L322 Syntax

Chapter 3: Structural Relations

Linguistics 322

1 The Parts of a Tree

A tree structure is one of an indefinite number of ways to represent a sentence or a part of it.

Consider the following rules

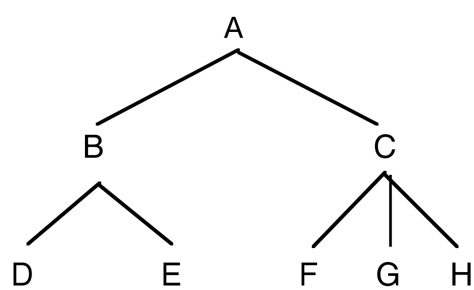
(1) a. A → B C

b. B → D E

c. C → F G H

These rules generate the following tree structure:

(2)



Another representation is in the form of labelled brackets:

(3) $[_A [_B$ D E$]$ $[_C$ F G H$]]$.

Some of Carnie's definitions are simply goofy:

(4) Branch: a line connecting two parts of a tree. (AC, p.68)

Which parts? This is not defined.

Normally, a branch refers to two "lines" which meet at a node. Even this description is less than desirable.

Let us put all this in terms of a set. A set is a group of any two or more items, called members. A set can have one member. An empty set is also possible.

Let us return to Rule (1) and its representation (2).

A is a set.

It contains two members B and C.

B and C are sets in themselves and as such are subsets of A.

D and E are members of B, and F, G, and H are members of C.

D, E, F, G, and H are members, but not subsets if they do not contain anything.

{A} = {B, C}

{B} = {D.E}

{C} = {F. G. H}

It is possible, but not necessary, to draw a link from any member or set to any other.

However, such links should serve a function.

Carnie calls these links ‘lines.’

For the remainder of this chapter, the only links we will permit are those that link a member to the set that contains it.

Thus a link is created between A and B, and A and C.

A branching line or diagram is one where two links are linked to a common set, here it is A; B and C are branching lines or links.

In set theory a node is a set. In set theory member is a member of its own subset. Seen this way, it is not the member that is a node but the set that contains it.

A root node is also called a matrix node. It is a set that is not a member of any other set.

A terminal node is a member that is nuniquely a member of its own subset.

A non-terminal node is a subset, or rarely a matrix (root) node.

2 Dominance

A set dominates all its members. and all the members of any set that it dominates, This repeats until the terminal node is reached. We could also say that X, a set, dominates everything that it contains. But then we have to define contain, which is not a bad idea.

(5) **Contain (A, B)**

"If A is a member of the subset {A}, and {A} is a subset of {B}, and {B} is a subset of {C}, and C is a subset of {D} and so forth up to {X}, then A is contained by {X}, by {B}, {C} and the remaining subsets in this chain."

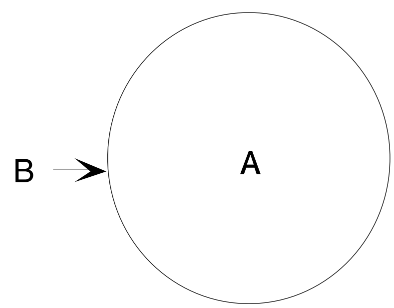
Similarly {B} is contained by {C} and {D} and {X} and the remaining subsets in this chain, except {B} is not contained by {A}. This could be made more formal, but this will do for now.

We could also say "if B occurs within A, A contains B." The problem here is what does "within" mean formally? The idea is clear, the definition is hard to make. Perhaps, IN is a prime, a semantic feature that can't be defined in terms of its parts. It takes two arguments:

(6) IN (A, B).

It must be understood somehow that (6) refers to the following figure (and other forms) that surround or nearly surround an object:

(7)



(7) could be read a "A is in B". Then we could defineCONTAIN as:

(8) **CONTAIN**

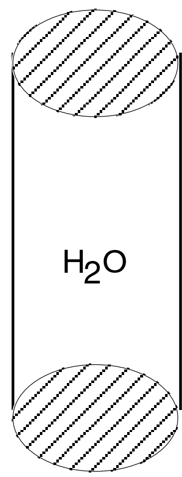
If A is in B, then B contains A.

It now follows that if A is in B, and B is in C, then A is in C. Or, we could say that if C contains B, and B contains A, then C contains A. Statements such as these are**theorems**. Whether these theorems are axioms, I will leave to logicians.

I don't mean to imply that B must be a perfect circle. I can extend B to any geometrical form that which totally encloses an object regardless of its shape (ovals and ellipses and any undefinable shape as long it forms a continuous line that connects with itself. Even this is not sufficient. Probably solids that are intersected by a plane contain any object that is bound either by the container or by a plane that intersects the container.

