

Week 1: Introducing... The Miracle of Syntax!

1. Introduction

1.1 What do we study when we study syntax?

A simplified definition of syntax would say: syntax is a level of linguistic structure that mediates between meanings and sounds

At a more detailed, deep level, we would say:

- The syntax of a language tells us how to generate an infinite number of new sentences from a finite set of words (lexical items)
- Syntax – the study of the hierarchical structure of sentences in the human language – aims to answer the question what do we know when we know that a particular sentence is grammatical or ill-formed in our language? How are we able to understand and generate an infinite number of new sentences
- Syntax studies the rules that underlie sentence formation and structure; we ask which rules are universal and which are language specific?
- Language (i-language) vs. e-language = the human linguistic capacity, a part of our cognitive endowment, something that all normally developing individuals possess vs. a specific language such as English or Chinese
- Syntactic theory – investigating the structure of language via **the scientific method**, that is, looking at **data**, coming up with **generalizations** about it, and explaining the generalizations by **making falsifiable hypotheses** about it; **testing the hypotheses** with more data
- Syntacticians aim to explain grammatical phenomena; they want to go above and beyond merely describing them; they NEVER tell native speakers what is the ‘right way’ to speak their language. We shall return to the distinction between **prescriptive, descriptive, and explanatory** grammar below.
- Syntax is concerned with discovering and explaining the hierarchical structure of sentences in the human language;
- We ask what are the rules that underlie sentence formation and structure; which rules are universal and which are language specific?
- Syntax is thus the study of the internal architecture of language

- In this regard, we can say that the grammar we aim to achieve is *generative and explanatory*. We want to deduce the mechanism by which we can generate new grammatical sentences in a language.
- It is distinct from being a *descriptive* grammar which only aims to describe the rules that seem to be operant on the surface, not explain what makes the surface representations grammatical in the language X.
- It is also distinct, in an even more crucial way, from being a *prescriptive* grammar, which tells native speakers what is possible or not possible in their language from the stand point of a higher grammatical authority. Ex. “Don’t end your sentences with a preposition!” This is the kind of grammar we check at the door and forget about the existence of when we enter this classroom
- The knowledge of syntax and syntactic wellformedness of sentences (i.e. whether they are possible or not in our language) is independent of the knowledge of meaning
- Consider the following: *Colorless green ideas sleep furiously*
- Conversely, often we may know the meaning someone is trying to convey, but the sentence is not possible syntactically:

I go to store yesterday. Cat hate dog.

1.2 But how can we talk about Language when languages are so different?

- True, languages do differ from one another, a speaker of Chinese would have trouble understanding a speaker of Warlpiri
- BUT! language variation, though extensive, is not infinite. There are certain principles that are common to all languages, i.e. are violated by (virtually) none
- We call them language Universals. Example: *no language forms a question from a declarative sentence by fully reversing the order of words in the declarative sentence*
- It is believed that language universals are part of Universal Grammar (UG)
- **Universal Grammar** - a set of principles that underlie our knowledge of language, are common to all languages (constrain crosslinguistic variation) and aid language acquisition in children by constraining the number of hypotheses children make when acquiring a language. These principles are claimed to be innate (*this claim may be a bit controversial*)
- A major goal of the study of syntax is to uncover and explain the principles of UG

1.3 Parts of syntax.

→ Very roughly speaking, (Chomsky 1967) the syntax of a language consists of

- A lexicon – set of words;
- a set of phrase structure rules that tell us how to put lexical items together;
- a set transformation operations – movement rules – that tell us how to arrive from a declarative sentence to the corresponding question

- (john arrive → who arrived?; john is here → is john here?); movement rules also tells us to get a passive sentence from an active one – (john hit bill → bill was hit by john)

→ much of the above has changed over the year as syntactic theory progresses. However, the three broad parts of syntax – the lexicon, operations for putting words together, and movement – have remained

2. The lexicon

- simply put, the lexicon is a bunch of words which are the building blocks of sentences
- the lexicon is divided into two broad categories: lexical words and function words.
- Lexical words are an open class – nouns, verbs, and adjectives. We can always add new ones to this set of words simply by making them up. *John blicked the ball.*
- in contrast, function words are a closed set – no new ones can be created, no matter how imaginative or poetic you may be. Try making up a new article like “tha” or a new complementizer like “dthat” instead of “that” or a new preposition like *John took the book frunder the bed* meaning “from under”. It is just not possible – i.e. native speakers won’t take to it. Their reaction would be like “wha....?”

