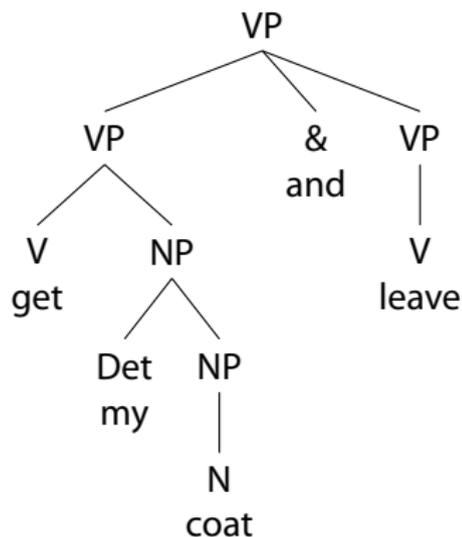
## Phrase Structure Rules

|                          |                          |
|--------------------------|--------------------------|
| $S \rightarrow NP VP$    | $S \rightarrow Comp S$   |
| $VP \rightarrow V NP$    | $VP \rightarrow V$       |
| $VP \rightarrow V NP NP$ | $VP \rightarrow V NP PP$ |
| $VP \rightarrow Aux VP$  | $VP \rightarrow V AP$    |
| $VP \rightarrow V S$     |                          |
| $NP \rightarrow Det NP$  | $NP \rightarrow N$       |
| $NP \rightarrow NP PP$   | $NP \rightarrow AP NP$   |
| $AP \rightarrow A$       | $PP \rightarrow P NP$    |

What is the Phrase Structure Rule for coordination?

We can also coordinate different kinds of phrase:

I will **get my coat** and **leave**



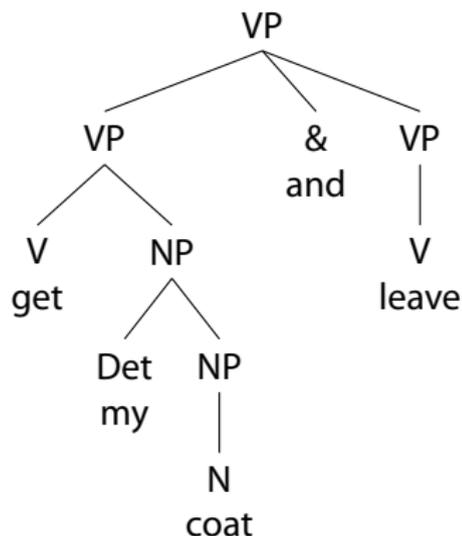
## Phrase Structure Rules

|                          |                          |
|--------------------------|--------------------------|
| $S \rightarrow NP VP$    | $S \rightarrow Comp S$   |
| $VP \rightarrow V NP$    | $VP \rightarrow V$       |
| $VP \rightarrow V NP NP$ | $VP \rightarrow V NP PP$ |
| $VP \rightarrow Aux VP$  | $VP \rightarrow V AP$    |
| $VP \rightarrow V S$     |                          |
| $NP \rightarrow Det NP$  | $NP \rightarrow N$       |
| $NP \rightarrow NP PP$   | $NP \rightarrow AP NP$   |
| $AP \rightarrow A$       | $PP \rightarrow P NP$    |

What is the Phrase Structure Rule for coordination?

We can also coordinate different kinds of phrase:

I will **get my coat** and **leave**



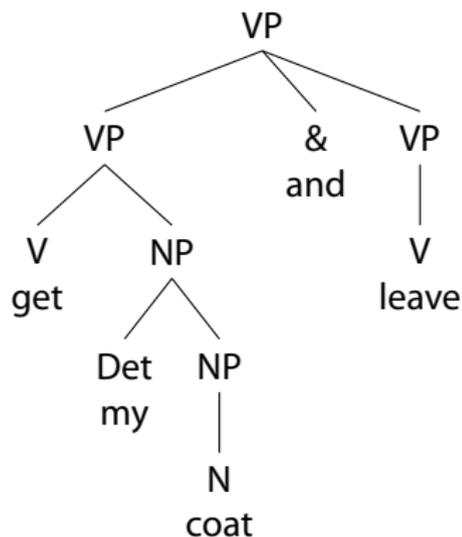
## Phrase Structure Rules

|                          |                           |
|--------------------------|---------------------------|
| $S \rightarrow NP VP$    | $S \rightarrow Comp S$    |
| $VP \rightarrow V NP$    | $VP \rightarrow V$        |
| $VP \rightarrow V NP NP$ | $VP \rightarrow V NP PP$  |
| $VP \rightarrow Aux VP$  | $VP \rightarrow V AP$     |
| $VP \rightarrow V S$     | $XP \rightarrow XP \& XP$ |
| $NP \rightarrow Det NP$  | $NP \rightarrow N$        |
| $NP \rightarrow NP PP$   | $NP \rightarrow AP NP$    |
| $AP \rightarrow A$       | $PP \rightarrow P NP$     |

What is the Phrase Structure Rule for coordination?

We can also coordinate different kinds of phrase:

I will **get my coat** and **leave**



## Phrase Structure Rules

|                          |                           |
|--------------------------|---------------------------|
| $S \rightarrow NP VP$    | $S \rightarrow Comp S$    |
| $VP \rightarrow V NP$    | $VP \rightarrow V$        |
| $VP \rightarrow V NP NP$ | $VP \rightarrow V NP PP$  |
| $VP \rightarrow Aux VP$  | $VP \rightarrow V AP$     |
| $VP \rightarrow V S$     | $XP \rightarrow XP \& XP$ |
| $NP \rightarrow Det NP$  | $NP \rightarrow N$        |
| $NP \rightarrow NP PP$   | $NP \rightarrow AP NP$    |
| $AP \rightarrow A$       | $PP \rightarrow P NP$     |

What is the Phrase Structure Rule for coordination? XP stands for a phrase of any category.

A man or a woman will get their coat and leave

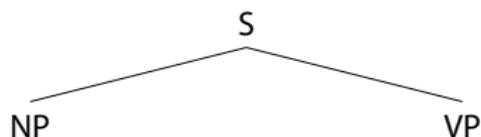
S

## Phrase Structure Rules

|                          |                           |
|--------------------------|---------------------------|
| $S \rightarrow NP VP$    | $S \rightarrow Comp S$    |
| $VP \rightarrow V NP$    | $VP \rightarrow V$        |
| $VP \rightarrow V NP NP$ | $VP \rightarrow V NP PP$  |
| $VP \rightarrow Aux VP$  | $VP \rightarrow V AP$     |
| $VP \rightarrow V S$     | $XP \rightarrow XP \& XP$ |
| $NP \rightarrow Det NP$  | $NP \rightarrow N$        |
| $NP \rightarrow NP PP$   | $NP \rightarrow AP NP$    |
| $AP \rightarrow A$       | $PP \rightarrow P NP$     |

# Coordination

A man or a woman will get their coat and leave

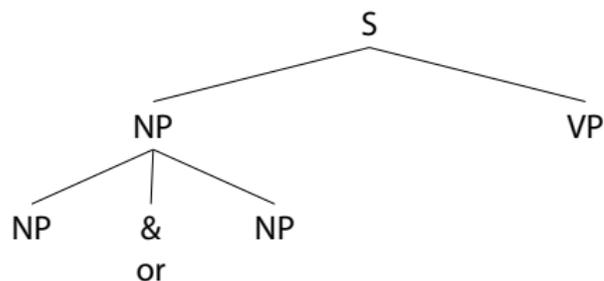


## Phrase Structure Rules

|                          |                           |
|--------------------------|---------------------------|
| $S \rightarrow NP VP$    | $S \rightarrow Comp S$    |
| $VP \rightarrow V NP$    | $VP \rightarrow V$        |
| $VP \rightarrow V NP NP$ | $VP \rightarrow V NP PP$  |
| $VP \rightarrow Aux VP$  | $VP \rightarrow V AP$     |
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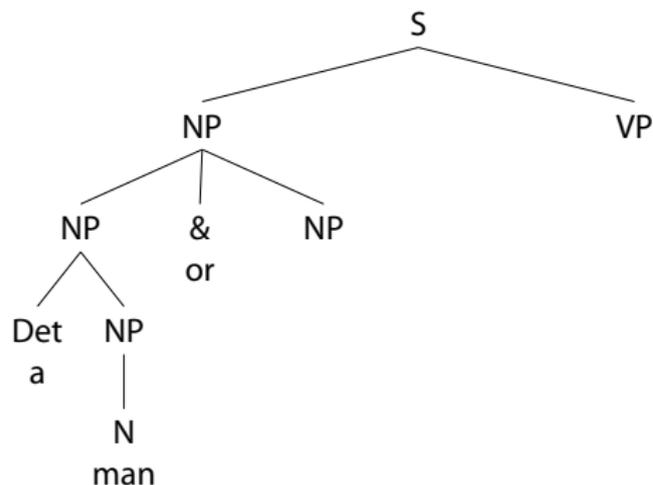


