

HG2002 Semantics and Pragmatics

Context and Inference

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Lecture 7

Location:

<https://bond-lab.github.io/Semantics-and-Pragmatics/>

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Overview

- Revision: Participants
 - Thematic Roles
 - Classifiers and Noun Classes
- Reference and Context
- Knowledge as Context
- Information Structure
- Inference
- Conversational Implicature
- Next Lecture: Chapter 8: Speech as Action

Revision: Participants

Thematic Roles

- Thematic roles are parts of the sentence that correspond to the participants in the situation described
- They classify relations between entities in a situation
- Roles link different alternations
 - (1) *Kim patted Sandy*
 - (2) *Sandy was patted by Kim*

Thematic Roles

- **AGENT** (takes *deliberately, on purpose, what did X do?*)
 - Volitional, typically animate
 - Typically SUBJECT
 - *Kim kicked Sandy*

- **PATIENT** (*What happened to X?*)
 - Undergoes change in state usually, both animate and inanimate
 - Typically OBJECT
 - *Kim kicked Sandy*

- **THEME**
 - Moved, location or state is described
 - Typically OBJECT
 - *He put the book on the shelf*

➤ EXPERIENCER

- Non-volitional, displaying awareness of action, state
- Typically SUBJECT
- *He heard thunder*

➤ BENEFICIARY

- for whose benefit the action was performed
- Typically indexed by "for" PP and "to" PP in English
- *They gave me a present*
- *They gave a present to me*
- *They made a present for me*

➤ LOCATION

- Place
- Typically indexed by locative PPs in English
- *I live in Jurong*

➤ GOAL

- towards which something moves (lit or metaphor)
- Typically indexed by "to" PP in English
- *She handed her form to him, She handed him her form*

➤ SOURCE

- from which something moves or originates
- Typically indexed by "from" PP in English
- *We gleaned this from the Internet*

➤ **INSTRUMENT/MANNER**

- Means by which action is performed
- Can be indexed by "with" PP in English
- *I ate breakfast with chopsticks*

➤ **STIMULUS**

- Usually used in connection with EXPERIENCER
- *The lightning scared him*

Theta-Grid

- Verbs can be described with their **valence** (**theta-grid**, **sub-categorization**)
 - **give**: V ⟨AGENT, THEME, BENEFICIARY⟩
 - underlined role maps to subject
 - order of roles allows prediction of grammatical function
- This is used to link the meaning with the realization
- Distinguish (with fuzzy boundaries) between
 - **participant roles**: depend on the verb — in the grid (**arguments**)
obligatory; part of meaning; idiosyncratic syntax;
participate in alternations
 - **non-participant roles**: combine freely — not in the grid (**adjuncts**)

➤ Theta Roles are semantic NOT syntactic

Linking Grammatical Relations and Thematic Roles

- Thematic roles typically map onto grammatical functions systematically
 - AGENT is usually the subject
 - PATIENT is usually the object
- It is possible to predict how arguments are linked to the verb from their thematic roles, and hence their grammatical functions.
- **Thematic Hierarchy** The higher you are in the hierarchy the more likely to be subject (then object, then indirect, then argument PP, then adjunct PP)

$$\text{AGENT} > \left\{ \begin{array}{c} \text{RECIPIENT} \\ \text{BENEFICIARY} \end{array} \right\} > \left\{ \begin{array}{c} \text{THEME} \\ \text{PATIENT} \end{array} \right\} > \text{INSTRUMENT} > \text{LOCATION}$$

- Generally true across languages

Dowty's Proto-Arguments

- The **Agent** Proto-Role (Dowty 1991)
 - Volitional; Sentient (and/or perceptive)
 - Causes event or change of state; Movement
- The **Patient** Proto-Role
 - Change of state; Incremental theme (i.e. determines aspect)
 - Causally affected by event
 - Stationary (relative to movement of proto-agent).
- when a verb takes a subject and an object
 - the argument with the greatest number of Proto-Agent properties will be the one selected as SUBJECT
 - the one with the greatest no. of Proto-Patient properties will be selected as OBJECT

Alternations

- Many verbs can have multiple theta-grids
 - (3) a. *Kim broke the window with the hammer*
b. *The hammer broke the window*
c. *The window broke*
 - (4) a. *I cut the cake with the knife*
b. *This cake cuts easily*
- The relations between them are called **alternations**
- English Verb Classes and Alternation (Levin 1993)

Voice

➤ Another way to change the number of arguments is **voice**: passive, middle

(5) Transitive Passive

- a. *Kim ate Sandy*
- b. *Sandy was eaten by Kim*

(6) Ditransitive Passive

- a. *A gave B C; A gave C to B*
- b. *C was given to B by A; B was given C by A*

