4. Semantic Roles and Grammatical Relations

Simple sentences and propositions, Arguments and semantic roles, Grammatical Relations, Adjuncts vs. arguments, Indirect objects and secondary objects.

ENG467: Syntax and Structures of Language

Introduction

- In our earlier lectures, we have seen the Phrase Structure Rules (PSR) and how to draw tress of the phrases or sentences.
- The Phrase Structure Rules are very useful tool for analyzing sentences.
- However, Phrase Structure Rules by themselves cannot provide an adequate account of what speakers say.

- For example, the simple set of Phrase Structure rules are

S → NP V (NP) (PP) (take S to be the root node)
NP → Det (A) N (PP)
PP → P NP
V → *{runs, sings, yawns, likes, gives, pinches}*
A → *{small, big, young, white}*
P → *{to, in, behind, from}*
Det → *{the, a, an}*
NP → *{John, Mary}*
N → *{boy, girl, house, tree, cake, sausage, dog, cat}*

Depending on the types of sentence, the Phrase Structure Rules can be (recap)

a) CP → (C) TP

b) TP → {NP /CP} (T) VP

c) VP → (AdvP+) V (NP) ({NP /CP}) (AdvP+) (PP+) (AdvP+)

d) NP → (D) (AdjP+) N (PP+) (CP)

e) PP → p (NP)

f) AdjP → (AdvP) Adj

g) AdvP → (AdvP) Adv

h) XP → XP conj XP

i) X → X conj X

- But if we simply follow these rules without any semantic and grammatical rule, then the Phrase Structure rules can produce odd sentences like those like in (1) and (2).

(1) a. #The young sausage likes the white dog.

D A N V D A N (S = NP V NP)

b. #Mary sings a white cake.

c. #A small dog gives Mary to the young tree.

(2) a. *John likes.

b. *Mary gives the young boy.

c. *The girl yawns Mary.

- Even though the rules seem consistent with what we know about the grammar of English, we see that they can produce unacceptable sentences.

- These sentences are unacceptable for different reasons.
- The # sign before the sentences in (1) indicates that they are semantically ill-formed, i.e. they cannot be given an acceptable semantic interpretation.
- The * sign before the sentences in (2) indicates that they are ungrammatical.
- In (2a,b) we feel there is a phrase missing, while (2c) seems to contain an extra phrase.

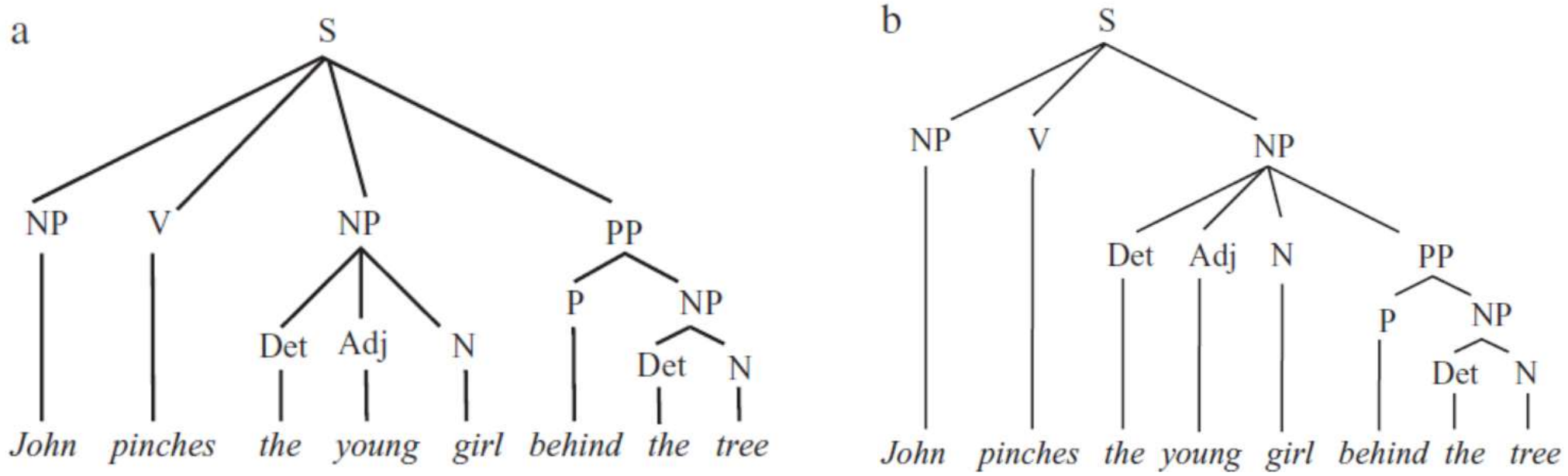
- The important point is that even though the Phrase Structure rules themselves may be correct, this will not necessarily ensure that the output of the rules is grammatical.
- Additional information is needed, **information about the specific words which are used**.
- This kind of information must be stored in the lexicon in some way.