One such example would be a cup. If a cup contains coffee, for example, the coffee is bound by the sides and bottom of the cup (physical) and by an intersecting plane that in this case represents gravitational pull. The same hods for glass, which is easier to depict:

(9)



H_2O is contained by the sides of the glass, the bottom of the glass and the top of the glass or where the surface of the coffee is (the diagonal lines). I haven't quite reduced this to a minimal statement of IN, but I think you can get the picture. The concept of IN is probably a prime that can't be adequately defined, but is perfect well understood.

OUT can probably be defined:

(10) **OUTSIDE OF**

Given A, and B

If B does not contains A and it is not equal to B, then A is outside of B.

~(IN (A, B)) and ≠(A, B), then OUT(A, B).

Of course, OUT = 'outside of' and 'out' as in 'The bird flew out the window.'

I checked with Saeed*Syntax* (1997) and he talks about image schemas, which display semantic drift, but he does not deal with the definition of IN nor does he talk about it as a prime.

Immediate dominance (immediately dominates)

A immediately dominates B if there is no node C, such that A dominates B and C dominates A. A is a set {A} and B is a member of {A}. If there is a set {C} such that {C} is a member of {C} and B is a member of {C}, then {A} does not immediately dominate B.

Mother

A is a mother of B if A immediately dominates B. (Mother is a set {A} and B is a member of A).

Daughter

B is a daughter if A if A immediately dominates B (or if A is the mother of B).

Sister

A and B are sisters if there is a node C such that C immediately dominates both A and B. C is a set {C} such that B and A are members of {C}.

Exhaustive Domination

A exhaustively dominates the set {B, C, …, D} if A immediately dominates all members of the set {B, C, …, D} and nothing else

Following Carnie suppose A immediately dominates the set {B C D} and G. The set BCG} is not exhaustively dominated by A, since A also immediately dominates G.

According to set theory, a member is also a set in its own right even if the set contains only member, here G, that is {A} immediately dominates {G}. G is the only member of G. Hence A exhaustively dominates {B C D} and {G}.

Constituent

A set of nodes exhaustively dominated by a single node. In the above example, {G} is not a constituent of A, since {G} is not exhaustively dominated by A.

Constituent of

B is a constituent of A, only if B is dominated by A. A constituent is a member of the set containing it.

Immediate Constituent

B is an immediate constituent of A only if B is immediately dominated by A.

3 Precedence

A precedes B if iff A occurs to the left of B, and neither A nor B dominates the other,

The crossing of lines constraint:

Two branch lines of a construction cannot cross each other.

This can also be restated as the Overlapping Constraint using labelled bracketing:

If a node M immediately dominates A and B and a node N immediately dominates C and D, and M precedes N, neither C nor D may precedes B.

In logical precedence is expressed by enclosing each argument in angled brackets separated by a comma:

(11) {<a>, <b>} = ‘a’ precedes ‘b’.

We could rewrite the rule “S <--> NP VP” as

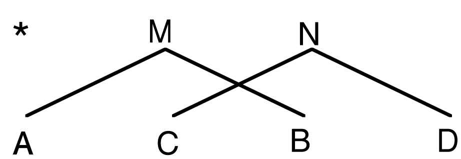
If S <--> {<NP>, <VP>}. then NP precedes VP (logical notation).

(12) **Overlapping Constraint**

$*[_M\ A\ [_N\ C\ B]\ D]$

If this is depicted in a tree format, two lines will cross:

(13)



Axioms of Precedence

(14) **Unidirectionality of Precedence**

If X precedes Y, then Y cannot precede X.

This constraint will be important later on.

(15) **Transitive Precedence**

If X precedes Y, and Y precedes Z, the X precedes Z.

(16) **Domination - Precedence Condition**

If X precedes Y, Y cannot dominate X, and X cannot dominate Y.

There is some reason to associate these with logical axioms that apply universally. They are not limited to linguistic theory. (14). (15) and (16) must apply universally. (14) applies to any string where X precedes Y, whatever X and Y are. (15) probably comes from sort of Transitivity Axiom which would include things like “great than”: if X is > Y, and Y is great than W, then X > W. We can make (16) a corollary of “If X contains Y, and Y contains W, then X contains W. But (16) seems to be a form of the Transitive Condition. If so, then we can reduce this set to two.: Transitive and Unidirectionality. It is not clear than the Overlapping Constraint is universal. Linguists have proposed overlapping before and no objected on logical grounds. Overlapping does appear to be true for syntax.

I just found a definition of transitive:

(17) a relation R is transitive whenever $<A, B> \in R$ and $<B, C> \in R$.

A relation can be any kind of a defined relation. Let us try “greater than”. If a > b, and b > c, it then follows that a > c. Thus this relation is transitive. It will be true for any three or more numbers if each has a different value. Precedence is another transitive relation, given these definitions. Hence, immediate precedence, immediate containment, and ‘immediate greater than’ (or lesser than) are transitive.