(7) Transitive Middle (or just causative/inchoative)

- a. *They open the gate very quietly*
- b. *The gate opens very quietly*

(8) Intransitive Middle

- a. *The knife cuts the cake well*
- b. *The knife cuts well*

Classifiers and Noun Classes

- Many languages include special ways to classify nouns
 - Noun Classifiers (Bantu, Yidi , ...)
 - Numeral Classifiers (Chinese, Malay, Japanese, ...)
 - * English group nouns: *flock, mob, group, pack, ...*
 - Gender (German, Spanish, ...)
- Classifiers can be marked on the noun, on the verb, on a separate word (a classifier) or on all words

What gets Classified?

- **Taxonomic Class:** Human, Animal, Tree, Female
- **Function:** piercing, cutting, writing instrument, for eating/drinking
- **Shape:** long, flat, round (1D, 2D, 3D)
- **Consistency:** rigid, flexible
- **Size:** grab in fingers, hand, < human, > human
- **Location:** towns
- **Arrangement:** row, coil, heap
- **Quanta:** head, pack, flock

Noun Classes vs Classifiers

	Noun classes	Classifiers
Size	Small Finite Set	Large Number (low hundreds)
Realization	Closed Grammatical System	Separate Morpheme
Marking	Also outside the noun word	Only in the noun phrase

- Gender (noun class in e.g., German)
 - typically 3 (Masculine, Feminine, Neuter)
 - marked as inflection
 - marked on determiners, adjective and nouns
- Numeral Classifiers (in e.g., Japanese)
 - typically 30-80 in common use, hundreds exist
 - separate classifier phrase (numeral/interrogative+classifier)
 - classifier phrase modifies noun

Summary

- Semantics motivates syntax
 - But most generalizations fail to cover all examples
- Argument structure and thematic roles link predicates and their arguments
 - Remember the basic roles and examples
- Dowty's Argument Selection Principle
prototypical agents and patients are subjects and objects
- Problems with thematic roles
- Noun Classes and Classifiers

Context and Inference

Overview

- Reference and Context
- Knowledge as Context
- Information Structure
- Inference
- Conversational Implicature

Reference and Context

Context-dependence is everywhere

- For example, in a restaurant

(9) *Have you got the new C.J. Cherryh?* “book by ~”

- In a snooker (pool) game

(10) *I have two reds left* “red balls”

- **metonymy**: substituting the name of an attribute or feature for the name of the thing itself

(11) *The ham sandwich is at table three* “person who ordered ~”

(12) *I spent all morning with the suits* “person who wears ~”

- **synecdoche**: substituting the name of a part for the name of a thing (a kind of metonymy)

(13) *We need some more willing hands* “person with ~”

Knowledge as Context

Generalize to all knowledge

- Knowledge to interpret utterances can come from multiple sources
 - 1. The physical context of the utterance
Deixis
 - 2. What has already been said
Discourse
 - 3. Background and common knowledge
World knowledge

Fragments

➤ In a dialogue, we often only add new knowledge

- (14) a. *Who moved these chairs?*
b. *Sandy (did) [move these chairs]*
- (15) a. *Where are you going?*
b. *[I am going] (to) Tokyo*

➤ Normally English requires a complete sentence,

... but here a **fragment** is OK

Discourse Topic

- It is much easier to understand an utterance if you know what it is about (Bransford and Johnson, 1972)
- Giving the same text different titles changes your interpretation
- Giving a discourse topic aids in understanding and retention

