

# Ambiguity in Natural Language: the Case of English and French

Hervé BLANCHON

CLIPS - IMAG

[herve.blanchon@imag.fr](mailto:herve.blanchon@imag.fr)

# Outline

## ❖ Ambiguity in English

- Lexical ambiguity
- Structural ambiguity

## ❖ Ambiguity in French

- Morphological & lexical ambiguity
- Syntactical ambiguity
- Predicative ambiguity
- Sémantical ambiguity
- Pragmatical ambiguity

# Ambiguity in English

## ❖ Lexical Ambiguity

- Polysemy
- Homonymy
- Categorical ambiguity

## ❖ Structural Ambiguity

- Attachment problems
- Gap finding & filling
- Analytical ambiguity

# Lexical ambiguity

- ❖ 3 types of lexical ambiguity
  - Polysemy
    - Several related meanings
  - Homonymy (homographs & homophones)
    - Several meanings with no relationship
  - Categorical ambiguity

# Polysemy

Several related meanings

❖ the verb *open*

- unfolding,
- expanding,
- revealing,
- moving to an open position,
- making openings in

# Homonymy

Several meanings with no relationship

- ❖ Homographs (written)
  - *row* : line of objects, a commotion
- ❖ Homophones (spoken)
  - *four, fore*
- ❖ the word *bark*
  - the noise a dog makes, the stuff on the outside of a tree

# Polysemy + Homonymy

## ❖ the word *right*

- polysemy: senses concerning correctness & righteousness
- homonymy: + senses concerning the right-hand side

## ❖ Linked also with metaphore

[today's metaphore may be tomorrow's polysemy or homonymy]

- a person's mouth and the mouth of a river

# Categorial ambiguity

The syntactic category may vary

- ❖ The word *sink*
  - a noun describing a plumbing fixture
  - a verb meaning become submerged
- ❖ It is mainly a problem of parsing



# Categorial ambiguity

- ❖ Categorial ambiguity is orthogonal to the other types
  - *respect* is categorial and polysemous as its noun and verb meanings are related
  - *sink* is categorial and homonymous as its noun and verb meanings are not related

# Structural ambiguity

## ❖ Types

- Attachment problems
- Gap finding and filling
- Analytical ambiguity

# Attachment problem

- ❖ There is more than one node (constituent) to which a particular syntactic constituent may be attached

# Attachment problem

- ❖ Prepositional phrases may have more than one noun phrase available to attach it to (as well as possibly a verb)

- ❖ Example

The door near the stairs with the “member only” sign

- *The door with the “member only” sign*
- *The stairs with the “member only” sign*

# Attachment problem

- ❖ Relative clauses have similar attachment ambiguity

- ❖ Example

The door near the stairs that had the “Members Only” sign had tempted Nadia.

- *The door with the “member only” sign*
- *The stairs with the “member only” sign*

