

T-(538|725)-MALV, Natural Language Processing Discourse and Reference Resolution

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1 Discourse Analysis

2 Discourse Model and Reference Resolution

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What is Discourse? (í. orðræða)

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- Examples?

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Examples of Discourse

- Written story in a book
- Someone telling a joke
- A conversation between two friends
- ...

Discourse Analysis (í. orðræðugreining)

- Linguistics tends to focus on isolated sentences and their formal structure, regardless of use.
- Discourse Analysis looks at what makes discourse coherent in light of its use.

What is language used for?

It is important to understand that language serves not one single purpose. One useful way of seeing language is in terms of two major categories of use:

- For transmitting information

Called:

Transactional / Propositional / Referential / Ideational /
Descriptive

- For managing a social relationship

Called:

Interactional / Relational / Emotive / Interpersonal /
Social-Expressive

Transactional Use (í. upplýsingamiðlun)

- Is the mediation of information the most important use?
 - The producer describes a fact or a point of view.
 - The producer describes an action she wishes to have performed.
- Culture is maintained this way. We build on transmitted knowledge.

Transactional Languages (í. upplýsingamál)

If a language is primarily used for transmitting information, one can call it a *Transactional Language*. The primary goal is then to ensure effective information transfer.

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Transactional Languages (examples)

- Instructions for using a prescribed drug
- End user license agreement
- Product comparison in a consumer newsletter
- Scientific articles
- Television news
- ...

Interactional Use (í. félagsleg notkun)

- Traditional linguistics focus less on Interactional use than Transactional use.
- *Sociology* and *sociolinguistics* examine for example how language is used to initiate and manage social relationships. E.g. what is the role of *small talk* for this purpose?
- *Conversational Analysis* examines in particular how language is used to coordinate turns, define participant roles and in general frame the overall language activity.
- *Context Analysis* broadens the study even further by looking at the role of nonverbal behavior in conducting interaction.
- When we look closer, we see that much of daily language use is interactional.

Interactional Use (examples)

- A: "Hi!" B: "Hi!"
- A: "mm..excuse me..." B: "Yes?"
- A: "Damn it's cold today!" B: "Freezing" (cold weather obvious)
- A: "...he's pretty good." B: "Yeah, he's pretty good."
- Not just spoken text, but also in written media like blogs, letters, cards and ads.

Discourse Functions and Devices (í. Orðræðumarkmið og orðræðuáhöld)

When you say that language is being used for a specific purpose, regardless of whether it's transactional or interactional, it is important to distinguish between:

- The *Discourse Function* (í. orðræðumarkmið) being performed (essentially an abstract goal).
- The *Discourse Device* (í. orðræðuáhalld) being used to carry out that function (essentially a concrete action).

Discourse Devices

Note that a *Discourse Device* can be any concrete action, including a particular choice of words or a linguistic structure, and visible behavior like head nods or drawing a picture.

Examples of functions and devices

- "Coke is good, but Pepsi is better"
(Function: contrast, devices: coordinating conjunction, comparative form)
- "Anyways.. it all worked out"
(Function: Wrapping up, device: cue word)

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Regularities rather than rules

- In the field of linguistics, a language is described by grammar rules that always have to be true for that language. One counter example would eradicate a rule.
- In the field of discourse analysis, a discourse is described by the kinds of linguistic and behavioral devices employed to perform communicative function.
- The mapping between functions and devices is seldom described by fixed rules, but rather one speaks of patterns that seem to emerge in well defined situations, with a high frequency.

Regularities rather than rules (cont.)

- The dynamic environment has great impact on actual language use.
- Discourse Analysis therefore provides a kind of a *tool box* for analyzing and understanding discourse, rather than a set of rules such as those describing the world of physics.

Discourse Analysis

"sentence-as-object" view

The sentence-grammarian deals with "the well-formed sentences of a language" which can exist independently of any individual speaker or hearer. How a sentence is used is not an issue. Chomsky said that to get to the core of human language capabilities one has to first ask "...what [language] *is*, not how or for what purpose it is used".

"text-as-product" view

The text-linguist admits that the text needs cohesion because producers are making it easier for receivers to understand, but the words themselves are examined without modeling the dynamic context of the communication process.