Background Knowledge

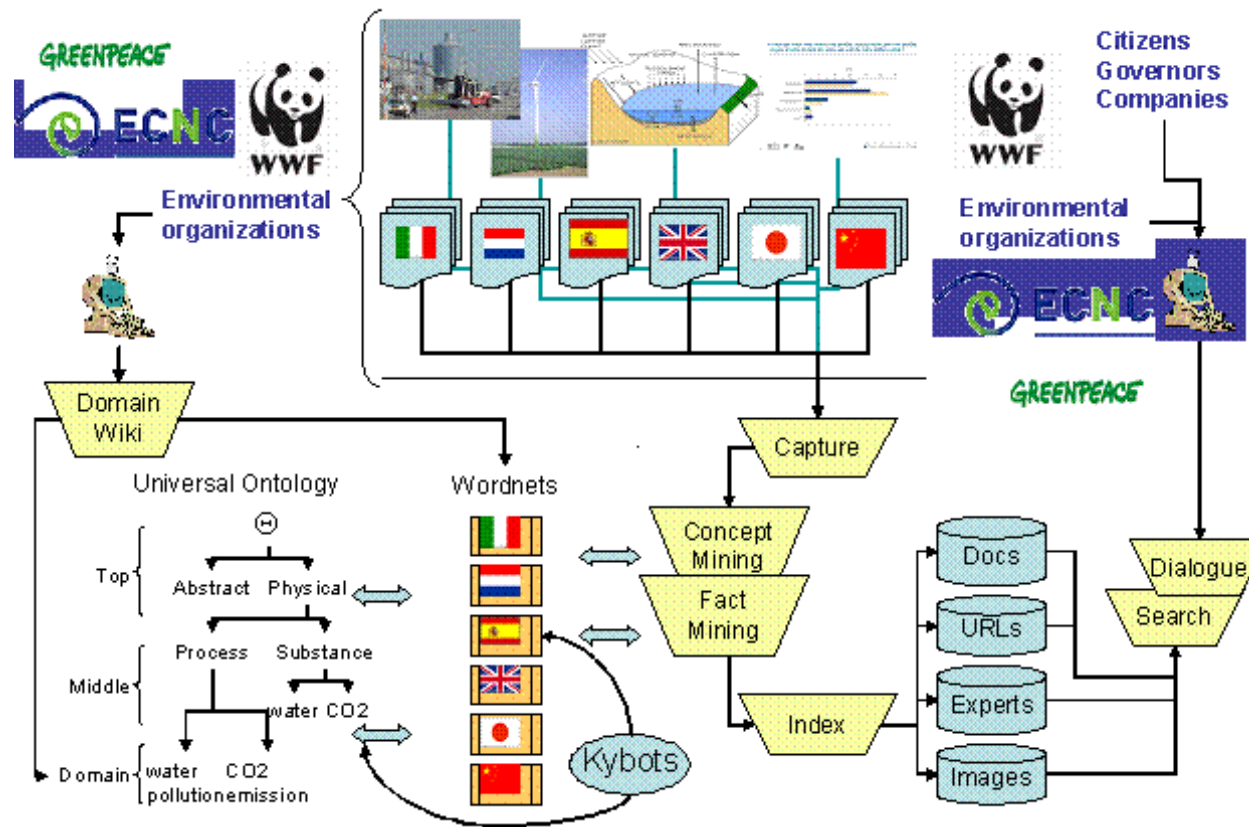
What knowledge do we need to interpret the following?

- (16) a. *I'm hungry*
b. *I'll lend you some money*
- (17) a. *Shall we get some icecream?*
b. *I'm on a diet*
- (18) a. *Shall we lunch next week?*
b. *It's Ramadan*
- (19) a. *Kim chased the dog with a stick*
b. *Kim chased the dog with a bone*
c. *Kim chased the dog with a broom*
d. *Kim chased the dog with a white tail*
e. *Kim chased the dog with a wound*

Formalizing Knowledge for Computers

- There is a lot of work on making knowledge available to computers so that they can interpret text
 - Formal ontologies (knowledge-based)
 - * Scripts
 - * Wordnets
 - * CYC
 - Example-based (compare to existing examples)
collect many fragments of existing knowledge

Knowledge Yielding Ontologies for Transition-based Orgs



What can computers do?

Q *Do birds migrate through Turkey?*

A Yes. *The crane (\subset bird) flies across Ankara (\subset_{in} Turkey).*

$\text{fly}_1(e_1, \text{crane}_5(x_1)), \text{across}(e_2, e_1, x_2), \text{Ankara}(x_2).$

- *through* and *across* are both *path* roles.
- *fly* and *migrate* are both *motion* verbs.
- Ankara is in Turkey

➤ Why do this?

- Local environmental knowledge is often not translated into many languages
- Facts may only be recorded in a few documents

Information Structure

Information status

➤ Many languages signal whether information is **new** or **given**

➤ We can signal this in many ways:

