

Discourse Structure

James Pustejovsky
Brandeis University



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Discourse

- Any set of connected sentences
- This set of sentences gives context to the discourse
- Some language phenomena more interesting at discourse level rather than sentence level
 - (e.g. reference)

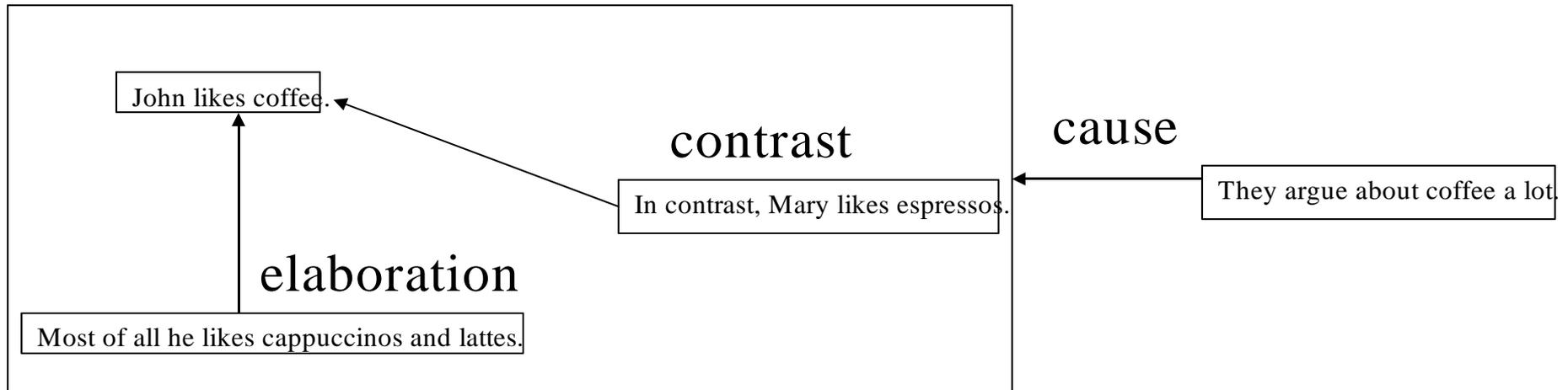
Example Discourse

John likes coffee. Most of all, John likes cappuccino and lattes. In contrast, Mary likes espresso. They argue about coffee a lot.

Discourse Relationships

- Sentences in a discourse are related to one another by :
 - **Result** : John drank coffee. He was wired
 - **Explanation** : John went to the grad lounge. He was thirsty.
 - **Parallel** : John drinks espresso. Mary drinks cappuccino
 - **Elaboration** : John is a coffee addict. He drinks it every day
 - **Occasion** : John's cup of coffee was piping hot. It hurt his tongue when he drank it.
 - **Contrast** : John likes coffee. Mary hates it.

Hierarchical Discourse Structure



Cues for Discourse Relationships

- Some discourse relations are indicated by cue phrases :

*John likes coffee. **Most of all**, John likes cappuccino and lattes. **In contrast**, Mary likes espresso. They argue about coffee a lot.*

- Other cues : but, however, then, though

Dialogue

- Unlike discourse, multiple speakers, multiple hearers
- This introduces new complications

Example Dialogue

John : Can I get a cup of coffee?

Jane : Cream?

John : Hm?

Jane : Do you want your coffee black?

John : Oh yes, thanks.

Turn-Taking

- First thing different between discourse and dialogue : alternating turns
- How do people decide when to speak?

Turn-Taking Rule

1. If during this turn, the speaker has selected A as the next speaker then A must speak.
2. If the current speaker hasn't selected the next speaker any other speaker may take the next turn.
3. If no one takes the next turn, the current speaker may take the next turn.

Turn-Taking in Action

Mary : I need someone to get me a coffee.

(2.0 silence)

Mary : John, Peter?

John : Busy, sorry.

Peter : Sure, Mary, I'll pour you a cup.

Grounding

- Hearer must acknowledge that speaker's statement was understood
- Doesn't happen in monologue, no chance for interaction

Continuers for Grounding

“We need a new coffee machine.”