- Another type of complication that can arise is illustrated in (3).

(3) John pinches the young girl behind the tree.

- The PS rules could generate this sentence in two different ways.
- This means that the rules assign more than one possible Phrase Structure for this sentence, as shown by the two tree diagrams in (4).

(4)



- These two structures correspond to two different interpretations of the sentence.

- The sentence in (3) is an example of structural ambiguity; the sentence as a whole is ambiguous because it has two possible Phrase Structures, even though none of the individual words is ambiguous in this context.
- Is it some problem with our PS rules that allows the same sentence to be assigned two different structures in this way? Not at all.
- This is simply a fact about English grammar.
- Sentence (3) really is ambiguous, so it is actually a good thing that our PS rules generate both of the structures shown in (4).

- In providing two analyses for (3), our miniature rule system is successful in the sense that it produces the same results as a native speaker's internal grammar.
- In contrast, when the rules produce sentences like those in (1) and (2) they are clearly failing to model what speakers actually say.

- In order to fix these problems we need to consider the unique properties of individual words, in particular of verbs.
- We will also need to refer to two aspects of sentence structure we have not yet discussed, namely **semantic roles** and **grammatical relations**.
- We will begin this discussion by considering certain aspects of word and sentence meanings.

4.1 Simple sentences and propositions

- We had mentioned that **a sentence must express a complete thought**.
- In other words, **each sentence must express a complete thought**.
- By saying this, we mean to say that we should not write “sentence fragments,” i.e. sentences which are lacking some essential element.

- Now, let's consider the question of what the essential elements of a sentence are and how they fit together.
- But first we might ask ourselves what kind of "complete thought" a sentence may express.
- For the moment we will only consider the simplest, or most basic, kind of sentence, namely DECLARATIVE sentences.

- **Declarative** sentences are typically used to make **statements**.
- A speaker uses a **statement** to assert or deny a PROPOSITION,

  i.e. a claim which can, at least in principle, be determined to be either true or false.

- Other kinds of sentences are interrogative, imperative, and exclamatory.
- Sentences of these kinds cannot be said to be either true or false.

- A **statement**, then, is a sentence which asserts a **proposition**, i.e. a claim that a certain state of affairs does or does not exist.
- Normally **statements** are made *about* something or someone; they claim that a certain state of affairs is true of a given individual or set of individuals (where the individual may be a person, place, thing, etc.).
- They may indicate that a certain individual has a particular property, as in (5a,b),

  or that a certain relationship holds between two or more individuals, as in (5c,d):

(5) a. John is hungry.

b. Mary snores.

c. John loves Mary.

d. Mary is slapping John.

- The element of meaning which identifies the property or relationship is called the PREDICATE: the words *hungry*, *snores*, *loves*, and *is slapping* express the predicates in the above examples.
- The individuals (or participants) of whom the property or relationship is claimed to be true (*John* and *Mary* in these examples) are called ARGUMENTS.
- The grammatical unit which expresses a single predicate and its arguments is called a simple sentence, or CLAUSE.