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"discourse-as-process" view

The discourse analyst examines how the shared situation and individual knowledge shapes the way the producer contributes to the discourse, and the way a receiver interprets it. The text has become a part of a dynamic process between the participants as opposed to being a collection of sentences or words.

The Gricean Maxims

These *maxims* describe the assumptions receivers make about producers' contributions, and therefore they interpret them with this in mind:

- **Truth (Quality)**

Do not say what you believe to be false or for which you lack evidence.

- **Information (Quantity)**

Make your contribution informative but not too loaded.

- **Relevance (Relation)**

Be relevant.

- **Clarity (Manner)**

Avoid obscurity and ambiguity. Be brief and orderly.

The Gricean Maxims and Interpretation

The interpretation of a text that assumes the producer is following the maxims is the most likely interpretation. That is why one has to take a good look when the maxims seem flaunted.

Examples

- A: "Why did the chicken cross the road?" (Truth?!)
- A: "What is your name?", B: "John, Gunna's husband" (Information?!)
- A: "Are you coming tonight?", B: "I have exam tomorrow" (Relevance?!)
- A: "Good food... good food!" (Brief?!)

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Discourse Context (í. orðræðusamhengi)

We interpret all meaning in some context. Strictly speaking our context covers our entire existence up to the moment of interpretation! For simplification let's divide the context into three categories.

- **Cognitive Context** (Knowledge)
Common sense world knowledge as well as special domain knowledge.
- **Situational Context** (Environment)
The physical environment of the exchange, including participants and any objects.
- **Textual Context** (Co-Text)
Whatever has been said so far in the exchange.

Discourse Model (í. orðræðulíkan)

- Every participant in the communication builds a *discourse model* that keeps track of the context and helps them with interpretation.
- For example, it can help them interpret *anaphoras* (í. anafórur), where the text contains pointers into the context (like "heap pointers" in compiled programs) for staying concise.
- Anaphoras include personal ("she") or demonstrative pronouns ("that").

Anaphora Examples

- "John lit a pipe. He pondered."
Here "John" is an *antecedent* and "He" an *anaphor*.
Keeping track of the *textual context* helped with interpretation here.
- "This is madness!" (Producer stands at a construction site)
Here "This" is an anaphor that refers (likely!) to the ongoing construction activity.
Keeping track of the *situation context* helped with interpretation here.

Keeping Track of Textual Context

What is discussed in a discourse, requires some representation in the discourse model. This representation is called a *Discourse Entity* (í. orðræðueining) or a *Discourse Referent*.

Discourse Entity (DE)

- DEs are objects, concepts or whatever else the text can be about.
- A DE corresponds to a constant or a sentence in a Knowledge Base (e.g. BILL3).
- *Referring Expressions* in the text are pointers to these *Referents*.

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Referring Expressions

- The simplest way to update our discourse model is to keep track of all referring expressions in the text.
- When we find a new (first-time) reference, we create a new DE in our model.
- Later references to the same thing are then connected to the corresponding DE in the model.
- All references to the same DE are said to *corefer*.

Example References (sjá síðu 378)

Referring Expression	DE	Logic Properties
Susan, she, her	'Susan'	'Susan'
Lyn, she	'Lyn'	'Lyn'
A Ferrari	X	ferrari(X)
A lot of trophies	E	$E \subset \{X, trophy(X)\}$

Referring Expressions and Noun Phrases

- If one only considers physical/concrete things, then the referring expressions correspond to all the *noun phrases* in the text.
- Then it is relatively easy to construct DEs inside the model from noun phrases.
- The difficulty is in realizing when a noun phrase is a referring expression to an existing DE, i.e. a coreference is found. There should only be one DE per actual object!

Finding Coreference

- Syntactic Cues of Coreference:
"Ég fékk mér **nýjan bíl**. **Hann** er grár á litinn."
- Semantic Cues of Coreference:
"Ég fékk mér **hund**. **Dýrið** er snælduvitlaust.!"
- Tricky: These can conflict - what's correct?
"Bílstjórinn ók jeppanum útaf. Hann missti bílprófið."