## Phrase Structure Rules

|                          |                           |
|--------------------------|---------------------------|
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| $VP \rightarrow V NP$    | $VP \rightarrow V$        |
| $VP \rightarrow V NP NP$ | $VP \rightarrow V NP PP$  |
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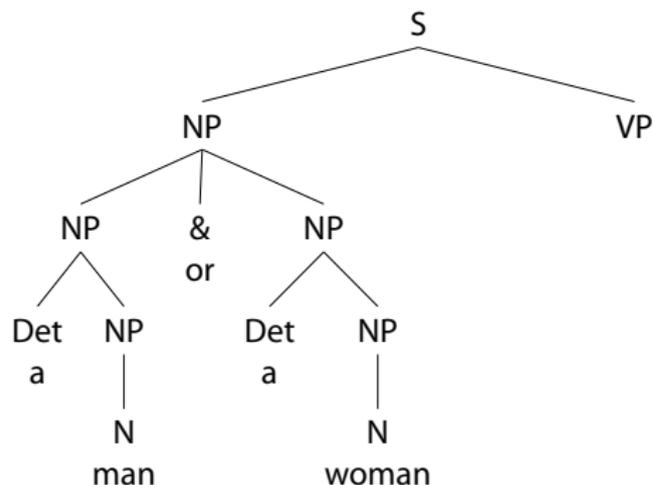


## Phrase Structure Rules

|                          |                           |
|--------------------------|---------------------------|
| $S \rightarrow NP VP$    | $S \rightarrow Comp S$    |
| $VP \rightarrow V NP$    | $VP \rightarrow V$        |
| $VP \rightarrow V NP NP$ | $VP \rightarrow V NP PP$  |
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A man or a woman will get their coat and leave

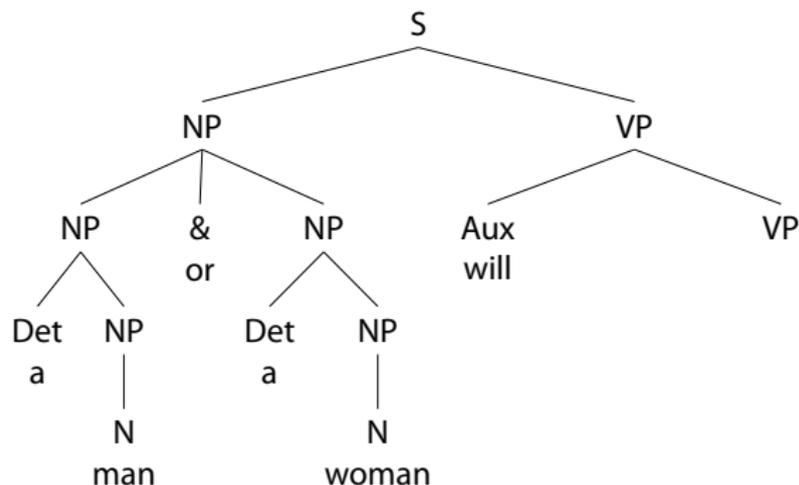


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# Coordination

A man or a woman will get their coat and leave

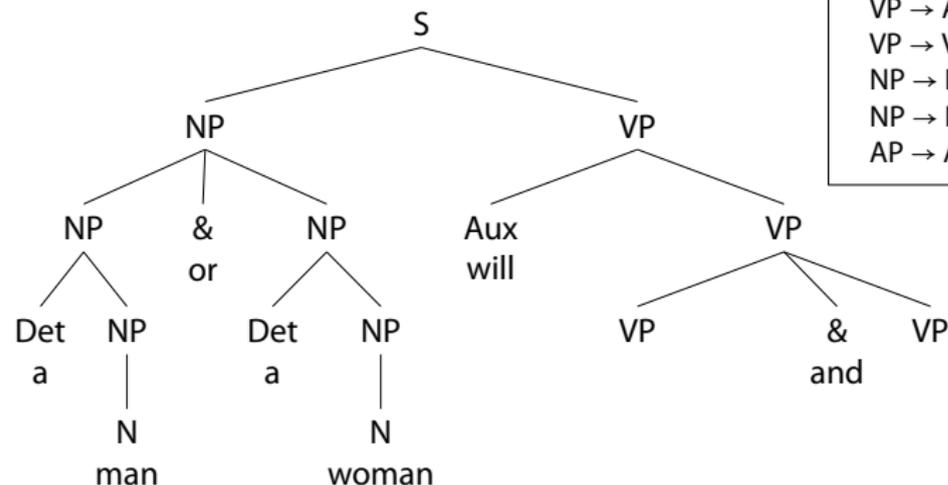


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|--------------------------|---------------------------|
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A man or a woman will get their coat and leave

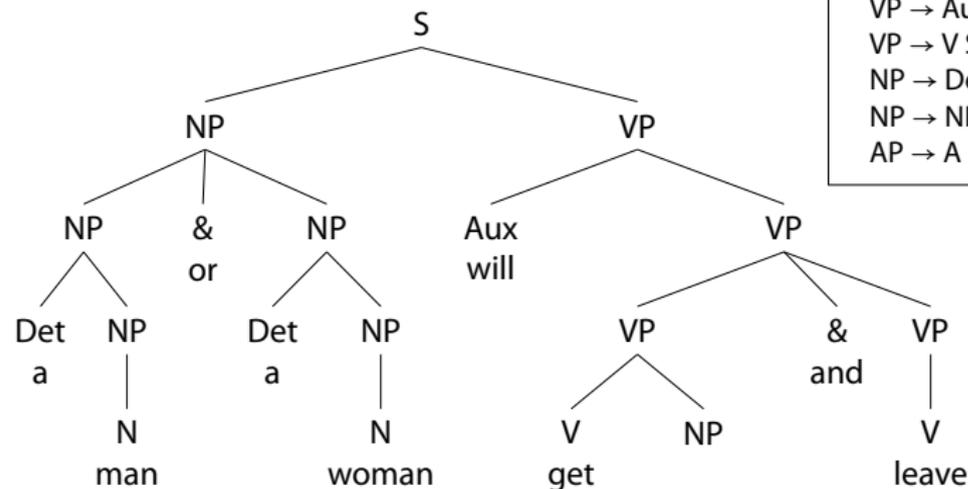


## Phrase Structure Rules

|                          |                           |
|--------------------------|---------------------------|
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A man or a woman will get their coat and leave