# Attachment problem

- ❖ A prepositional phrase can also be attached to an adjective phrase

- ❖ Example

He seemed nice to her

- *He seemed to act nicely towards her*

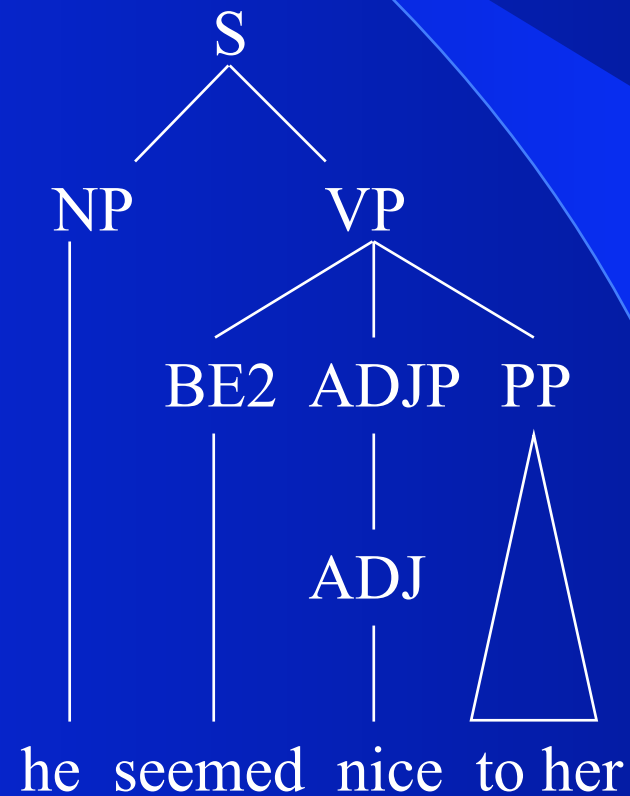
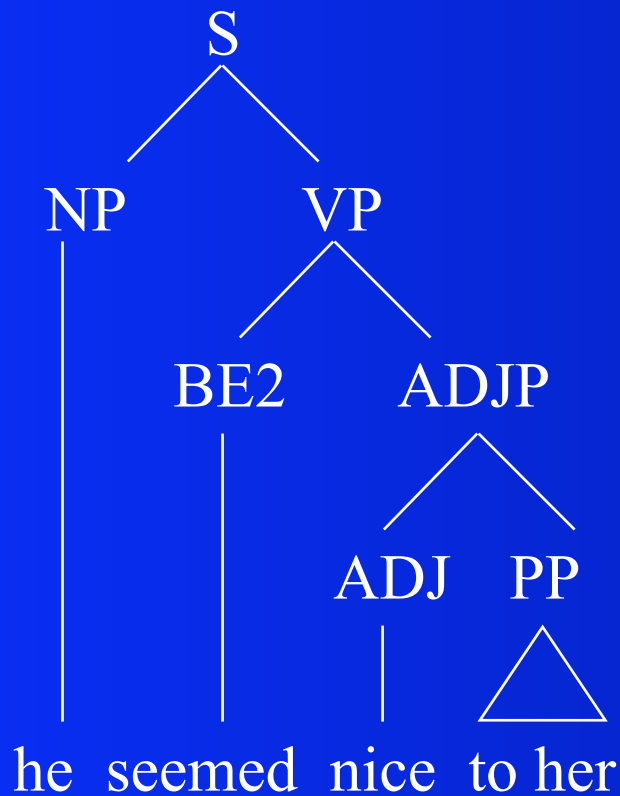
- Attachment to the adjective phrase

- *To her, he seemed to be nice*

- Attachment to the verbal phrase

# Attachment problem

❖ He seemed nice to her



# Attachment problem

- ❖ A sentence contains a subsentence, both may contain place for the attachment of a prepositional phrase or adverb

- ❖ Example

Ross said that Nadia had taken the cleaning out yesterday

- *Yesterday, Ross said that Nadia had taken the cleaning out*
- *Ross said: “Nadia had taken the cleaning out yesterday”*



# Attachment problem

- ❖ An adverbial may modify the sentence verb or the whole sentence

- ❖ Example

Happily, Nadia cleaned up the mess Ross had left

- happily could be attached to the sentence
  - meaning that the event was a fortunate occurrence
- or it could be attached to the Verbal Phrase
  - meaning that Nadia was quite happy to clean up the mess

# Attachment problem

❖ Adverbial placed between two clauses can be attached to the verb of either

❖ Examples

The lady you met now and then came to visit us

- *We were visited by the lady you met now and then*
- *We were visited now and then by the lady you met*

The friends you praise sometimes deserve it

- *Sometimes, the friend you praise deserve it*
- *The friends you sometimes praise deserve it*

# Gap finding and filling

- ❖ A moved constituent has to be returned to its original position, and there is more than one place it might go

- ❖ Example:

Those are the boys that the police debated  $\Delta$  about fighting  $\Delta$ .