(20) *I couldn't sleep last night*

(21) a. A dog next door kept me awake

b. This dog next door kept me awake

c. The dog next door kept me awake

d. That dog next door kept me awake

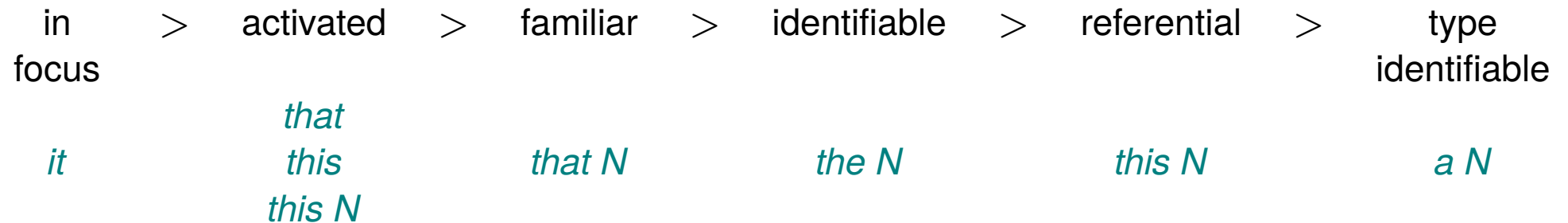
e. This kept me awake

f. It kept me awake

Givenness Hierarchy

Given

New



- The more known and salient something is, the more it is **given** information

Focus

- We can also mark information structure with intonation

(22) *HENRY cleaned the kitchen*

- a. **Given:** someone cleaned the kitchen
- b. **New:** it was Henry

cleft

(23) *Henry cleaned THE KITCHEN*

- a. **Given:** Henry cleaned something
- b. **New:** it was the kitchen

(24) *Henry CLEANED the kitchen*

- a. **Given:** Henry did something to the kitchen
- b. **New:** he cleaned it

- The prominent part is the **focus**

Topic

- Some languages have a special [sentence] topic

(25) *nihon-wa josei-wa heikin jumyou-ga*
japan-TOP women-TOP average life expectancy-NOM
nagai
long

As for Japan, as for women, the average life expectancy is long.

The average life expectancy of women in Japan is long.

(26) *Nàge shù yèzi dà*
that tree leaves big

As for that tree, the leaves are big

That tree has big leaves. / That tree's leaves are big.

- This differs a little from a subject
(typically you can have none or multiple topics)

Inference

Anaphoric Reference

- A pronoun (or definite nominal) can refer back to something earlier in the discourse

- (27) a. *I tripped over a dog. The dog bit me.*
b. *I tripped over a dog. The beast bit me.*
c. *I tripped over a dog. It bit me.*
d. *I tripped over a dog. The tail tangled me. bridging*
e. *I tripped over a dog. ϕ bit me.*
- (28) a. *I left early. I had a train to catch.*

Inference: I left early **because** I had a train to catch.

- People use inference to
 - Interpret pronouns and nominals
 - More generally, to link information together

Conversational Implicature

Cooperation in Conversation

➤ **Cooperative Principle:** people cooperate in conversation

“Make your conversational contribution such as is required, at the stage at which it occurs, by the accepted purpose or direction of the talk exchange in which you are engaged.”

➤ **Implicature**

The aspect of meaning that a speaker conveys, implies, or suggests without directly expressing.

(29) *Did you do the reading?*

(30) *I meant to.*

Implicates: No

Gricean Maxims

Maxim of Quantity

- Make your contribution as informative as is required (for the current purposes of the exchange).
- Do not make your contribution more informative than is required.

Maxim of Quality

- Do not say what you believe to be false.
- Do not say that for which you lack proper evidence.

Maxim of Relation

- Be relevant.

Maxim of Manner

- Be perspicuous [= be easily understood]
- Avoid obscurity of expression.
- Avoid ambiguity
- Be brief (avoid unnecessary prolixity)
- Be orderly

An Example of implicature

Speech that seems to violate the maxims will evoke **implicatures** (inferences about the reason why the speaker violated the maxim(s)). This is because the hearer assumes the speaker is acting in accordance with the Cooperative Principle, and is rational.

(31) A: *Can you tell me the time?*

Lit: Do you have the ability to tell me the time?

(32) B: *Well, the milkman has come.*

Lit.: The milkman came at some time prior to the time of speaking.

What is meant:

A Do you have the ability to tell me the time of the present moment, as standardly indicated on a watch, and if so, please do so tell me what time it is.

B No, I don't know the exact time of the present moment, but I can provide some information from which you may be able to deduce the approximate time, namely the milkman, who delivers milk at 6:30am, came at some time prior to the time of speaking.

A flouted Manner — why not request that you are told the time?

B flouted Relation — what does this have to do with the time?

Generalized Conversational Implicatures

- When no special knowledge is required in the context to calculate the additional conveyed meaning

(33) *Did you bring the flowers and the card?*

(34) *I brought the card.*

Implicature: but not the flowers.

Particularized Conversational Implicatures

Most of our conversations take place in very specific contexts in which locally recognized inferences are assumed.