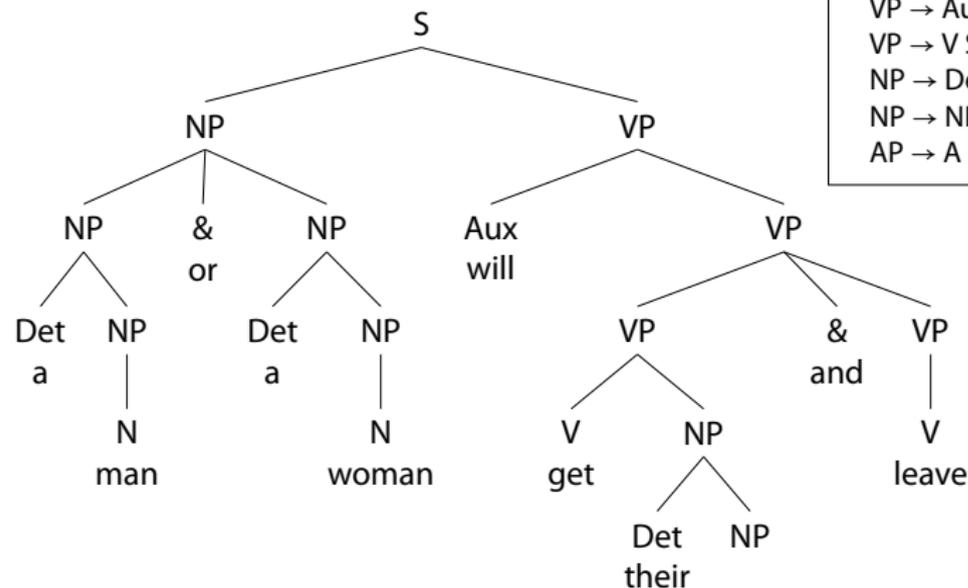


## Phrase Structure Rules

|                          |                           |
|--------------------------|---------------------------|
| $S \rightarrow NP VP$    | $S \rightarrow Comp S$    |
| $VP \rightarrow V NP$    | $VP \rightarrow V$        |
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# Coordination

A man or a woman will get their coat and leave

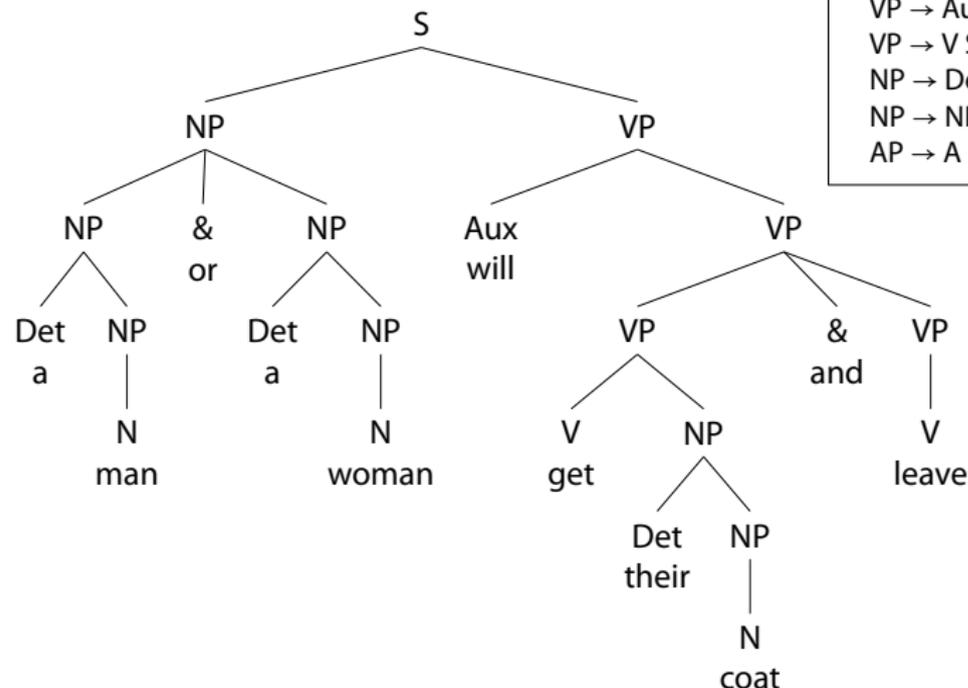


## Phrase Structure Rules

|                          |                           |
|--------------------------|---------------------------|
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# Coordination

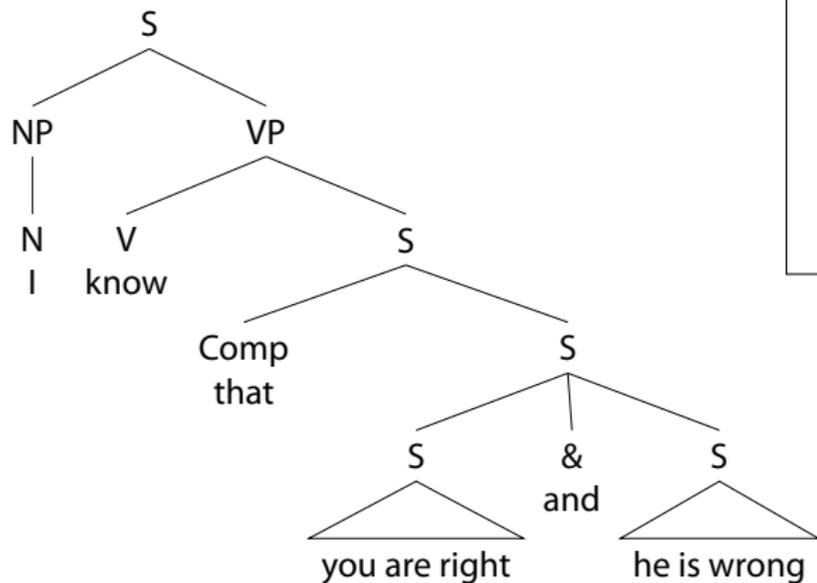
A man or a woman will get their coat and leave



## Phrase Structure Rules

|                          |                           |
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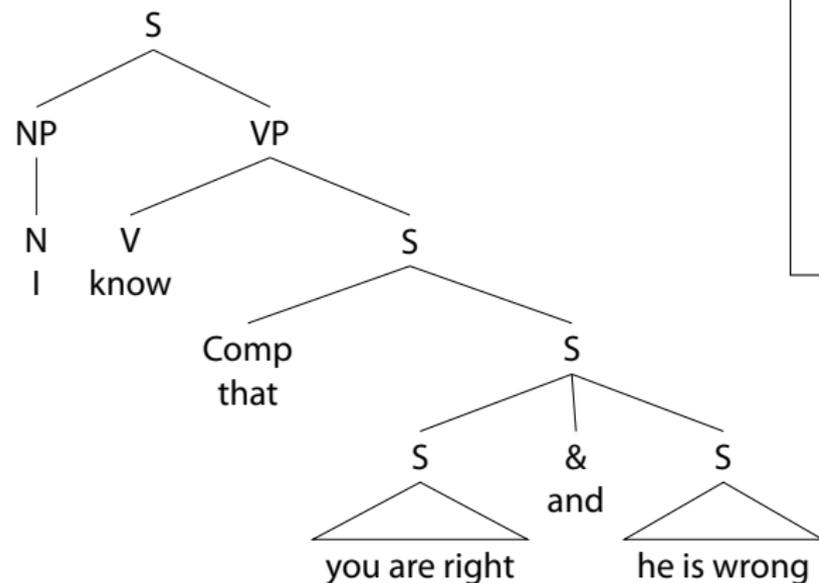
I know that you are right and he is wrong



## Phrase Structure Rules

|                          |                           |
|--------------------------|---------------------------|
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| $VP \rightarrow V NP NP$ | $VP \rightarrow V NP PP$  |
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| $VP \rightarrow V S$     | $XP \rightarrow XP \& XP$ |
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| $NP \rightarrow NP PP$   | $NP \rightarrow AP NP$    |
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I know that you are right and he is wrong



## Phrase Structure Rules

|                          |                           |
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| $VP \rightarrow V NP$    | $VP \rightarrow V$        |
| $VP \rightarrow V NP NP$ | $VP \rightarrow V NP PP$  |
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| $NP \rightarrow NP PP$   | $NP \rightarrow AP NP$    |
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(XP has to also stand for 'S', too.)

- Look at these sentences from Hiaki (spoken in Arizona and Mexico):
  - (1) a. Hunaa'a ya'uraa hunaka'a hamutta nokriak  
that chief that woman defend  
'That chief defended that woman'
  - b. Taawe totoi'aso'olam kaamomolim hiba-tu'ure  
hawk chickens young like  
'The hawk likes young chickens'

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- What is the basic word order in Hiaki?