- Continued Attention : (nods)
- Relevant Next Contribution : *“It should be cheap”*
- Acknowledgement : *“Yes, definitely.”*
- Demonstration : *“An espresso machine.”*
- Display : *“A new coffee machine.”*

Conversational Implicature

- To understand, must get beyond the literal semantics of the statement, to what is the intended meaning.
- “Can I get a cup of piping-hot coffee?”
 - Not asking about physical ability, but asking for a cup of coffee

Grice's Maxims

- Maximum of Quantity
 - Be exactly as informative as possible
- Maxim of Quality
 - Do not say what you believe is false
 - Do not say what you lack adequate evidence for
- Maxim of Relevance
- Maxim of Manner
 - Avoid obscurity, ambiguity
 - Be brief, orderly

Example Violations of Grice's Maxims

- *“There are three more classes.”*
 - When there are 12
- *“There is no more coffee.”*
 - When you know there is
- *“Is there Coffee?” “Yes, in China!”*

Dialogue Acts

John : Can I get a cup of coffee?

Jane : Cream?

John : Hm?

Jane : Do you want your coffee black?

John : Oh yes, thanks.

Austin's theory of speech acts

- Every statement in a dialogue is an action taken by the speaker
 - E.g. performative sentences:
 - “*You're fired.*”
 - “*I knight you Sir John.*”

Types of Speech Acts

- Locutionary acts :
 - The act of uttering a string of words
- Illocutionary act
 - The act the speaker performs in the utterance
- Perlocutionary act
 - Production of effects by means of the utterance

Communicative Acts, really

- John and Sue are coffee smugglers. If John has a shipment, he leaves a jar of CoffeeMate in the kitchen.
- One day someone else leaves CoffeeMate in the kitchen
- Communication works when one intends to communicate, and the other recognizes the intention.

Locutionary acts

- Typically identified as speech acts
 - Assertives (suggesting, swearing, concluding)
 - Directives (asking, ordering, advising)
 - Commissives (promising, betting)
 - Expressives (thanking, apologizing)
 - Declarations (I resign, you're fired)

What Makes a Discourse Coherent?

The reason is that these utterances, when juxtaposed, will not exhibit coherence. Almost certainly not. Do you have a discourse? Assume that you have collected an arbitrary set of well-formed and independently interpretable utterances, for instance, by randomly selecting one sentence from each of the previous chapters of this book.

Better?

Assume that you have collected an arbitrary set of well-formed and independently interpretable utterances, for instance, by randomly selecting one sentence from each of the previous chapters of this book. Do you have a discourse? Almost certainly not. The reason is that these utterances, when juxtaposed, will not exhibit coherence.

What makes a text coherent?

- **Appropriate use of coherence relations between subparts of the discourse -- rhetorical structure**
- **Appropriate sequencing of subparts of the discourse -- discourse/topic structure**
- **Appropriate use of referring expressions**

Rhetorical Structure Theory

- **One theory of discourse structure, based on identifying relations between segments of the text**
 - **Nucleus/satellite** notion encodes asymmetry
 - **Some rhetorical relations:**
 - **Elaboration** (set/member, class/instance, whole/part...)
 - **Contrast:** multinuclear
 - **Condition:** Sat presents precondition for N
 - **Purpose:** Sat presents goal of the activity in N

Relations

- **A sample definition**
 - **Relation: evidence**
 - **Constraints on N: H might not believe N as much as S think s/he should**
 - **Constraints on Sat: H *already believes or will believe* Sat**
- **An example:**
 - The governor supports big business.**
 - He is sure to veto House Bill 1711.**

Some Problems with RST

- **How many Rhetorical Relations are there?**
- **How can we use RST in dialogue as well as monologue?**
- **RST does not model overall structure of the discourse.**
- **Difficult to get annotators to agree on labeling the same texts**

Referring Expressions

- **Referring expressions provide an additional kind of glue that makes texts cohere.**

Referring Expressions: Definition

- Referring expressions are words or phrases, the *semantic interpretation of which is a discourse entity* (also called referent)
 - Discourse entities are *semantic objects* and they can have multiple *syntactic realizations* within a text

NY Times Example

A college student accused of faking her own kidnapping last month was charged Wednesday with lying to police in what they suggested was a desperate attempt to get her boyfriend's attention. Audrey Seiler, a 20-year-old sophomore at the University of Wisconsin, was charged with two misdemeanor counts of obstructing officers. Each charge carries up to nine months in jail and a \$10,000 fine.

Seiler disappeared from her off-campus apartment March 27 without her coat or purse. She was discovered curled in a fetal position in a marsh four days later, and told police that a man had abducted her at knifepoint.

But police concluded Seiler made up the story after obtaining a store videotape that showed her buying the knife, duct tape, rope and cold medicine she claimed her abductor used to restrain her. Seiler confessed after she was confronted with the tape, according to authorities.