2.1 Lexical vs. functional categories

- What is a lexical category (lexical word/ item) and how do we know what category a word belongs to?
- what is a noun, verb, or an adjective?

Consider: “*the frump gromed the dron from out of the croled krune*”

Now consider “*the grome frumped*”

“*the krune grome frumped the dron out of the crole*”

... you get the idea...

What are the categories of the novel words? How do you know them if you don’t know the meaning of each individual word? How do you know that “frump” is a noun if you don’t know whether it is a thing or a person or a concept?

Does the category of 'grome' and 'frump' change in the above sentences? Why is this happening?

→ while there is no unanimous agreement in the field as to what defines a category of a word, but here we can see that the functional words/elements surrounding it such as inflectional endings and articles/determiners play a crucial role in letting us know what category a word is.

→ consider a more radical example:

The blah blah blahes and blahas

OR:

Buffalo buffalo buffalo buffalo buffalo (S. Pinker 1994). Yes, this is a grammatical sentence of English

2.2 Other things we know when we know a word

→ In addition to knowing the category of a word we also know:

→ its subcategorization frame, i.e. what other words it can combine with

syntactically. This is especially relevant to verbs: **John devoured* vs. *John ate*.

→ The word 'devour' subcategorizes for a noun object, while the word 'eat' does not.

→ we also know the word's semantic selection: we know which words can combine with other words given their meaning. For example we can say "John sleeps" but not "#this idea sleeps" even though the structure is grammatical syntactically

3. Phrase structure rules

→ phrase structure rules combine words into groupings / units called **constituents**.

Words in a sentence are not strung together in a linear fashion like beads on a string. They are hierarchically grouped together with some words belonging closer together than others.

→ Hierarchical structure pervades language: it exists at the phonological (syllable), morphological (word), and sentence level. Hierarchy plays a crucial role in sentence processing because the representation we assign to the sentence we hear is also non-linear

→ While the crucial evidence for non-linearity of syntactic structures at the sentence level will come in the next lecture, for now consider smaller units that comprise a sentence - phrases

3.1 From words to phrases

John runs

The cat runs

The fat white cat runs

The fat white silly cat runs

The fat white silly cat with a spotted tail and funny feet runs

The fat white cat and a small thin cat run

- In the above sentences, what is the subject?
- In order to represent the idea that more than one word than be the subject of a sentence we say that the subject is a Noun Phrase – NP – which is a constituent.
- Importantly, every NP has a head – the noun. It may or may not also have a complement. For example: *The man with the telescope*. The noun “man” is the head of the phrase that determines its category. “with the telescope” is a complement. It is optional.
- The same can be done with the verb:

[The man [with the telescope]]

John runs

John runs and screams

John sees a fat white cat

John put the fat white cat on the floor

→ the Verb Phrase constituent can consist of only a single verb, but it may also have one or more *complements*, *ie.* An object, an indirect object.

→ A noun phrase as well as a verb phrase are constituents. That an NP is a constituent is seen from our ability to replace a very long NP with a single pronoun “it”/”she”. This means that for syntactic purposes even though the NP is very long, it occupies only one – a single – syntactic position.

Ex. The big fat white cat with a spotted tail and a funny pink nose runs = She runs

→ verb phrases (VPs) are constituents as well. Interestingly verbs that take direct objects (transitive verbs) form a constituent with the object, but not with the subject:

Ex. John sees the big fat white cat that runs around and Bill does too. / so does Bill
Does too/ so does = sees the big fat cat that runs around

→ we can replace the entire VP with a VP-“pronoun” such as “Does too” which replaces not just the verb but V+Object. There is no such pronoun that would replace V+Subject even though it is conceivable in theory: * *John sees the fat cat and so does the dog* =/= *John sees the dog as well*

→ In addition, constituents don’t like to be broken up. Consider the following:

John saw the fat cat and the skinny cat

Who did John see?