- *The police debated with the boys on the topic of fighting*
- *The police debated (among themselves) about fighting the boys*

# Analytical ambiguity

- ❖ The nature of the constituent is itself in doubt when there is more than one possible analysis for it
- ❖ Idea (the clause [that they couldn't hear])  
The tourists objected to the guide that they couldn't hear
  - a relative clause modifying “the guide”  
The tourists signaled to the guide that they couldn't hear
  - a sentential complement modifying “signal”

# Analytical ambiguity

- ❖ Particle detection

- Is a preposition functioning as a verb or as a part of a prepositional phrase? Related with phrasal verbs

- ❖ Examples

A good pharmacist dispenses with accuracy

- *the way a good pharmacist dispenses is with accuracy*
- *what a good pharmacist dispenses with is accuracy*

Ross looked up the number

Ross looked up the elevator shaft

# Analytical ambiguity

- ❖ Prepositional phrase or adjectival phrase?
  - Distinguishing a simple prepositional phrase from one that is actually an adjective phrase left after raising and *to-be*-deletion have been applied
- ❖ 2 contexts for
  - “I want the music box on the table”

# Analytical ambiguity

## ❖ Example

“You can have the music box that’s in the closet or the one that’s on the table” said Ross. “I want the music box on the table” said Nadia.

– *I want the music box that is on the table*

“I put the music box on the mantelpiece. is that okay?” asked Ross. “No,” said Nadia, “I want the music box on the table.”

– *I want the music box to be on the table*

# Analytical ambiguity

- ❖ Present participle or adjective?

- ❖ Example

Ross and Nadia are singing madrigals

Pen and pencils are writing implements

- ❖ Ambiguity

They are cooking apples

- They are preparing apples as cook

- What are they doing?

- Those apples are used for cooking

- What are those apples for?



# Analytical ambiguity

- ❖ Present participle or noun?

- Distinguishing between a present participle or a noun

- ❖ Example

We discussed running

- *We discussed the sport of running*
- *We discussed the possibility of our running*

# Analytical ambiguity

- ❖ Where does an NP ends?
  - Two contiguous noun phrases can appear to be a single one

- ❖ Example

Ross gave the dog some water, and Nadia gave the cat food

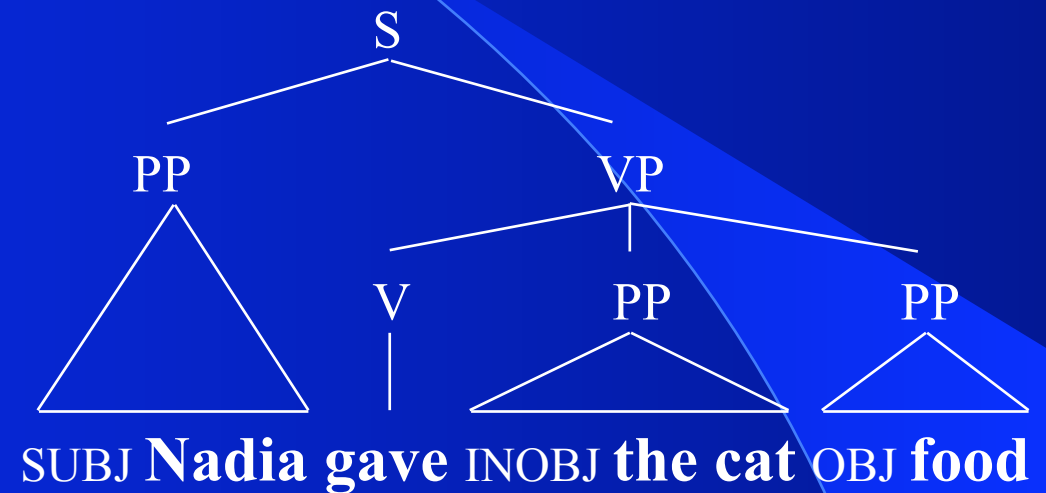
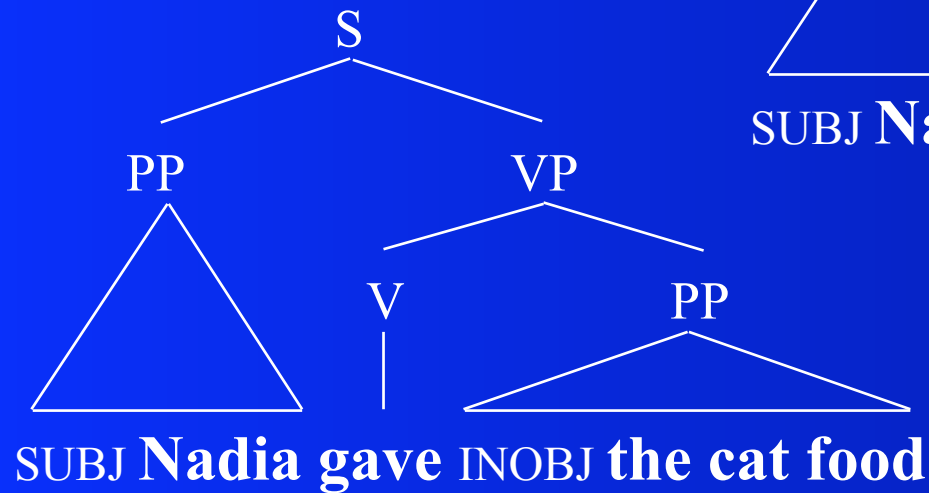
- *The cat was given some food*

