Phrase structure grammar

The term **phrase structure grammar** was originally introduced by Noam Chomsky as the term for grammar studied previously by Emil Post and Axel Thue (Post canonical systems). Some authors, however, reserve the term for more restricted grammars in the Chomsky hierarchy: context-sensitive grammars or context-free grammars. In a broader sense, phrase structure grammars are also known as *constituency grammars*. The defining trait of phrase structure grammars is thus their adherence to the constituency relation, as opposed to the dependency relation of dependency grammars.

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Constituency relation

In linguistics, phrase structure grammars are all those grammars that are based on the constituency relation, as opposed to the dependency relation associated with dependency grammars; hence, phrase structure grammars are also known as constituency grammars.[1] Any of several related theories for the parsing of natural language qualify as constituency grammars, and most of them have been developed from Chomsky's work, including

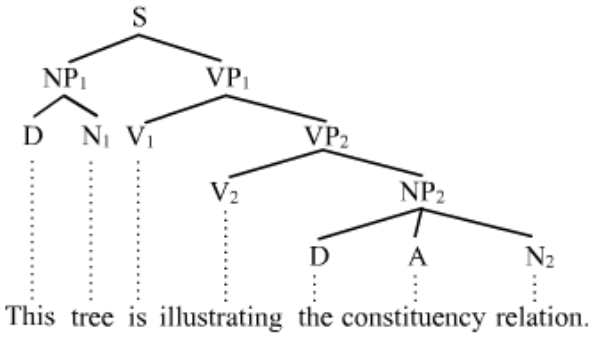
- Government and binding theory
- Generalized phrase structure grammar
- Head-driven phrase structure grammar
- Lexical functional grammar
- The minimalist program
- Nanosyntax

Further grammar frameworks and formalisms also qualify as constituency-based, although they may not think of themselves as having spawned from Chomsky's work, e.g.

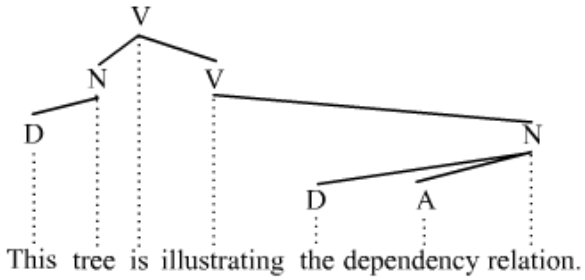
- Arc pair grammar, and
- Categorial grammar.

The fundamental trait that these frameworks all share is that they view sentence structure in terms of the constituency relation. The constituency relation derives from the subject-predicate division of Latin and Greek grammars that is based on term logic and reaches back to Aristotle[2] in antiquity. Basic clause structure is understood in terms of a binary division of the clause into subject (noun phrase NP) and predicate (verb phrase VP).

The binary division of the clause results in a one-to-one-or-more correspondence. For each element in a sentence, there are one or more nodes in the tree structure that one assumes for that sentence. A two word sentence such as *Luke laughed* necessarily implies three (or more) nodes in the syntactic structure: one for the noun *Luke* (subject NP), one for the verb *laughed* (predicate VP), and one for the entirety *Luke laughed* (sentence S). The constituency grammars listed above all view sentence structure in terms of this one-to-one-or-more correspondence.



Constituency relation (PSG)



Dependency relation

Dependency relation

By the time of Gottlob Frege, a competing understanding of the logic of sentences had arisen. Frege rejected the binary division of the sentence and replaced it with an understanding of sentence logic in terms of logical predicates and their arguments. On this alternative conception of sentence logic, the binary division of the clause into subject and predicate was not possible. It therefore opened the door to the dependency relation (although the dependency relation had also existed in a less obvious form in traditional grammars long before Frege). The dependency relation was first acknowledged concretely and developed as the basis for a comprehensive theory of syntax and grammar by Lucien Tesnière in his posthumously published work *Éléments de syntaxe structurale* (Elements of Structural Syntax).[3]

The dependency relation is a one-to-one correspondence: for every element (word or morph) in a sentence, there is just one node in the syntactic structure. The distinction is thus a graph-theoretical distinction. The dependency relation restricts the number of nodes in the syntactic structure of a sentence to the exact number of syntactic units (usually words) that that sentence contains. Thus the two word sentence *Luke laughed* implies just two syntactic nodes, one for *Luke* and one for *laughed*. Some prominent dependency grammars are listed here:

- Recursive categorical syntax, sometimes called *algebraic syntax*
- Functional generative description
- Lexicase
- Link grammar
- Meaning-text theory
- Operator grammar
- Word grammar

Since these grammars are all based on the dependency relation, they are by definition NOT phrase structure grammars.

Non-descript grammars

Other grammars generally avoid attempts to group syntactic units into clusters in a manner that would allow classification in terms of the constituency vs. dependency distinction. In this respect, the following grammar frameworks do not come down solidly on either side of the dividing line:

- Construction grammar
- Cognitive grammar

See also

- Dependency grammar
- Catena
- Gottlob Frege
- Lucien Tesnière
- Predicate
- Subject
- Verb phrase

Notes

1. Matthews (1981:71ff.) provides an insightful discussion of the distinction between constituency- and dependency-based grammars. See also Allerton (1979:238f.), McCawley (1988:13), Mel'cuk (1988:12-14), Borsley (1991:30f.), Sag and Wasow (1999:421f.), van Valin (2001:86ff.).
2. Bobzien, Susanne. "Ancient Logic" (https://plato.stanford.edu/archives/win2016/entries/logic-ancient/). *Stanford Encyclopedia of Philosophy*. Stanford. Retrieved 4 March 2018.
3. See Tesnière (1959).

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