**Who did John see and?*

John saw the fat cat with the skinny cat

Who did John see the fat cat with?

→ now to see that constituents are hierarchically structured, consider the following NPs

Fat cats and dogs

→ what are the two possible readings?

→ knowing what we know from morphology and ambiguous words, how do we represent the above ambiguity via tree diagrams?

[[Fat cats] and dogs] vs. [fat [cats and dogs]

Fat cats and dogs

→ more will be said about constituents and the tests we have to determine them. For now we can explain the above effect as follows: the verb and the object belong structurally “closer” together than the verb and the subject

4. Some (very) brief remarks on the evolution of syntactic theory

- **the science of linguistics as we know it today developed in the late fifties. Its development was crucially instigated by Chomsky’s groundbreaking review of B.F. Skinner’s *Verbal Behavior* in 1957. Skinner was a behaviorist psychologist in the 50’s who was very influential in psychology. However, after Chomsky’s devastating review of his book, behaviourism became falling into disfavor. Namely, Chomsky argued that the behaviorist model of language and language acquisition which is essentially based on habit-formation and stimulus-response mechanisms is untenable. Language is a computational, abstract, combinatorial system that relies on generalization and rule formation and extends far beyond what mere analogy formation could ever capture.**

– transformational grammar or standard theory (Chomsky 1965): a language is a lexicon + a set of phrase structure rules that tell us how to put words together into sentences + A set of transformation operations that tell us how to move constituents to create question and passive sentences from the underlying deep structure;

- In the 70’s and later in the 80’s The GB theory replaced ST with some improvements and theoretical modification. Only a single phrase-structure schema- the X’ phrase structure; reduce transformation operations into one – move alpha
- In the 90’s the theory evolved into the Principles and Parameters (languages vary along some fixed set of parameters and are all governed by principles that are not variable) and then later into Minimalism, which is now the current syntactic framework. We will mostly deal with the Principles and Parameters framework, though Minimalism will figure a bit in our discussion

5. Overview of the topics in the course

→ Lexical vs. Functional Categories, Hierarchy, Constituency

Rules and trees; The beginnings;
Towards and X-bar schemata
Phrases: NP, VP, AP

- Constituents, c-command, and dominance relations
Recursion and ambiguity
- Theta-theory and the Theta-Criterion
Verbs and their arguments
Theta-roles and linking;
- Case Theory: an Introduction
Case and agreement: from GB to Minimalism
Case and Agreement in Minimalism
- Tense (finiteness) and Case
Arguments and Case: Theta-theory meets Case Theory
Theta-roles, case, and the EPP
- Functional Categories and the IP/TP layer Tense marking,
Do-support, and movement
- A-movement: Passives (what, why, and how); Unaccusatives
- Binding theory
- Infinitives: Raising, Control, ECM. and empty categories
- Constraints on Wh-movement

Week 2 , Lecture 1

0. Let's Review!

→ Words in a sentence are grouped into units called constituents. That is, some words belong closer together than others. We will see later there are different types of tests to determine whether two or more categories form a constituent (substitution is the one we already talked about)

→ when we talk about parts of a sentence we make reference to phrases, not just single categories. Thus, the subject of a sentence is an NP, [noun phrase], not just a noun.

→ phrases have a hierarchical structure. Consider again:

Fat cats and dogs

Let's draw the two structures that represent the ambiguity of this phrase. Why does the existence of this kind of ambiguity suggest that phrase structure is non-linear, i.e. it is hierarchical, not flat?

1. From phrases to sentences

→ Let's build a sentence. Below I give you a formal grammar, i.e a lexicon and a set of rules for putting the words together.