- As we can already see from example (5), different predicates require different numbers of arguments:
  hungry and *snores* require just one,
  loves and *slapping* require two.
- Some predicates **may not** require any arguments at all.
- For example, in many languages comments about the weather (e.g. *It is raining*, or *It is dark*, or *It is hot*) could be expressed by a single word, a bare predicate with no arguments.
- When a predicate is asserted to be true of the right number of arguments, the result is a well-formed proposition: a **"complete thought."**

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4.2 Arguments and semantic roles

- The properties or relationships described by different predicates may differ in any number of specific details, but many of these differences will have no effect on the grammatical structure of the sentence.

- For example, someone who *slaps* John (as Mary did in (5d)) is performing a different action from someone who *spanks*, *beats*, *whips*, or *punches* him.

(5) a. John is hungry.

b. Mary snores.

c. John loves Mary.

d. Mary is slapping John.

- But, in most contexts, the semantic differences among these verbs are irrelevant to the grammar.

- Simple sentences which express the relationship between John and Mary will have exactly the same grammatical structure no matter which of these verbs is used.

- On the other hand, in some languages sentences like ***Mary loves John*** or ***Mary sees John*** would have different grammatical properties from ***Mary slaps John***.

- It is helpful to classify arguments into broad semantic categories **according to the kind of role they play** in the situations described by their predicates.

- For example in the sentence ***Mary slaps John***, *Mary* plays the role of an AGENT, while *John* plays the role of a PATIENT.

- The same roles are involved if Mary *spanks*, *beats*, *whips*, or *punches* John.

- In the sentence ***Mary sees John***, however, *Mary* plays the role of an EXPERIENCER; *John* is the perceived object, which we will call a STIMULUS.

- The use of a different role label implies a potential difference in grammatical properties.

- How many of these categories are there? How many role labels do we need to use?
- Different linguists have different opinions on this issue, and (unfortunately but not surprisingly) sometimes use the same labels in different ways.

Semantic roles (also known as **thematic roles** or **theta roles):**

- A semantic role is the underlying relationship that a participant(s) or argument(s) has with the main verb in a clause.
- Semantic roles that help us understand the meaning of a sentence.
- Valency is the number of argument(s) that is allowed to accompany a predicate (verb) in a sentence.

1. Verbs with VALENCY ZERO: It's raining
2. Verbs with VALENCY ONE: The **dog** is sleeping
3. Verbs with VALENCY TWO: The **cat** killed the **rat**
4. Verbs with VALENCY THREE: **John** gave the **book** to **Mary**.

Note: Valency zero means verbs that have NO logical arguments, such as a subject or object.

AGENT:

- The causer or initiator or doer of the action or event denoted by the predicate (verb).
- The agent is a participant or argument who (deliberately) carries out or initiates an action (causing something, possibly intentionally) denoted by the verb (usually animate).
- The agent is often considered the doer of the action and is usually found in transitive verbs.
- The argument that by its action affects some other entity.

Eg.

The **boy** kicked the ball

John hit the ball.

The **ball** was hit by John

Tom broke a window

John killed the tiger.

John ate the rice.

ACTOR:

- The role of an argument that performs some actions without affecting any other entity.

Eg.

John left.

John saw Mary.

- The **agent** is the entity that initiates the action or causes it to happen, while the **actor** is the entity that performs the action.
- While these roles are *closely linked*, they are *not the same thing*, and understanding the difference between them can greatly help us understand the meaning of a sentence.

PATIENT:

- The ‘undergoer’ of the action or event denoted by the predicate.
- Entity undergoing the effect of some action.
- an affected participant (animate or inanimate) undergoing the action.

Eg.

The dog ate the **meat**.

John hit the ball.
John loved **Mary**.
John killed the **tiger**.
John ate the **rice**.
Mary fell over.