Note not all relations are transitive. If Mary loves John, and John loves Lindsay, then it follows that Mary does not necessarily loves Lindsay. Transitive verbs not necessarily transitive in the logical sense. It is one of things that *transitive* is ambiguous and is not synonymous in linguistics and math. Ergo, we must be careful using the term*transitive*.

At this time it appears that operators are transitive, while lexical relations are not.

Immediate precedence

What do you suppose this means?

Node Sharing

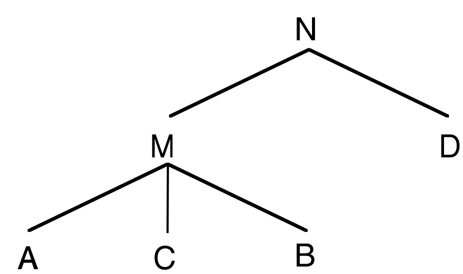
if A includes C and D, and B includes D and E, then D is simultaneously a member of A and B. I don[‘t know if logic permits this, but the evidence for this is found in English phonology.

The word*setting* [‘sɛt^{h}ɪŋ] contains two syllables. The middle consonant (in slow speech or some Canadian dialects) occurs in the first syllable making the first syllable closed, in which case the lax vowel /ɛ/ occurs. Lax vowels cannot occur syllable final position with the exception of /ə/, And the middle consonant /t/ occurs in the second syllable, since /t/ is aspirated: [t^h]. This holds true if /t / is a tap: [sɛ ɪŋ]. The tap or [t^h] belong simultaneously to the coda of the first syllable and the onset of the second syllable. However, there is no direct evidence for node sharing in syntax.

4 C-command

A c-commands B, if the first branching node that dominates A also dominates C.

(18)



N c-commands nothing

M c-commands D

D c-commands M, A, C, and B

A c-commands C and B

B c-commands A and C

C c-commands A and B

A, C and B do not c-command D, nor M or N.

M and D do not c-command N.

Symmetric c-command

A and B symmetrically c-command each other iff[1] A c-commands B, and B c-commands A.

Sisters c-command each other.

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[1] The abbreviation ‘iff’ stands for ‘if and only if.’

Government

A very important concept iff one does not go along with Minimalism.

A governs B if

A c-commands B

A is a governor

B is a complement of A or included in the complement of A

There is no governor C such that A governs C and C governs B.

The idea here to localize government with the result a node may be governed by only one governor.

Government is nontransitive.

Perhaps, we can replace the condition with a bridge. This idea is speculative and I will leave it for later.

5 Grammatical Relations

Subject

Semantically, the subject of a clause has been difficult to define.

The closest semantic definition is to consider the subject to denote the most prominent NP of a clause,

In a sentence such as

(19) John ate some ice cream.

John is considered to be prominent.*Ice-cream* is not.

In a related sentence such as

(20) Some ice cream was eaten by John.

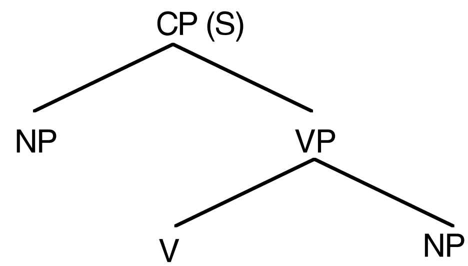
Here *some ice cream* is considered to be prominent.

There is also a structural definition:

(21) **Subject**

The subject of a clause is the NP that is immediately dominated by CP (S):

(22)



The first NP is immediately dominated by CP, but the second NP is not.

In logic there are relations that turn out to be very similar to subject + predication:

Consider the following relation:

(23) Is-mother-of(Patty, Lyle)

This relation means that Patty is the mother, and that she is that mother of Lyle. (23) can be rewritten as:

(24) Is-mother-of(Lyle) = Patty.

This can be read as:

(25) Patty is the mother of Lyle.

Patty is the subject of the clause. In this case, Lyle cannot be the subject of this particular clause. A related relation is required in that case:

(26) Is-child-of(Lyle, Patty).

What do you suppose the this relation is in normal English?

Direct Object

The direct object is a complement of the verb (still to be introduced). It is immediately dominated by V^1, or it is a sister to the verb head V^0.

It is the directed object.

(27) **The direct object of a verb**

The direct object of a verb is the complement governed by the verb.

It is governed by V^0.

I'm not going to use the definition where VP dominates NP. Government is better definition for reasons that will come later.

Prepositional Object (object of preposition)

(28) **The prepositional object of a verb**

The object of a prepositional is the complement governed by the prepositional.

It is governed by P^0.

6 The Indirect Object

I agree with Carnie here. This topic is too difficult to cover here.