Ross gave the shampoo, and Nadia gave the cat food

- *Cat food was given by Nadia*

# Analytical ambiguity

## ❖ Parse trees



# Analytical ambiguity

- ❖ Reduced relative clause or VP?

- i.e. Garden path sentences

- ❖ Example

The horse raced past the barn fell

- The horse that was raced past the barn fell

# Analytical ambiguity

- ❖ Noun group structure?
  - Determining the structure of a complex noun group, including modifier scope
- ❖ Example

airport long term car park courtesy vehicle  
pickup point

# Analytical ambiguity

❖ [   
 [   
 [airport   
 [[long term]   
 [car park]]   
 ]   
 [courtesy vehicle]   
 ]   
 [pickup point]   
]

# Analytical ambiguity

- ❖ What is the subject of the supplementive?
  - Participles and adjectivals at the end of a clause. A subject and an object can be the subject of a supplementative.

- ❖ Example

We meet him leaving the room

- *we were leaving the room* vs *he was leaving the room*

I saw him going home

- *I was going home* vs *he was going home*

# Analytical ambiguity

- ❖ Suppletive, restrictive relative or verb complement?
  - the participle, instead of being a suppletive, could be attached to the object NP either as a reduced restrictive relative clause or as a verb complement
- ❖ Example

The manager approached the boy smoking a cigar

  - *the manager is smoking* (suppletive)
  - *the boy is smoking* (relative clause)



# Analytical ambiguity

The manager caught the boy smoking a cigar

- *the manager caught the boy in the act of smoking a cigar* (verb complement)
- *the manager caught the boy who was smoking a cigar (but the boy smoking a pipe escaped)* (relative clause)

# Analytical ambiguity

- ❖ Cleft or not?

- Apparent cleft sentences may also admit a non-cleft subject-verb-object analysis

- ❖ Example

It frightened the child that Ross wanted to visit the lab.

- *The fact that Ross wanted to visit the lab. frightened the child* (the cleft analysis)
- *The child, whom Ross wanted to visit the lab., was frightened by X* (where X is some entity in the discourse focus)

# Analytical ambiguity

## ❖ Question or command?

- In a few cases, a past participle can look like a grapped VP, rendering a question indistinguishable, but for punctuation or intonation, from a command

## ❖ Example

Have the crystals dissolved?

- Question

Have the crystals dissolved.

- Command

# Analytical ambiguity

- ❖ How is the predicate formed?