THEME:

- The entity or participant (animate or inanimate) moved by the action or event denoted by the predicate. (the roles ‘theme’ and ‘patient’ are often related).
- The entity undergoing the effect of some action.

Eg.

Farhan kicked the **ball**.
Peter (exp) loves **Mary**.
Peter (exp) knows **Mary** well.
The **door (T/P)** opened.
The **purse (T/P)** was stolen.
Mary is beautiful.
Mary is happy.

Peter (agent) has broken a vase **(T/P).**

theme because it is affected by the action performed by the subject.

- The argument that is the topic of a predicate that does not express action - a stative predicate.

eg. **John** is a computer expert.

EXPERIENCER:

- The living entity or participant that experiences the action or event denoted by the predicate.
- The participant (animate or inanimate) that experiences some (psychological, emotional, etc.) state.
- A participant who is characterized as aware of something. (Eg. subject of love.

Eg.

Mary smelled the rose.

Peter (exp) loves Mary.

John felt happy.

Peter (exp) knows Mary well.

Peter (exp) has broken his leg (T/P).

RECIPIENT:

- Animate entity which receives or acquires something.
- It is a subtype of GOAL involved in actions describing changes of possession.

Eg.

John (agent) gave the letter (theme) **to Mary** (recipient).

I (recipient) got the money (theme) from my mother (source).

Bill sold the car **to Mary**

BENEFICIARY/BENEFACTIVE:

- The participant (usually animate) who benefits or gains an action denoted by the verb.

Eg.

John (Beneficiary) received a letter (theme) from Mary (source).

GOAL:

- The participant towards which the activity is directed.
- The location or entity in the direction of which something moves.
- Object to which motion proceeds. (Examples: subject of *receive*, *buy*, dative objects of *tell*, *give*).

Eg.

John went **home**.

Mary (agent) wrote a letter (theme) to **John** (goal) the following day.

SOURCE:

- The place from which something is moved as a result of the action.
- Object from which motion proceeds. (Examples: subjects of buy, promise, objects of deprive, free, cure).

Eg.

John (Beneficiary) received a letter (theme) from **Mary** (source).

My **mother** (source) gave me (beneficiary**)** the money (theme).

LOCATION:

- The place in which the action or state denoted by the verb is situated.

Eg.

John saw the fly on the **wall**.

John (theme) is in **Paris**.

INSTRUMENT:

- The medium by which the action or event denoted by the predicate is carried out.

Eg.

Mary (agent) cut the bread (theme) with a **knife** (instrument).

STIMULUS / PERCEPT:

- Object of perception, cognition, or emotion; entity which is seen, heard, known, remembered, loved, hated, etc.
- the entity which is perceived or experienced.

Eg.

Sherlock Holmes heard [**a piercing scream]**.

(experiencer) (**stimulus)**

Mary fears **thunder**

PATH:

- The trajectory or pathway of a motion

Eg.

Water **flows** through the aqueduct

theme (**path)**

The bus **goes** through this route.

ACCOMPANIMENT (OR COMITATIVE):

- The entity which accompanies or is associated with the performance of an action.

Eg.

John went to the market **with Mary**.

Thematic grid, or theta grid

kill: verb

Agent NP	Patient NP
i	j

Eg. John $_{\text{AGENT}}$ killed the bird $_{\text{PATIENT}}$

*John $_{\text{AGENT}}$ killed

put: verb

Agent NP	Theme NP	Location NP
i	j	k

Eg. Fred $_{\text{AGENT}}$ put the glass $_{\text{THEME}}$ on the table $_{\text{LOCATION}}$

* Fred $_{\text{AGENT}}$ put the glass $_{\text{THEME}}$

give: verb

Agent	Theme	Recipient
NP i	NP j	NP k

Eg. Fred $_{\text{AGENT}}$ gave the book $_{\text{THEME}}$ to Mary $_{\text{RECIPIENT}}$