Our lexicon: { john, sees, likes, the, a, fat, man, cat, cats, run, walk, scream, -s, -ed, will, can }

Our rules: S → NP Infl VP
NP → det N;
NP → PN (proper name);
NP → Adj, N;
VP → Vtr NP
VP → Vintr
VP → Vintr Conj Vintr
VP → Vtr Cons V intr
NP → det N

NP → det (Adj) N(sg)
 NP → det (Adj) N(pl)
 NP → (Adj) N(pr)
 N(sg) → {cat, man}
 N(pl) → {cats}
 N(pr) → {John}
 Adj → {fat}
 V(tr) → {like, see}
 V(intr) → {scream, run, walk}
 Det → {a, the}
 Infl → {-ed, -s, will, can}

→ phrase structure rules are sometimes referred to as “re-write” rules. The symbol on the left (e.g. S or VP) is rewritten on the right (NP VP). This is our first step in looking at natural language as a formal language

→ phrase structure rule are intended to generate only the grammatical sentences and none of the ungrammatical ones.

→ let’s test our grammar. Does it generate the sentence *John sees the fat cat*

S					
NP	Infl	VP			
N(pr)		Vtr	NP		
John		sees	Det	Adj	N
			The	fat	cat

What about a sentence *John the fat cat sees* ?

→ some important aspects of phrase structure.

All phrases have heads. English is a left-headed language, but other languages may have the head on the right.

Note that V + NPobj (sees fat cat) forms a constituent – the VP – which the verb and the subject do not

We can test it by replacing the VP with a single element: john sees a fat cat and Bill *does* too = sees a fat cat.

→ a sentence can take another sentence as a complement – **phrase structure rules are recursive!** That is, they include rules of the form:

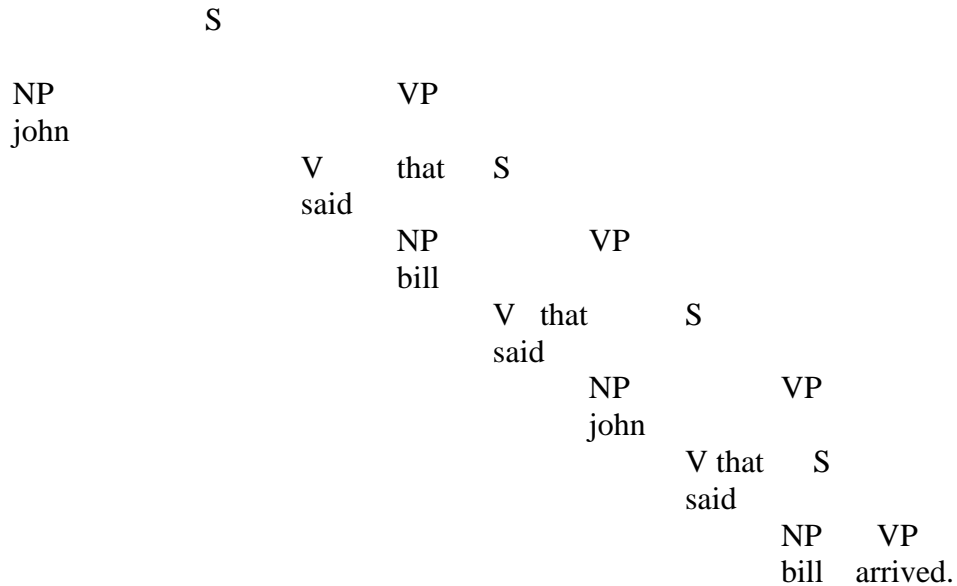
S → NP VP

VP → V COMP(that) S

Or

NP → Det Adj(+) N = the big, fat, scary, hairy,white... cat

→ the two rules above allow us to create an infinite number of new sentences from a finite lexicon:



John said that bill arrived

John said that bill said that john said that bill arrived

John said that bill said that john said that bill said that john said that bill arrived

John said that bill said that john said that bill said that john said that bill said that john said that bill arrived

→ the point is: for any sentence S you can create a sentence of the form V that S. while the resulting sentences would not be interesting, and would be very hard to process, they are possible and they can be generated by our grammar!

2. Sentential Ambiguity

→ phrase structure rules also explain why sentences can be structurally ambiguous:

→ A noun phrase as well as a verb phrase are constituents that have an internal hierarchical structure.