(35) *Hey Terry, are you coming to the party tonight?*

(36) *My parents are visiting.*

Note that all implicatures are **defeasible**: they can be canceled without a contradiction.

(37) *But I can still come.*

Scalar Implicatures

Certain information is communicated by choosing a word which expresses one value from a scale of values.

(38) *< all, most, many, some, few >*

(39) *< always, often, sometimes >*

We should choose the word from the scale which is the most informative and truthful in the circumstances (Quantity and Quality):

(40) *I'm doing a major in Linguistics and I've completed some of the required subjects*

(41) *They are often late.*

(42) *I got some of these antiques in London – hang on, actually I think I got most of them there.* (defeasible)

Horn Scales

To form a Horn scale $\langle S, W \rangle$, two words (S and W) must satisfy the following conditions:

- (i) $A(S)$ must entail $A(W)$ for some arbitrary sentence frame A ;
- (ii) S and W must be equally lexicalized;
- (iii) S and W must be about the same semantic relations, or from the same semantic field.

➤ Words on the scale implicate the negation of words on their left

- $\langle \textit{always}, \textit{often}, \textit{sometimes} \rangle$.
- $\langle \textit{...}, \textit{5}, \textit{4}, \textit{3}, \textit{2}, \textit{1} \rangle$.
- $\langle \textit{hot}, \textit{warm}, \textit{lukewarm}, \textit{cold} \rangle$.
- $\langle \textit{the}, \{ \textit{a}, \textit{some} \} \rangle$.

Conventional Implicatures

Conventional implicatures are non-truth conditional inferences that are not derived from superordinate pragmatic principles like the [Gricean] maxims, but are simply attached by convention to particular lexical items.

They are non-cancellable:

- (43) a. *She was poor, but honest.*
b. **She was poor but honest, and was in fact rich.*

Flouting the maxims

- Quantity: (In answer to *Tell me about him!:*) *He has a nice personality.*
- Quality: (In response to something stupid someone did:) *That was brilliant!*
- Relation: (In response to *Can I go out and play?:*) *Did you finish your homework?*
- Quality:
 - (44) *My car breaks down every five minutes* hyperbole
 - (45) *I've got millions of bottles of wine in my cellar* figure of speech
 - (46) *Queen Victoria was made of iron* a metaphor
 - (47) *I love it when you sing out of tune* irony or sarcasm

What happens when we flout?

- If someone doesn't understand this, (e.g. someone from another culture), then what was originally intended to be a metaphor may result in a **lie**.
- We may flout:
 - Quantity:
 - * say more than we need to indicate a sense of occasion, or respect
 - * say less than we need, in order to be blunt, or rude
 - Relation
 - * to signal embarrassment
 - * to change the subject
 - Manner
 - * for the sake of humour
 - * to obscure information (parents talking in front of children)
 - * to show in-group status, ...

Hedges

When we **flout** a maxim, we can use **hedges**:

(48) Quantity:

(48) As you probably know, ...

(49) To cut a long story short, ...

(50) Quality:

(50) I'm not sure, but I think they got divorced last year.

(51) As far as I'm aware, Kim is still on medication.

(52) Relation:

(52) I don't know if this is will affect the bottom line, but some of the numbers are missing.

(53) Manner:

(53) I'm not sure if this makes sense, but the car had no lights.

Acknowledgments and References

- Definitions from WordNet: <http://wordnet.princeton.edu/>
- Some slides use material from Alexander Coupe

Truly Unique Things

- the music of Beethoven
- the intuition of a woman
- the obstinacy of an ass
- the crowing of a cock
- the song of a tit
- the waywardness of the wind

Alas Smith and Jones (1986)

Mistakenly attributed to Oscar Wilde (1854 – 1900), who actually said:

“Intuition: the strange instinct that tells a woman she is right, whether she is or not.”



References

- John D. Bransford and Marcia K. Johnson. 1972. Contextual prerequisites for understanding: Some investigations of comprehension and recall. *Journal of Verbal Learning and Verbal Behavior*, 11:717–726.
- Robert M.W. Dixon. 1986. Noun classes and noun classification in typological perspective. In Colette Craig, editor, *Noun Classes and Categorization*, volume 7 of *Typological Studies in Language*, pages 105–12. John Benjamins, Amsterdam.
- H Paul Grice. 1975. Logic and conversation. In Peter Cole and Jerry Morgan, editors, *Speech Acts*, volume 3 of *Syntax and Semantics*, pages 43–58. Academic Press, New York.

Jeannette K. Gundel, Nancy Hedberg, and Ron Zacharski. 1993. Cognitive status and the form of referring expressions in discourse. *Language*, 69(2):274–307.