# Context-Free Grammar Reference Sheet

Last updated by Daniel Patterson on Monday, November 16, 2020

Following are a quick reference and descriptions of elements commonly found in context free grammars. This reference is focused on the English language.

## Terms

ANTLR. ANother Tool for Language Recognition.

BNF. Backus-Naur Form. A meta-syntax notation for a context-free grammar.

CFG. Context-Free Grammar.

G = (T, N, S, R), where

* G = Grammar. The total content of the grammar.
* T = Terminal values.
  + Appear as leaves in the parse tree.
  + Present on the right-hand side of rules.
  + The collection of all words in the target language.
* N = Non-terminal values.
  + Don't appear as leaves in the parse tree.
  + Can be present in the left and right sides of a rule.
  + Are the collection of descriptive elements about the language, as in NP, VP, Sentence, etc.
* S = Start symbol. Sentence, for example.
* R = Rules and productions in the form of n -> N(U)T.

## Rule Names

The Lexer is the part of the process that separates input tokens into distinct groups. The Parser is the part of the process that determines context and meaning from lexer output.

|  |  |  |
| --- | --- | --- |
| **Name** | **Section** | **Description** |
| Auxiliary | Lexer | Auxiliary. Do, does, can, have, am, was, etc. |
| Determiner | Lexer | Determiner. A, the, this, that, these, those, etc. |
| LHS |  | Left-hand side of the rule. |
| Nominal | Parser | Head noun. |
| Noun | Lexer | Noun. |
| NP | Parser | Noun phrase. |
| Pronoun | Lexer | Pronoun. |
| Proper | Lexer | Proper noun. |
| RHS |  | Right-hand side of the rule. |
| PP | Parser | Prepositional phrase. |
| Preposition | Lexer | Preposition. From, to, on, near, at. |
| Verb | Lexer | Transitive or intransitive Verb. |
| VP | Parser | Verb phrase. |
| Where | Lexer | Wh-word. What, which, when, where, why, etc. |

## Types of Sentence

* Declarative: S : NP VP
* Imperative: S : VP
* Interrogative: S : Aux NP VP, S : Wh NP VP, S : NP Aux NP VP
* Exclamatory: (Declarative | Imperative | Interrogative)!

## Basic English Grammar

Following is a basic English grammar, expressed in ANTLR format, which is similar to BNF.

### Lexer Rules

This lexer is set to be case-insensitive.

Auxiliary: /\* Every auxiliary word in the English language. \*/  
Determiner: /\* Every determination word in the English language. \*/  
Noun : /\* Every noun in the English language. \*/  
Pronoun: /\* Every pronoun in the English language. \*/  
Preposition: /\* Every preposition in the English language. \*/  
Proper: /\* Every proper noun in the English language. \*/  
Verb: /\* Every transitive and intransitive verb in the English language. \*/  
Where: /\* Every Wh-word in the English language. \*/

### Parser Rules

The parser contextualizes the input phrase.

Nominal:

Noun |  
Nominal Noun |  
Nominal PP;

NP:

Pronoun |  
Proper |  
Determiner Nominal;

PP:

Preposition NP;

VP:

Verb |  
Verb NP |  
Verb NP PP |  
Verb PP;

S:

NP VP |  
Auxiliary NP VP |  
VP;