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- What is the basic word order in Hiaki?
- What is the order of **subject** and **object**?

# Doing syntax: Hiaki

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'That chief defended that woman'
- b. **Taawe toto'aso'olam kaamomolim** hiba-tu'ure  
hawk chickens young like  
'The hawk likes young chickens'

- What is the basic word order in Hiaki?
- What is the order of **subject** and **object**?
- The basic word order is SOV.

# Doing syntax: Hiaki

- (2) **Hunaa'a ya'uraa hunaka'a hamutta** nokriak  
that chief that woman defend  
'That chief defended that woman'

What rules do we need to analyze Hiaki?

**Phrase Structure Rules**

# Doing syntax: Hiaki

- (2) **Hunaa'a ya'uraa hunaka'a hamutta** nokriak  
that chief that woman defend  
'That chief defended that woman'

What rules do we need to analyze Hiaki?

S

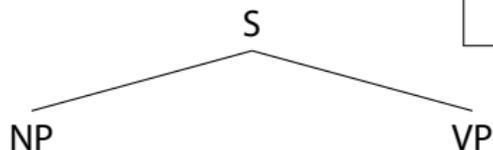
**Phrase Structure Rules**

# Doing syntax: Hiaki

- (2) **Hunaa'a ya'uraa hunaka'a hamutta** nokriak  
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'That chief defended that woman'

What rules do we need to analyze Hiaki?

**Phrase Structure Rules**

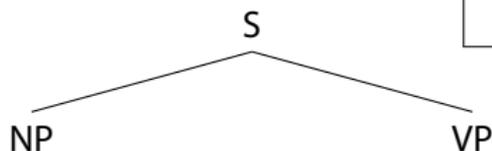


# Doing syntax: Hiaki

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that chief that woman defend  
'That chief defended that woman'

What rules do we need to analyze Hiaki?

**Phrase Structure Rules**  
 $S \rightarrow NP VP$



# Doing syntax: Hiaki

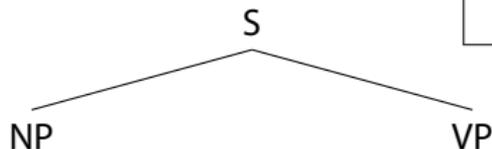
- (2) **Hunaa'a ya'uraa hunaka'a hamutta** nokriak  
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'That chief defended that woman'

What rules do we need to analyze Hiaki?

## Phrase Structure Rules

$S \rightarrow NP VP$

$NP \rightarrow Det NP$



# Doing syntax: Hiaki

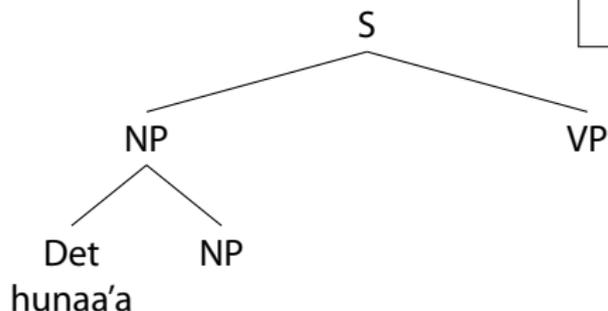
- (2) **Hunaa'a ya'uraa hunaka'a hamutta** nokriak  
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'That chief defended that woman'

What rules do we need to analyze Hiaki?

## Phrase Structure Rules

$S \rightarrow NP VP$

$NP \rightarrow Det NP$



# Doing syntax: Hiaki

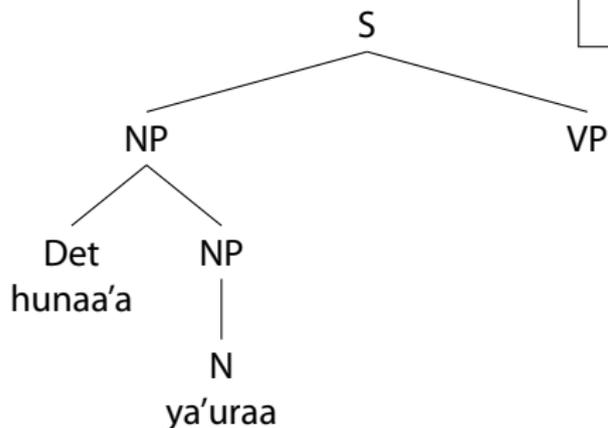
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What rules do we need to analyze Hiaki?

## Phrase Structure Rules

$S \rightarrow NP VP$

$NP \rightarrow Det NP \quad NP \rightarrow N$



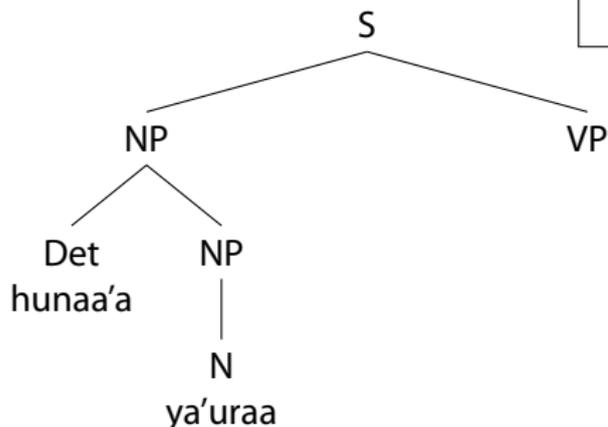
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## Phrase Structure Rules

$S \rightarrow NP VP$        $VP \rightarrow NP V$   
 $NP \rightarrow Det NP$        $NP \rightarrow N$



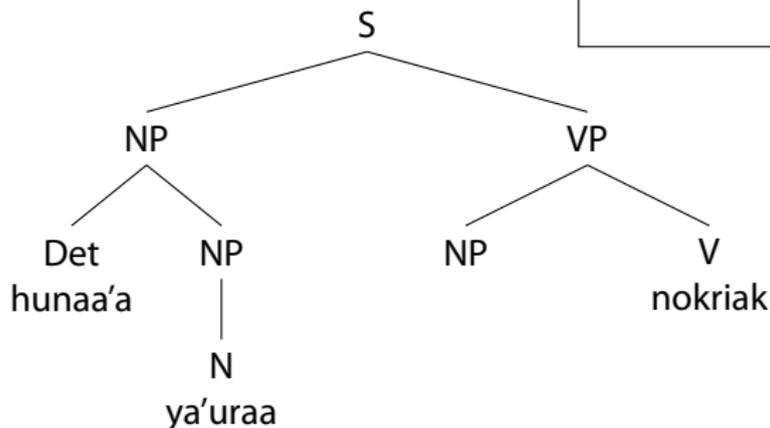
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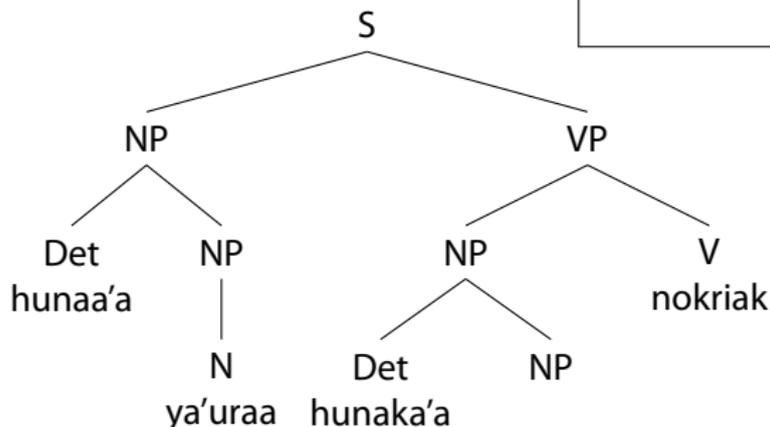
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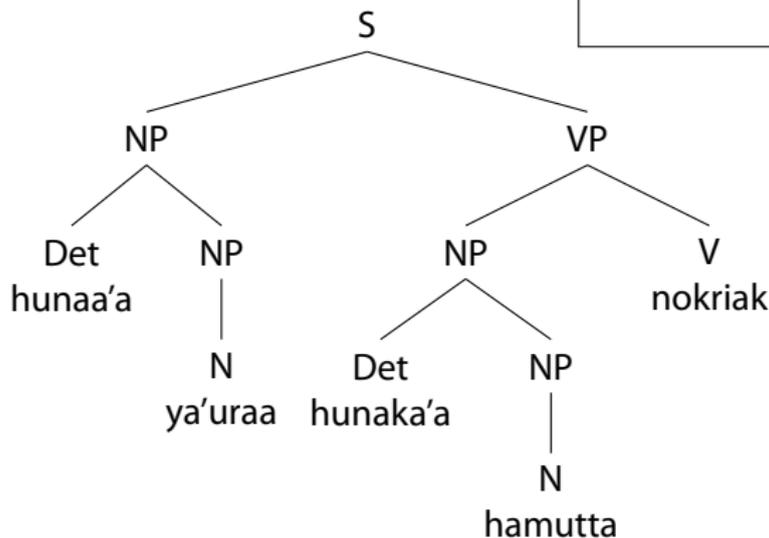
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# Doing syntax: Hiaki