- There are at least 4 different structures that can underlies sentences of the form

NP be ADJ to V

- ❖ Examples

Ross is eager to please

- *Ross is eager that he pleased someone* ; Ross be [eager [Ross please  $\emptyset$ ]]

Ross is ideal to please

- *Ross is ideal for someone to please him* ; Ross be [ideal [ $\emptyset$  please Ross]] ;

# Analytical ambiguity

## ❖ Examples

Ross is easy to please

- *pleasing Ross is easy* ; [Ø please Ross] be easy ;

Ross is certain to please

- *that Ross will please someone is certain* ; [Ross please Ø ] be certain ;

## ❖ Example of the ambiguity

The chicken is ready to eat

- *the chicken will eat*
- *the chicken will be eaten*

# Ambiguity in French

- ❖ Morphological & lexical ambiguity
- ❖ Syntactical ambiguity
- ❖ Predicative ambiguity
- ❖ Semantical ambiguity
- ❖ Pragmatical ambiguity

# Morphological & Lexical Ambiguity

- ❖ word boundaries
- ❖ syntactic class
- ❖ inflection
- ❖ homonymy
- ❖ polysemy

# Word boundaries

- ❖ Spoken, homophonous sequences

- ❖ Exemple

Passe moi *l'affiche* / la fiche

– give me *the poster* / the card

Ils étaient *très amis* / treize amis

– they were *very good friends* / thirteen friends

- ❖ Written, no problem



# Syntactic class

- ❖ Without context

bois: wood [noun] or (I) drink [verb]

- ❖ Interaction of possible syntactic classes

Le pilote **ferme** [verb, adj.] *la* porte [noun, verb]

- The pilote **closes** *the* door
- The pilote **steady** carries *her*

- ❖ No interaction

Devant cette somme il hésite

- Owing this sum he hesitates
- In front of (concdidering) this sum he hesitates

# Inflexion

❖ spoken, same sound for

Il marche / Ils marchent

– He walk / They walk

J'ai vu son amie / J'ai vu son ami

– I saw his(her) femal friend / I saw his(her) male friend

# Homonymy

- ❖ Homophon but not homograph (spoken)

Montrer moi ce sot / seau / sceau / saut

– let me see this idiot / bucket / seal (stamp) / jump

- ❖ Homograph but not homophon (written)

Elle a perdu ses fils

– She has lost her sons / threads, cottons

- ❖ Homograph and homophon

Je suis un imbécile

– I am following a fool

– I am a fool

# Polysemy

## ❖ Non-grammatical words

Dans le milieu des conservateurs cette mesure à été rejetée

- In the conservatives/curators (preservatives) circle this measure was rejected

Also with verbs

## ❖ Grammatical words

Vous devez le savoir

- You may know this
- You must know this

# Syntactical Ambiguity

- ❖ Define the scope of sentences and clauses
- ❖ Define phrases and organize them into a hierarchy
- ❖ Recognize the nature of the clauses
- ❖ Recognize the function of the phrases

# Scope of sentences & clauses

## ❖ Spoken

L'instituteur dit : “le maire est un âne”

– the teacher said : “the mayor is a dimwit (donkey)”

“L'instituteur”, dit le maire, “est un âne”

– “the teacher”, said the mayor, “is a dimwit (donkey)”

## ❖ Written (telegraphic style)

Confirme achat chiens *envoyez-en deux mille baisers*

– confirm dogs purchase *send two thousand kisses*

# Phrases & their organisation

## ❖ Prepositional phrase attachment

- Group 1: attachment points with  $\neq$  types
  - V N PP, V A PP, N A PP, V PP PP
- Group 2: attachment points are verbs
  - V V PP, V PP V, V et V PP
- Group 3: attachment points are nominals
  - N PP PP, N et N PP
- Group 4: attachment points are prepositionals
  - N P N P N et P N

# PP attachment group 1

## ❖ V N PP

Paul regarde le toit *de* la tour

- Paul is looking at the roof *of* the tower
- Paul is looking at the roof *from* the tower