* Fred $_{\text{AGENT}}$ gave the book

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Sentence examples for semantic roles

a. ***John***	***gave***	***Mary***	***a bouquet of roses.***
agent		recipient	theme
b. ***John***	***baked***	***Mary***	***a chocolate cake.***
agent		beneficiary	patient
c. ***John***	***opened***	***the lock***	***with a key.***
agent		patient	instrument
d. ***The key***	***opened***	***the lock.***	
instrument		patient	
e. ***Sherlock Holmes***	***heard***	***a piercing scream.***	
experiencer		stimulus	
f. Little Jack Horner	**sat**	**in the corner.**	
agent/theme		location	
g. Water	**flows**	**through the aqueduct**	
theme	path		
from mountain reservoirs		**to the city of San Francisco.**	
source		goal	

Grammatical Relations

Subjects and objects

- The terms "**subject**" and "**object**" are very familiar, but it may be helpful to clarify what they actually mean.
- We know that the **subject** of a sentence is the *doer of the action*, while the **object** is the *person or thing acted upon by the doer*. This definition seems to work for sentences like (1a,b), but is clearly wrong in examples like (1c,d):

(1) a. Mary slapped John.

b. A dog bit John.

c. John was bitten by a dog.

d. John underwent major heart surgery.

- Phrases like “the doer of the action” or “the person or thing acted upon” identify particular semantic roles, namely **agent** and **patient**.
- But, as we can see in example (1), the *subject is not always an agent*, and *the patient is not always an object*.
- John is “acted upon” in all four of these sentences; but the word **John** appears as the *object* in (1a,b) and the *subject* in (1c,d).

What **grammatical properties do subjects** have that other elements of the sentence do not share.

a. Word order: In a basic English sentence, the *subject normally comes before the verb*, while the object and other parts of the sentence follow the verb.

b. Pronoun forms: The *first and third person pronouns in English appear in a special form when the pronoun is a subject*, as in (2). This form is not used when the pronoun occurs in other positions:

(2) a. **She** loves **me**.
b. **I** love **her**.
c. **We** threw stones at **them**.
d. **They** threw stones at **us**.

c. Agreement with verb: In the simple present tense, an **-s** is added to the verb when a third person subject is singular. However, the number and person of the object or any other element in the sentence have no effect at all on the form of the verb:

(3) a. She angers him.
b. They anger him.
c. She angers them.

Adjuncts vs. Arguments

Arguments

- Arguments (participant role in the sentence) are elements of a clause which have a close semantic relationship to their predicate (verb).
- They are the participants which must be involved because of the very nature of the relation or activity named by the predicate, and without which the sentence cannot express a “complete thought.”
- It is an expression that helps to complete the meaning of a predicate.

Examples:

1-Jill likes **Jack**.

2- **Sam** fried **the meat**.

3- **The old man** helped **the young man**.

- Each of these sentences contains two arguments (in bold),
  the first noun (phrase) being the **subject argument**, and the second the **object argument**.
  Jill, for example, is the **subject argument** of the predicate *likes*, and ***Jack*** is its **object argument**.

- A predicate and it's arguments form a predicate-argument structure.
- Most predicates take **one**, **two** or **three** arguments.

  For example, any event named by the predicate **'eat'** must involve at least **two participants**, **the eater** and **the eaten**.
- This is true even though one or the other of these participants may not be mentioned in a particular description of the event, e.g. *John is still eating* (object omitted), or *The fish was eaten* (subject omitted).

  For this reason we say that the predicate 'eat' takes two arguments.

Adjuncts

- But speakers often need to convey **other elements of meaning as well**, elements which are not closely related to the meaning of the predicate but which are important to help the hearer understand the flow of the story, the time or place of an event, the way in which an action was done, etc.
- Elements of this type are not arguments; they are called adjuncts.
- An **adjunct is an optional**, or structurally dispensable, part of a sentence, clause, or phrase that, if removed or discarded, will not otherwise affect the remainder of the sentence.