- (2) **Taawe toto'aso'olam kaamomolim** hiba-tu'ure  
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What rules do we need to analyze Hiaki?

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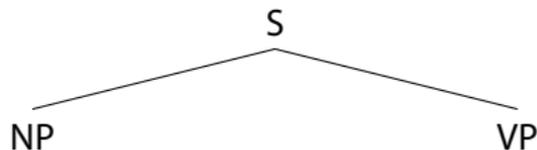
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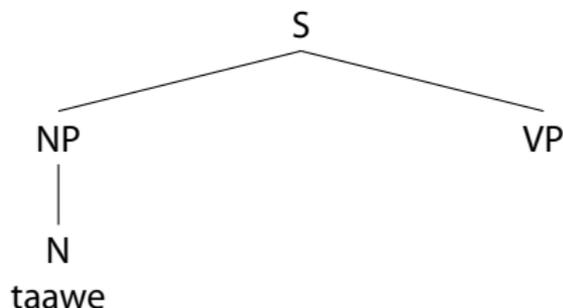
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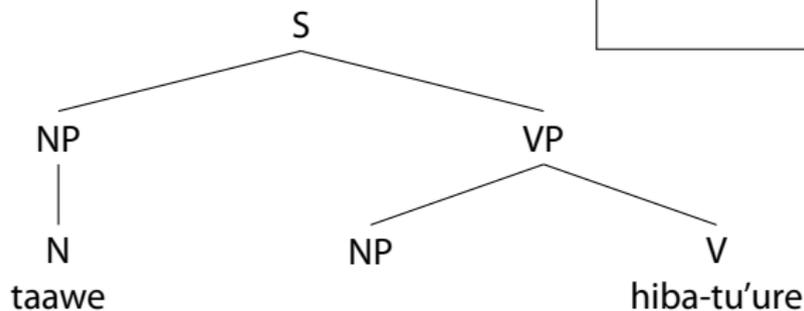
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## Phrase Structure Rules

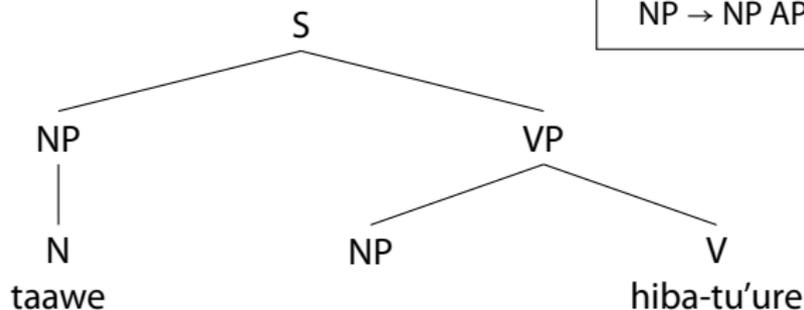
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 $NP \rightarrow Det NP$      $NP \rightarrow N$



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What rules do we need to analyze Hiaki?



## Phrase Structure Rules

|                         |                       |
|-------------------------|-----------------------|
| $S \rightarrow NP VP$   | $VP \rightarrow NP V$ |
| $NP \rightarrow Det NP$ | $NP \rightarrow N$    |
| $NP \rightarrow NP AP$  |                       |

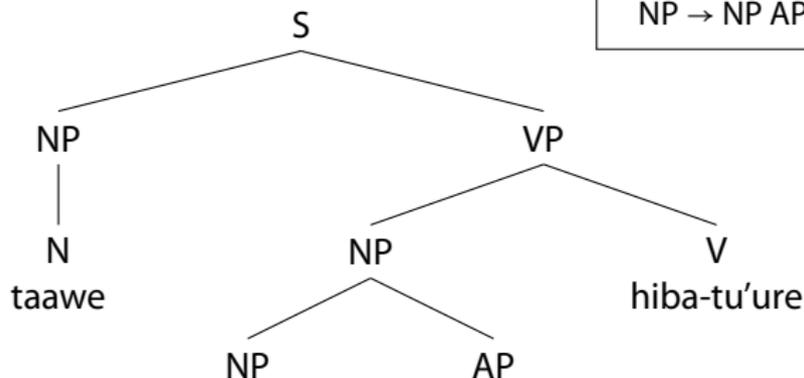
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## Phrase Structure Rules

$S \rightarrow NP VP$        $VP \rightarrow NP V$   
 $NP \rightarrow Det NP$      $NP \rightarrow N$   
 $NP \rightarrow NP AP$



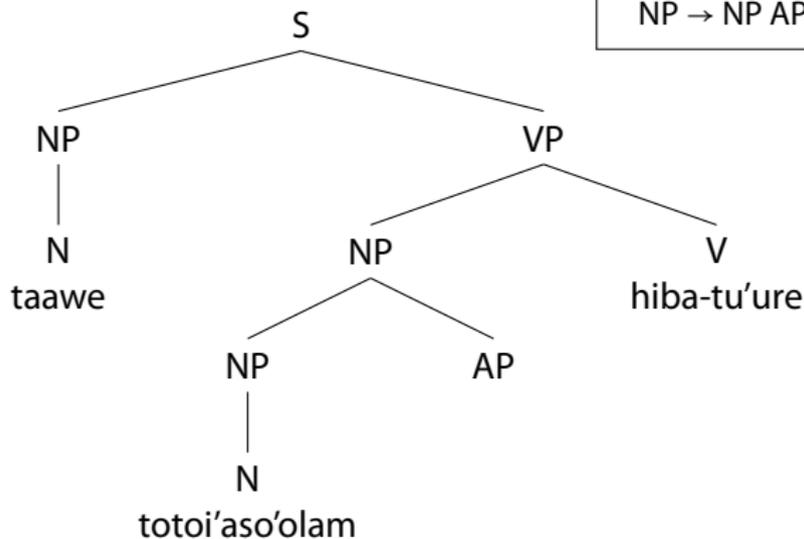
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## Phrase Structure Rules

$S \rightarrow NP VP$        $VP \rightarrow NP V$   
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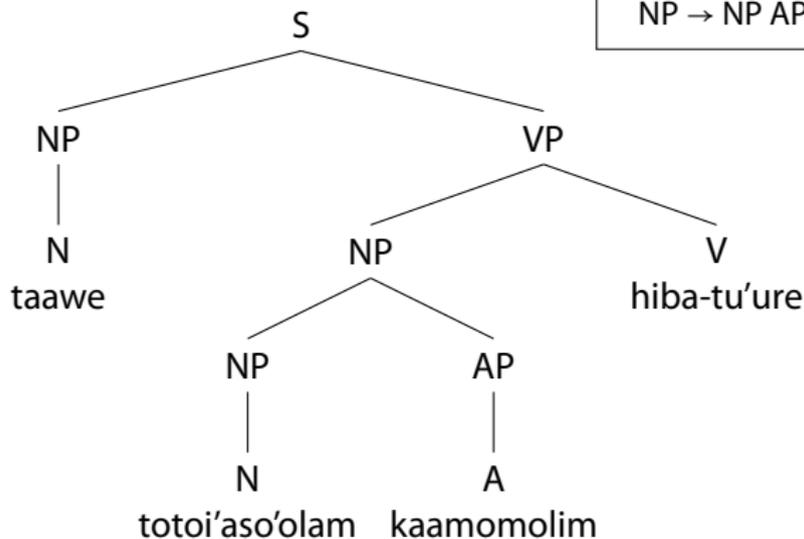
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|                         |                       |
|-------------------------|-----------------------|
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Now, look at this data from Tzotzil (spoken in Mexico):

- (3) a. 'ispet lok'el 'antz ti t'ule  
carry away woman the rabbit  
'The rabbit carried away (the) woman'
- b. 'ibat xchi'uk smalal li Maruche  
go with husband the Maruche  
'Maruche went with her husband'

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What rules do we need to analyze Tzotzil?