## ❖ V A PP

Ils sont repartis satisfaits *de* la mairie

- They left satisfied *with* the town hall
  - Satisfied with the town hall, they left
- They left satisfied *from* the town hall
  - From the town hall, they left satisfied



# PP attachment group 2

## ❖ V V PP

Il a dit qu'il donnerait son avis par fax

– He said he will give his opinion *by* fax

=> say by fax vs. give by fax

## ❖ V PP V

Je voudrais *bien comprendre*

– I would like *to understand really*

– I really would like *to understand*

# PP attachment group 3

## ❖ N PP PP

Il a fondé une *école de commerce de jeune filles*

- He founded a *business school* for girls
- He founded a girl's trade school

## ❖ N et N PP

*Les voisins et les parents de Paul sont venus*

- The neighbours and Paul's parents came
- Paul's neighbours and Paul's parents came

# PP attachment group 4

❖ NP NP N et P N

J'ai visité la maison du père de Paul et de Marie

- I visited the house that is the one of the *father of both Paul and Marie*
- I visited the house that is the one of the father of Paul and the one of Marie

# Phrases & their organisation

## ❖ Adjectival phrase attachment

- Group 1: attachment to N or V

  - V N A

- Group 2: attachment points are nomials

  - N P N A/Rel ; N et N A/Rel ; N, A, N ; N P N A et A

# AP attachment group 1

## ❖ V N A

Ce produit vous aide à conserver votre teint  
frais

- This product help you to keep your healthy glow
- This product help you keep fresh your *complexion*

J'aime boire mon *café* chaud

- I enjoy drinking my *coffee* hot
- I enjoy drinking my hot *coffee*

# AP attachment group 2

## ❖ N P N A/Rel

C'est un *marchand* de drap anglais

- This is a trader of English sheet
- This is an *English trader* of sheet

## ❖ N et N A/Rel

J'ai croisé un homme et un enfant *très heureux*

- I met a man and a very happy child
- I met a very happy man and a very happy child

# NP attachment

- ❖ N N et N V

Le président de la République, M. Chirac, et le premier ministre se sont rencontrés

- President of the Republic, M. Chirac, and the prime minister met (2 or 3 people)

- ❖ V et V N

- ❖ V N qui V N et N

Au zoo il y a un lion qui terrifie les badauds et de pauvres petites antilopes

- passerbies are terrified and antelops (are terrified)

# Nature of the clauses

## ❖ Relative / Indirecte interrogative

J'ai demandé au monsieur qui habitait là

– I asked to the man who was living here

- I asked who was living here to the man
- I asked to (the man who was living here)

## ❖ Adverbial / Indirecte interrogative

Ecrivez-moi si vous comptez venir me voir

– Write me if you intend to visit me

- If you intend to visit me, write me
- Write me to tell me if you intend to visit me



# Function of the phrases

## ❖ Ambiguous functional marker (word)

La circulation à été déviée par la gendarmerie

- The traffic was diverted by the gendarmerie
- The traffic was diverted near by the gendarmerie

Il faut limiter la circulation au centre ville

## ❖ Ambiguous places

Quel auteur cite ce conférencier?

- Which author does this speaker quote?
- Which speaker does this author quote?

# Predicative Ambiguity

- ❖ Identify the predicate and its arguments
- ❖ Restore the arguments
- ❖ Restore the predications
- ❖ Recognize the adverbial clauses role

# The predicate & its arguments

## ❖ Identification of the predicate

C'est elle qui a *fait la cuisine*

- That's her who *cooked*
- That's her who *made (built) the cuisine*

## ❖ Identification of the arguments

Cette construction me *déplaît*

- I dislike this construction
  - I dislike what is being built (the result)
  - I dislike the fact that something is being built (the process)

# Arguments restoration

## ❖ With infinitive

Pierre a fait porter des chocolats à Lucie

- Pierre is having chocolates sent to Lucie
- Pierre is having chocolates sent by Lucie

## ❖ With nominalization

Le choix du *médecin* peu se discuter

- The choice the doctor made can be questioned
- The choosed *doctor can be questioned*

# Predications restoration

## ❖ Elliptical constructions

Georges admire Marie autant que Jean

– Georges admires Marie as much as Jean

- Georges admires Marie as much as Georges admires Jean

- Georges admires Marie as much as Jean admires Marie

## ❖ “Reduced” constructions

Le magistrat juge les *enfants* coupables

– The magistrate found the children guilty

– The magistrate judged the *guilty children*

# Adverbial clauses role

## ❖ Interrogative

Quand as-tu affirmé que Paul était mort?