Example:

In the sentence *John helped Bill* ***(in Central Park,) (****yesterday), (at 5. pm), (when we were there****)***.

- The phrase ***in Central Park*** is an adjunct.
- In the above sentence if the adjunct *in central park or* ***(****yesterday), (at 5. pm), (when we were there****)***.

  is removed, it does not affect the sentence.

(4) **Arguments**

a. Mary used *my shirt* for a hand towel.

*Mary used for a hand towel.

b. Henry put the money *into his pocket*.

*Henry put the money.

(5) **Adjuncts**

a. George fell down the stairs *last night*.

George fell down the stairs.

b. My daughter *intentionally* swallowed a penny.

My daughter swallowed a penny.

- Time and manner phrases are not, in most cases, related to the inherent meaning of the verb.
- They can be optionally added. So, they are called adjuncts.

a Arguments

John gave a bouquet of roses to Mary.

*John gave a bouquet of roses [to Mary].

b Time adjuncts

George fell down the stairs [last night] [at 3:00 AM] [during the typhoon].

c Manner adjuncts

My daughter [suddenly], [impulsively], [without thinking], swallowed a penny.

Indirect objects and Secondary objects

There is a problem with the way the term “indirect object” is used in traditional grammar.

This problem can be seen in relation to the pair of sentences in (1).

(1) a. John gave Mary his old radio.

b. John gave his old radio to Mary.

In traditional grammar, *Mary* would be called the “indirect object” of both sentences (1a) and (1b).

However, in (1b) *Mary* is preceded by the **preposition to** and occurs at the end of the sentence, while in (1a) *Mary* occurs immediately following the verb **without any preposition**.

These facts suggest that the Grammatical Relation of Mary in (1a) is not the same as in (1b).

- As this example illustrates, the term **"indirect object" in traditional grammar** is used to refer to the semantic role of recipient (or sometimes beneficiary), rather than to a specific Grammatical Relation.
- So, Grammatical Relations must be identified on the basis of grammatical properties, not semantic roles.
- The grammatical properties of Mary in (1a) are essentially the same as those of Bill in (2a); and the grammatical properties of Mary in (1b) are in many ways the same as those of *the attic* in (2b).
- Thus, based on grammatical properties, we would say that Mary bears the OBJ(ect) relation in (1a), but the OBL(ique) relation in (1b).

(2) a. Susan slapped Bill.

b John stored his coin collection in the attic.

- If *Mary* bears the OBJ Relation in (1a), what is the Grammatical Relation of *his old radio* in that sentence?
- We will refer to it as the **secondary object**, using the abbreviation OBJ2.
- The sentences in (3) provide additional examples of this "double object" pattern.
- In these sentences the **verb is followed** by **two NP objects**.

  The first of these bears the OBJ relation; we call it the direct or primary object.

  The second NP is the secondary object (OBJ_2).

(3) a. Mary gave [her son]$_{OBJ}$ [a new bicycle]$_{OBJ2}$.

b. Reluctantly, Henry showed [Susan]$_{OBJ}$ [his manuscript]$_{OBJ2}$.

c. Uncle George told [the children]$_{OBJ}$ [a story]$_{OBJ2}$.

These terms (i.e. SUBJ, OBJ, OBJ2) play an active role in a wide variety of syntactic constructions, while obliques are relatively inert.

References:

Kroeger, P. (2005). *Analysing Grammar: An Introduction*. Cambridge University Press.

Newson, M. et al. (2006). *Basic English Syntax with Exercises*. Bölcsész Konzorcium.

semantic roles:

https://www.academia.edu/33237582/Unit_4_semantic_roles

https://www.slideshare.net/slideshow/semantic-roles-66500612/66500612

http://elies.rediris.es/elies11/cap5111.htm#:~:text=Semantic%20roles%20(also%20known%20as,to%20the%20semantics%2Fsyntax%20interface.