**Phrase Structure Rules**

- (4) 'ispet lok'el 'antz ti t'ule  
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What rules do we need to analyze Tzotzil?

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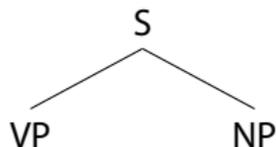
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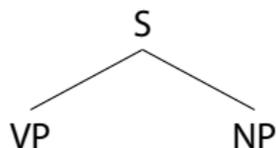


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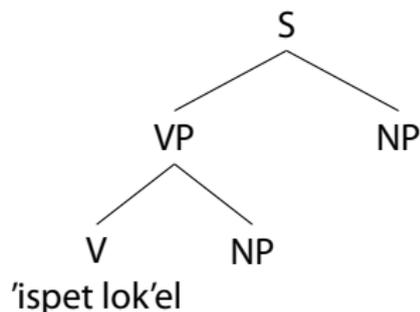
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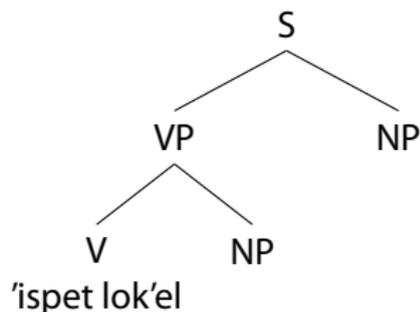
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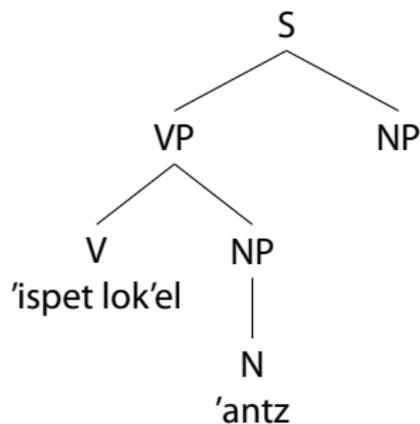
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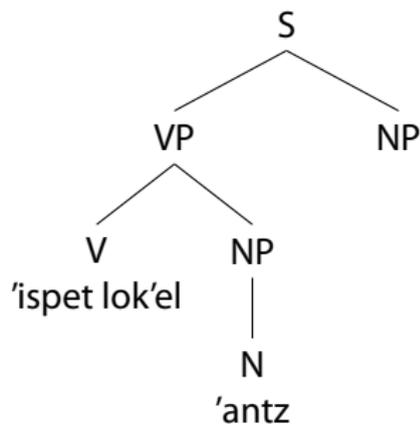
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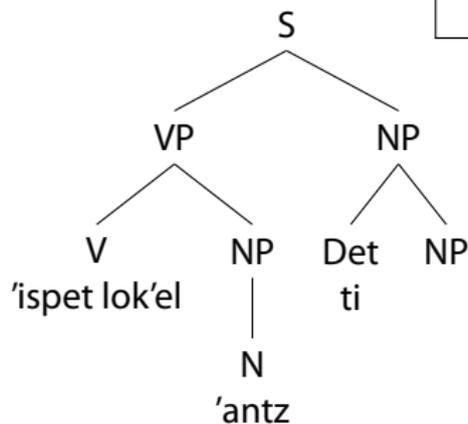
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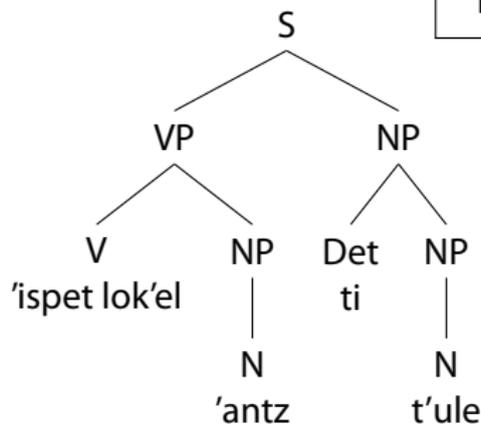
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- (5) Hanakowa Taroga kono hono yonda to omou  
Hanako Taro this book read that thinks  
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- The basic word order is SOV.
- Clauses (constituents of category S) also count as objects.