- (When did you say) that Paul was dead?
- You said that (Paul was dead when)?

## ❖ Cleft structures

C'est à Marie que tu as dit que Jean téléphonerà

- You said to Marie that Jean was going to call
- You said that Jean was going to call Marie

# Semantical Ambiguity

- ❖ Calculate the hierarchy of the operators
- ❖ Calculate the process and actor types
- ❖ Calculate the thematic of the utterance

# Hyerarchy of the operators

## ❖ Interaction with negation

Toutes les victimes n'*avaient* pas *été vaccinées*

- Not all the victims *had get vaccinated*
- None of the victims *had get vaccinated*

## ❖ Interaction with restriction and question

Il n'a connu qu'une série d'échecs dans sa vie

- He new only one series of failures in his life
- He new nothing else than a series of failures in his life



# Hierarchy of the operators

## ❖ Interaction with quantification

Tout le monde déteste son frère

- Every one hates his own brother
- Every one hates the brother of X

# Process & actor types

Ce texte ne pose aucun *problème*

- This text is not *problematic* (reading, understanding)
- This text asks no *question*

Il s'est fait renvoyé par *son patron*

- He made *his boss* fire him
- He was *fired* by *his boss* against his wishes

Pierre et Jean se battent tout le temps

- Pierre and Jean fight all the time against each other
- Pierre and Jean fight all the time together against others

# Theme of the utterance

C'est *le voisin* qui fait du bruit

- The one making noise is *the neighbour* (bruit)
- This one is *the neighbour* making noise (voisin)

# Pragmatic Ambiguity

- ❖ Calculate the referential values
  - of the process
  - of the actors
- ❖ Calculate the interlocutive values

# Referential values of the process

Paul va à l'école

- Paul is (currently) going to school
- Paul is sent to school

Ça ne se dit pas

- One must not say that (obligation)
- One never say that (observation)

# Referential values of the actors

Marie veut épouser un milliardaire

- Marie wants to marry a multimillionaire
  - There is a multimillionaire that she wants to marry (specific)
  - She wants to become the wife of a multimillionaire (non- specific)

Paul à confiance en lui

- Paul trust him (X)
- Paul trust himself

# Interlocutive values

Jean veut boire cette liqueur empoisonnée

- Jean wants to drink this liqueur without knowing that it is poisoned
- Jean wants to drink this liqueur knowing that it is poisoned to commit suicide

As-tu un ticket de métro ?

- Do you have an subway ticket?
  - I want to know if you have or not an subway ticket.  
[If you don't have one you should buy one]
  - I ask you to give me an subway ticket.  
[Because I don't have any]

# Sources

## ❖ For English

- Hirst, G. (1987) *Semantic interpretation and the resolution of ambiguity*. Cambridge University Press, 263p.

## ❖ For French

- Fuchs, C. (1996) *Les ambiguïtés du français*, Ophrys, 184p.

## ❖ For LIDIA and interactive disambiguation

- Blanchon, H. (1997) *Interactive Disambguation of Natural Language Input: a Methodology and Two Implementations for French and English*. Proc. IJCAI-97. Nagoya, Japan. August 23-29, 1997. vol. 2/2 : pp. 1042-1047.
- Blanchon, H. & Fais, L. (1997) *Asking Users About What They Mean: Two Experiments & Results*. Proc. HCI'97. San Francisco, California. August 24-29, 1997. vol. 2/2 : pp. 609-912.