John sees a bug with a telescope

a. *john sees a bug who is holding a telescope*

b. *john sees a bug through a telescope*

→ how do we arrive at these two different readings? We need to add some rules to our grammar:

NP → Det N PP = [a bug with a telescope]

VP → V NP PP = [sees a bug with a telescope]

PP → P NP = [with a telescope]

→ let us now draw the two representations that will account for the ambiguity in the sentence.

→ Again, why does the existence of sentential ambiguity indicate that there is hierarchy in syntax?

3. Constituents and constituency tests – now in more detail

→ below are several tests we can use to determine whether two or more words in the sentence form a constituent. Just because they are next to each other does not mean that they are a constituent!

→ For example, the subject and the verb stand next to each other, yet they do not form a constituent: *John see Bill and so does Mary* ≠ *John sees Mary as well*

Test 1. substitution by a pronoun: only a constituent can be replaced by a pronoun-like element. For example, as we saw before:

- (1) The big fat white cat chases the small cat → She chases the small cat
- (2) The cat hid in the closet => She hid there
- (3) The fat white cat likes the small cat and I do so too.

Test 2. the movement / clefting test: only a constituent can be moved to a different position in the sentence. This is also referred to as “clefting” or “topicalization”. (A word of caution: some constituents may resist being topicalized for independent reasons.)

- (4) In the closet she sat for a long time; Into the woods they came carrying sticks
- (5) *In the she sat for a long time closet
- (6) The fat white cat, I like! (the brown one, I just find cute)
- (7) *The fat I like white cat

Test 3. coordination: only constituents can be conjoined by “and” / “or”, “but”

- (8) The fat cat and the thin cat run around
- (9) The fat cat runs around and makes a mess

- (10) *The fat cat runs around and makes (*makes* needs an object, it is not a constituent without it).

**Test 4. the ellipsis test: only constituents can be omitted in the sentence (elided).
This test is similar to substitution in some respects**

- (11) The fat cat likes to eat too much, but the thin cat does not
Does not = [like to eat too much]
(12) The fat cat can't run fast, but the skinny one can. [run fast]
(13) ?/* The fat cat can't run fast, but the skinny one can run.

IMPORTANT NOTATION: the '?' means the sentence is not fully ungrammatical, but less acceptable. Star '*' means the sentence is impossible

Test 5. Question-answer test: only a constituent can serve as an answer to questions that start with *who, what, where*

- (14) Who does John like? – the fat cat
(15) Who likes John? – the small brown cat
(16) Where is the fat cat? – in the closet
(17) What does the fat cat do? – run around; make a mess

4. More on phrase structure

→ S = IP = TP.

→ 'IP' stands for Inflection Phrase. It can be used equivalently with 'TP'

Domination and c-command

Terminology (from Carnie 2002)

branch- a line connecting two parts of the tree

node – the end of a branch

label – the name given to a node

root node – the node with no line on top of it (give an example)

terminal node – any node with no branch underneath it

non-terminal node – any node with a branch underneath it

dominance – node A dominates node B if and only if A is higher up in the tree than B and if you can trace a line from A to B going only downwards

immediate dominance – Node A immediately dominates B if there is no intervening node C that is dominated by A that dominates B

we can phrase the above relations in terms of dominance:

root node – the node that dominates every other node and is not dominated by anything

terminal node –

non-terminal node – a node that ...

mother – A is a mother of B if and only if A immediately dominates B

daughter – B is the daughter of A if and only if

exhaustive domination – node A exhaustively dominates a set of nodes {B,C... D} provides it immediately dominates all the members of the set and there is no node X immediately dominated by A that is not a member of the set.

(ex. p.71)

precedence – Node A precedes node B iff A is to the left of B and neither A dominates B nor B dominates A and every node dominating A either appears to the left of B or dominates B.

No crossing branches – if one node X precedes another node Y then X and all nodes dominated by X must precede Y and all nodes dominated by Y

On some more modern terminology

merge = join two syntactic objects; merge can only combine two constituents as wholes, it cannot place one constituent into another

projection = features of a daughter node project onto the mother node