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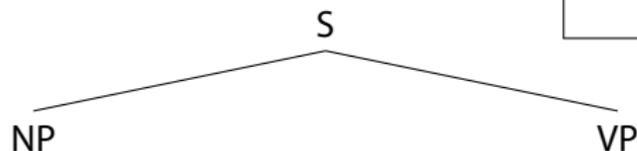
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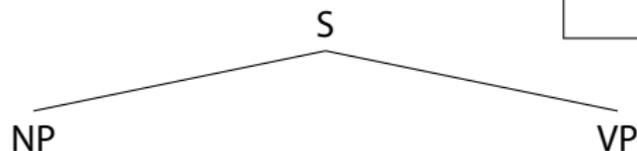
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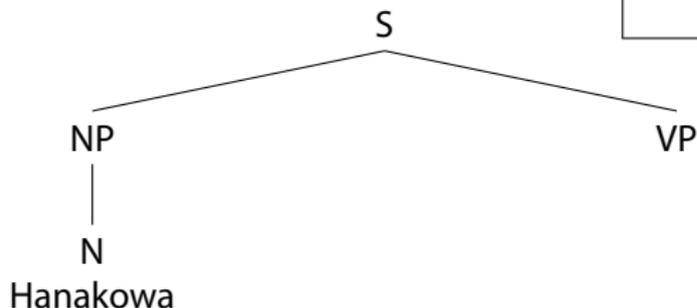
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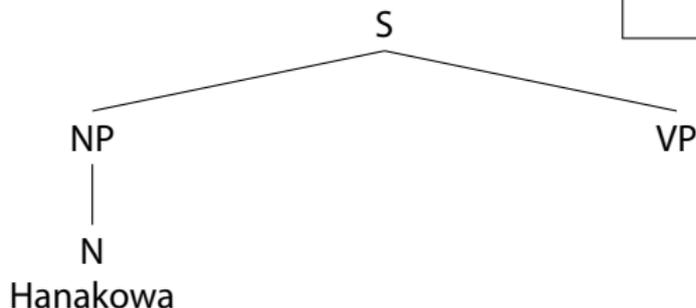
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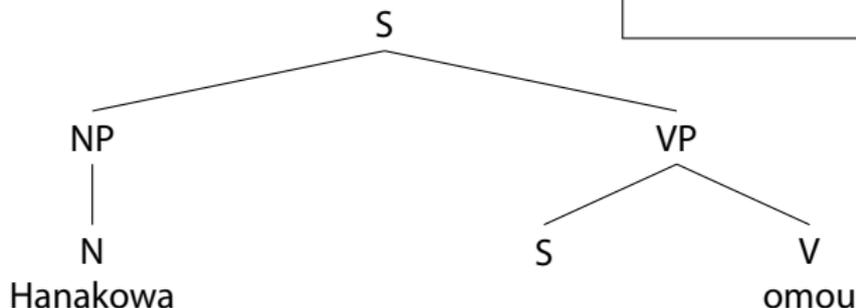
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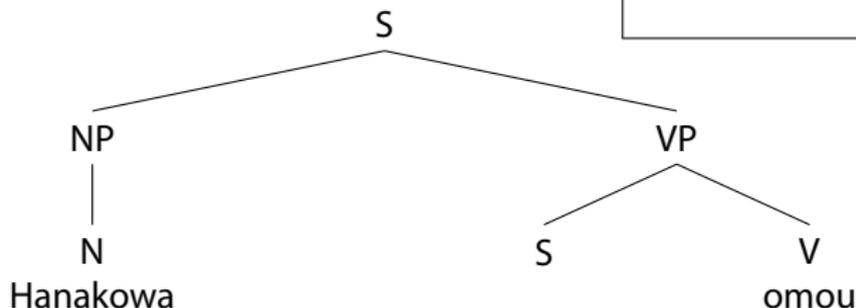
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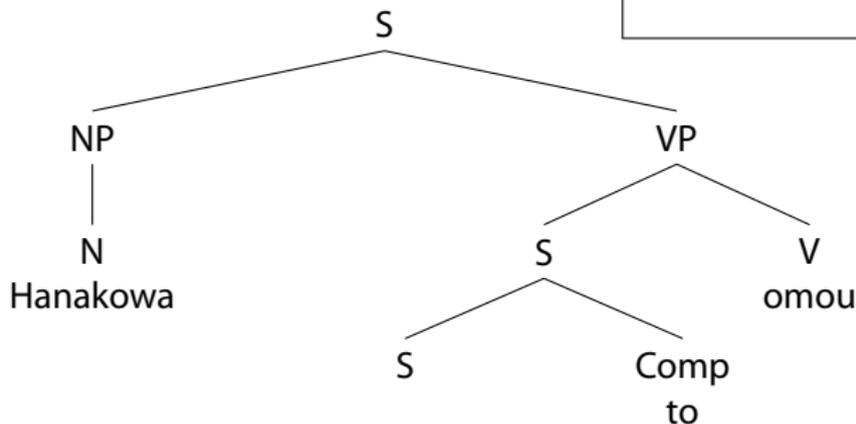
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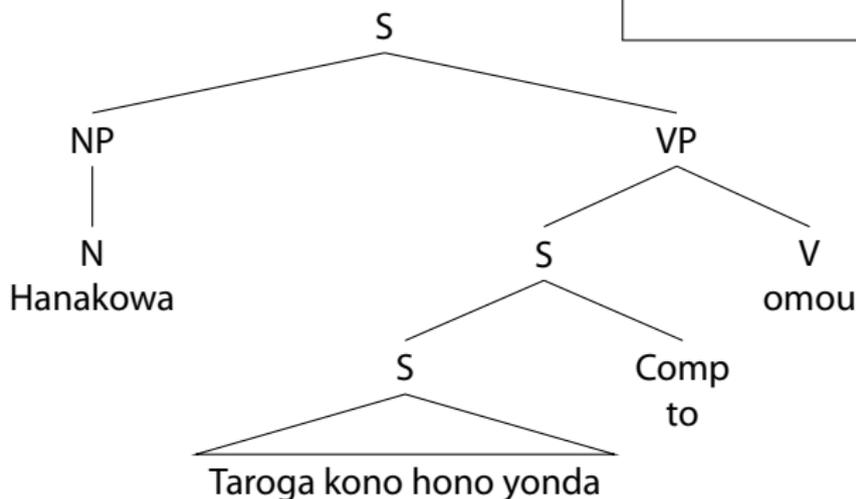
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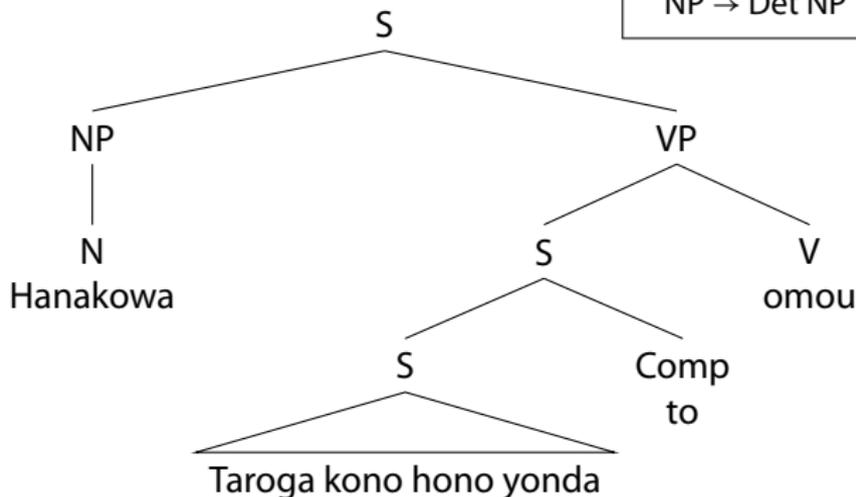
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| $NP \rightarrow Det NP$ | $VP \rightarrow NP V$ |



# Word order variation

We can now see how we begin to get language variation:

|     | <b>Rule for S</b>     | <b>Rule for VP</b>    |                      |
|-----|-----------------------|-----------------------|----------------------|
| SVO | $S \rightarrow NP VP$ | $VP \rightarrow V NP$ | e.g. English         |
| SOV | $S \rightarrow NP VP$ | $VP \rightarrow NP V$ | e.g. Hiaki, Japanese |
| VOS | $S \rightarrow VP NP$ | $VP \rightarrow V NP$ | e.g. Tzotzil         |
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What about VSO and OSV?

Well, object-initial orders like OSV are extremely rare.

But there are some examples of VSO...

- (7) a. Phóg an fear an mhuc  
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- b. Rince an bhean  
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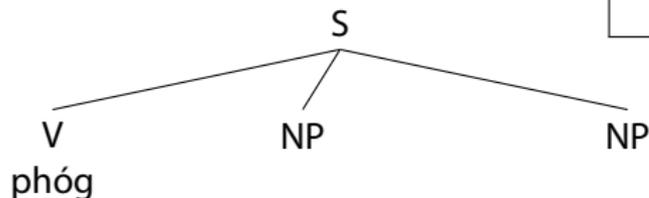
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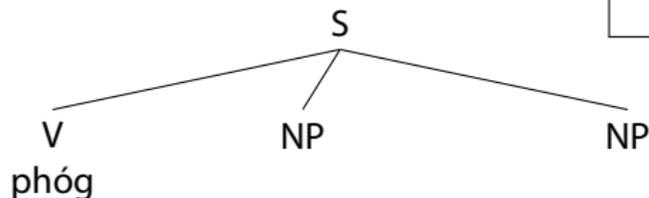
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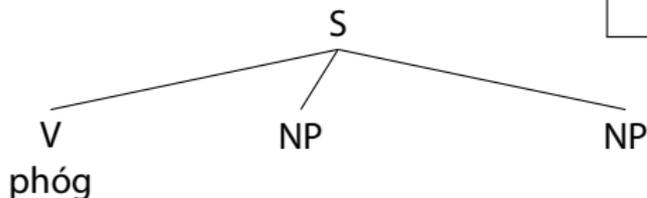
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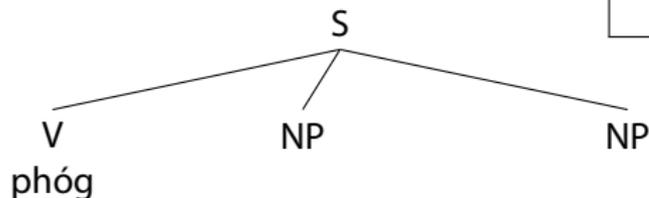