Referring Expressions: Example

A pretty woman entered the restaurant. She sat at the table next to mine and only then I recognized her. This was Amy Garcia, my next door neighbor from 10 years ago. The woman has totally changed! Amy was at the time shy...

Pronouns vs. Full NP

A pretty woman entered **the restaurant**. **She** sat at the table next to **mine** and only then **I** recognized **her**. This was Amy Garcia, my next door neighbor from 10 years ago. The woman has totally changed! Amy was at the time shy...

Definite vs. Indefinite NPs

A pretty woman entered **the restaurant**. She sat at the table next to mine and only then I recognized her. This was **Amy Garcia**, my next door neighbor from 10 years ago. The woman has totally changed! Amy was at the time shy...

Common Noun vs. Proper Noun

A pretty woman entered **the restaurant**. She sat at the table next to mine and only then I recognized her. This was **Amy Garcia**, **my next door neighbor** from 10 years ago. The woman has totally changed! **Amy** was at the time shy...

Modified vs. Bare head NP

A pretty woman entered **the restaurant**. She sat at **the table next to mine** and only then I recognized her. This was Amy Garcia, my next door neighbor from 10 years ago. **The woman** has totally changed! Amy was at the time shy...

Premodified vs. postmodified

A pretty woman entered the restaurant. She sat at **the table next to mine** and only then I recognized her. This was **Amy Garcia, my next door neighbor from 10 years ago**. The woman has totally changed! Amy was at the time shy...

More NP types

- **Inferrables**

- *Sally bought a used car. **The tires** need to be replaced.*

- **Discontinuous sets**

- *John has known Bill for many years now. **They** often go hiking together.*

Anaphora resolution

- **Finding in a text all the referring expressions that have one and the same denotation**
 - **Pronominal anaphora resolution**
 - **Anaphora resolution between named entities**
 - **Full noun phrase anaphora resolution**
 - **Zero anaphora detection/resolution**

What is a dialog model?

- A model is an abstraction of a thing, dimensionally reduced, while still informative of the thing with respect to a particular perspective.
- A dialog model is a process calculus of a dialog, dimensionally reduced, while still informative of the dialog with respect to usability.

Grosz and Sidner's Discourse Structure

- As opposed to meaning (needs to partially rest on the discourse structure)
- Stresses **discourse purpose** and **processing**
- 3 separate but interrelated components (needed to explain interruptions, referring expressions, etc.):
 - **Linguistic structure** (sequence of utterances)
 - **Intentional structure**
 - **Attentional state**

Linguistic structure

- Utterances in a discourse are naturally aggregated into discourse segments (like words into constituent phrases)
- Segments are not necessarily continuous (interruptions)
- LS is not strictly decompositional
- 2-way interaction between discourse segment structure and utterances constituting the discourse:
 - linguistic expressions can convey info about discourse structure (cue phrases, **ling. boundary markers**)
 - Discourse structure constraints the interpretation of these ling. expressions

Intentional Structure

- Discourse (participants) have an **overall purpose**
- Even though there might be more than one, G&S distinguish one as **foundational to the discourse** (vs. private purposes) which needs to be recognized
- Each discourse segment has a **discourse segment purpose (DSP)**, which contributes to the overall DP

Intentional structure.

- 2 structural relationships between DSP:
 - **Dominance**
DSP1 contributes to DSP2 = DSP2 dominates (DOM) DSP1
 - **Satisfaction-precedence** (Parsing: linear precedence)
DSP1 satisfaction-precedes DSP2 when 1 must be satisfied before 2
- The dominance relation invokes a partial ordering on DSPs, i.e. a **dominance hierarchy**
- **Determinations** (complete specification of what is intended by whom) **vs. recognition**

Attentional State

- As opposed to cognitive state, which is a richer structure that includes knowledge, beliefs, desires and intentions
- Abstraction of the **participants' focus of attention** as their discourse unfolds (a property of the discourse itself)
- **Dynamic**: records the objects, properties and relations that are salient at each point in the discourse

Attentional State

- Modeled by a set of **focus spaces** which constitute the focusing structure
- A focus space = segment + DSP
- Although each focus space contains a DSP, the focus structure does not include the intentional structure as a whole
- The **stacking** of focus spaces reflects the salience of entities in each space during the corresponding segments of the discourse

Attentional State

- Focusing structure **depends on the intentional structure**: the relationships between DSPs determine **pushes** and **pops** from the stack
- Focusing structure coordinates the linguistic and intentional structures during processing (p. 181)
- Like the other 2 structure, focusing structure evolves as discourse proceeds