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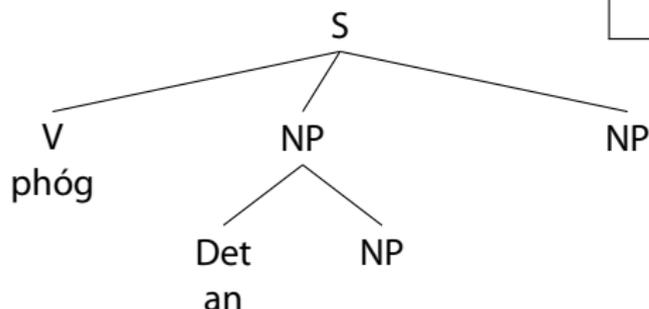
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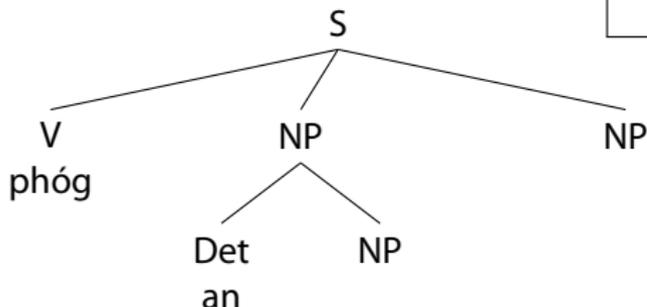
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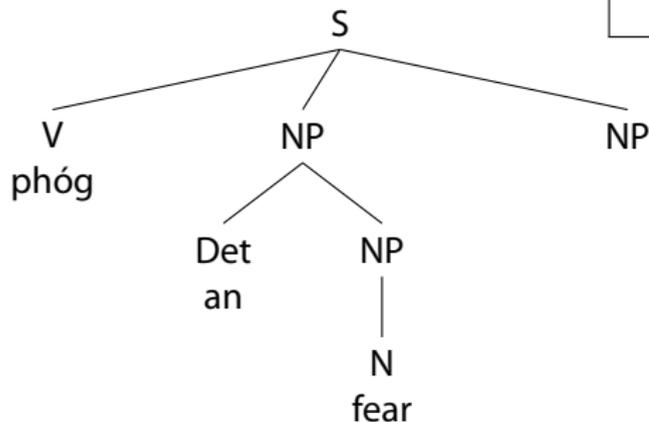
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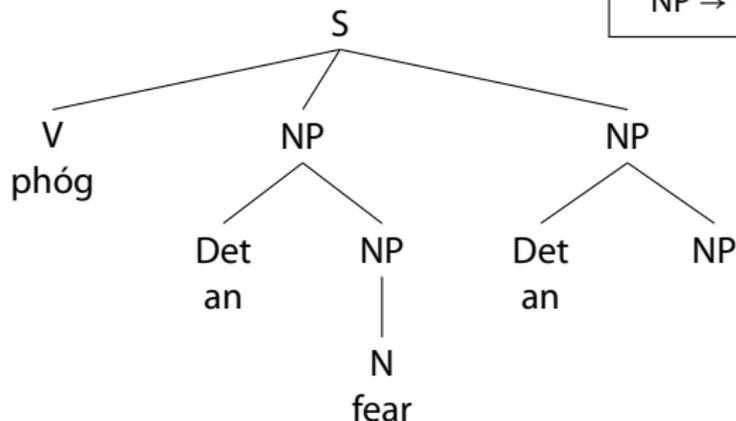
- (8) Phóg an fear an mhuc  
kissed the man the pig  
'The man kissed the pig.'

What rules do we need to analyze Irish?

## Phrase Structure Rules

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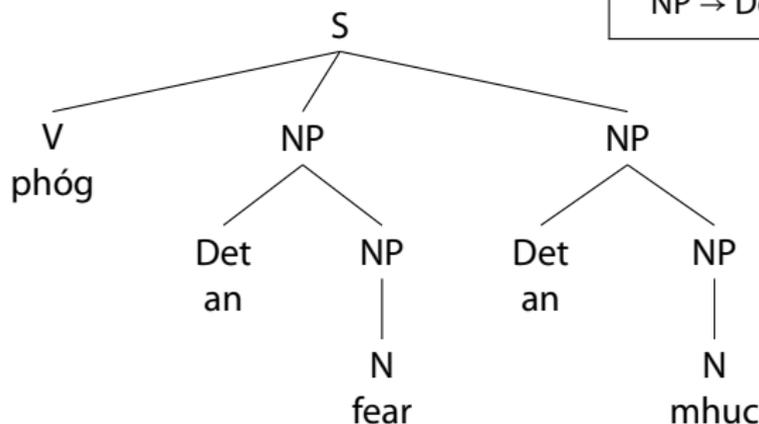
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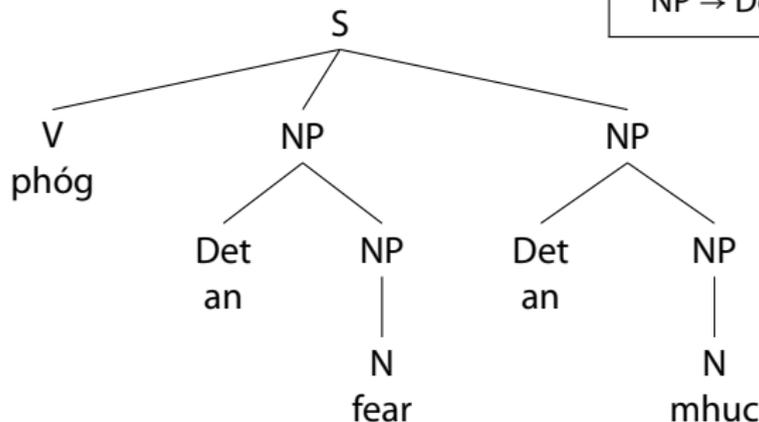
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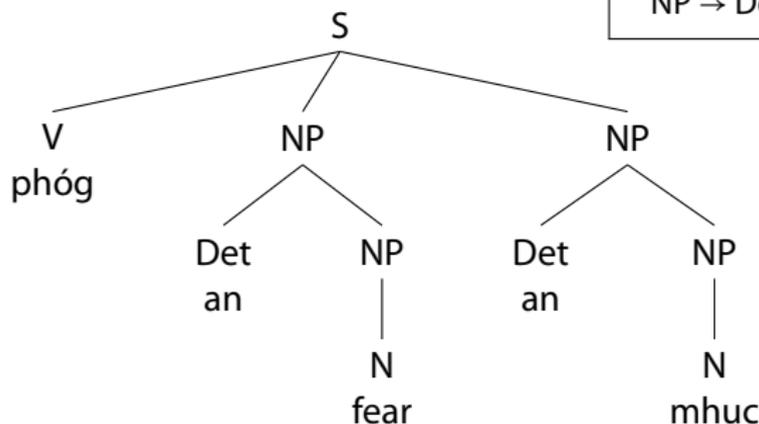
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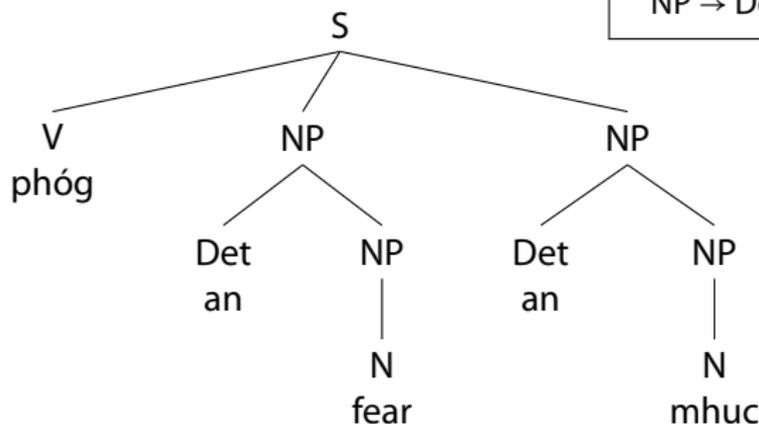
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