

Anaphora and Ambiguity in Narratives

Daniel Altshuler, Hampshire College

Julian J. Schlöder, University of Amsterdam

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More than the sum of its parts: The train ride

(1) John took a train from Paris to Istanbul. He has family there.
(Hobbs 1979)

More than the sum of its parts: The train ride

(2)

a. John took a train from Paris to Istanbul.

b. He has family there.

} Explanation

More than the sum of its parts: The train ride

(3) ?John took a train from Paris to Istanbul. He likes spinach.
(Hobbs 1979)

More than the sum of its parts: The train ride

(4)

a. John took a train from Paris to Istanbul.

b. He likes spinach.

} Explanation fails!

David Hume on association of ideas

*Though it be too obvious to escape observation that different ideas are connected together, I do not find that any philosopher has attempted to enumerate or class all the principles of association – a subject, however, that seems worthy of curiosity. To me there appear to be only three principles of connection among ideas, namely **Resemblance, Contiguity in time or place, and Cause or Effect.***

Jerry Hobbs restating Hume's project

*It is tempting to speculate that these **coherence relations** are instantiations in discourse comprehension of more general principles of coherence that we apply in attempting to make sense out of the world we find ourselves in, principles that rest ultimately on some notion of cognitive economy. [...] Recognizing coherence relations may thus be just one way of using very general principles for simplifying our view of the world.*

Cue phrases

- (5) a. Max fell
b. **because** John pushed him.
- (6) a. Max fell.
b. **So** John helped him up.
- (7) a. Max fell.
b. **Then** John pushed him.
- (8) a. Max fell.
b. John did **too**.
- Explanation (Cause/Effect)
- Result (Cause/Effect)
- Narration (Contiguity)
- Parallel (Resemblance)

Another train ride: Narration vs. Result

- (9) The train arrived in Chicago at 3.
Obama held a press conference at 5. (after Hobbs 1990)

Anaphora resolution

(10) Phil tickled Stanley. Liz poked him. (Smyth 1994)

Anaphora resolution

(11)

a. Phil tickled Stanley.

b. Liz poked him (x = Stanley)

} Parallel (Resemblance)

Anaphora resolution

(12)

a. Phil tickled Stanley.

b. Liz poked him (x = Phil)

} Result (Cause/Effect)

Hypothesis

The resolution of pronouns and the establishment of coherence relations are correlated and mutually constraining tasks.

(Hobbs 1979, 1985)

- See experimental work by, e.g. Wolf et al. 2004, Kertz & Elman 2006, Kehler et al. 2008, Rohde & Kehler 2008, Kaiser 2011, Rohde and Horton 2014, Kaiser & Cherqaoui 2016.

Anaphora resolution

(13) Phil screamed with pain in his eyes. Liz poked him.
(Altshuler 2016)

Anaphora resolution

(14)

a. Phil screamed with pain in his eyes.

b. Liz poked him (t = before the screaming)

} Explanation (Cause/Effect)

Anaphora resolution

(15)

a. Phil screamed with pain in his eyes.

b. Liz poked him (t = after the screaming)

} Result (Cause/Effect)

Restating the hypothesis

The resolution of **context sensitive expressions** (e.g. pronouns, tenses) and the establishment of coherence relations are correlated and mutually constraining tasks.

- Stojnić (2016) considers the role that coherence relations play in modal anaphora and in restricting the domain of quantification.
- Stojnić & Altshuler (2019) consider the role that coherence relations play in fixing the referent of *now*, arguing that pure indexicals are, crucially, coherence driven.

Coherence relations also play an instrumental role in analyzing...

- cataphora
- presupposition
- bridging
- open questions
- attitude reports
- tense, aspect and temporal adverbs
- demonstration and gesture
- intonation and focus
 - > Ask us if you want references!
 - > Talk to us if you're (interested in) pursuing (some of) these topics (by applying a formal theory of coherence relations)!

The rest of the course

Introduce **Segmented Discourse Representation Theory (SDRT)** pioneered by Alex Lascarides, Nicholas Asher and colleagues.

- Magnum Opus:
Logics of conversation Cambridge University Press (2003).

Three innovations of SDRT

- SDRT models discourse structure as a **graph** over semantic representations (SDRSs) of **discourse units** (DUs)
- The graph edges connecting DUs are **labeled**.
- The graph used to model discourse structure is **directed**.

DUs come in two types:

- **elementary discourse units (EDUs)**, which are the atoms of a given discourse.
- **complex discourse units (CDUs)**, which are built out of EDUs and may include only two or three EDUs or correspond to several paragraphs or even multiple pages of text.

Assumption: Each EDU contains at least one eventuality description, and often only one (Afantenos et al 2012).

Defining *discourse*

A **discourse** is two or more EDUs that are connected by an edge of a graph.

- Every discourse (regardless of length) is, simply, a CDU.

Innovation 2

An edge of a graph is labeled. The label constitutes a coherence relation (a relation between two nodes of the graph).

- In principle, an edge may have several (nonconflicting) labels.

Partner petting

(16) Julian petted his cat. Then, Yu'an did too.

Partner petting

(17) a. Julian petted his cat.

b. Then, Yu'an did too.

} Narration, Parallel

Defining *(in)coherent discourse*

- A **coherent discourse** is a CDU whose edges are labeled.
- An **incoherent discourse** is a CDU which contains an unlabeled edge.

Gradience

(18) ???Julian is a philosopher. Pickles gave me gas.

(19) ??John took a train from Paris to Istanbul. He likes spinach.

(20) ?Arash walked in. Akna put on her gloves.

Innovation 3

A vertical edge represents a **subordinating** coherence relation, while a horizontal edge represents a **coordinating** coherence relation.

Intuitive distinction

- Coordinating coherence relations **change the scene**, hence **moving forward** the narrative.
- Subordinating coherence relations **detail the scene**, hence **deepening** the narrative.

There were three circles.



One of them was filled.



Later, there were three squares.



Discourse with subordinated coherence relations

You fit into me (Margaret Atwood)

- You fit into me.
Like a hook into an eye.
A fish hook.
An open eye.

Discourse with subordinated coherence relations

Blue notebook No. 10 (Daniil Kharms)

- Once there was a redheaded man without eyes and without ears. He had no hair either, so that he was a redhead was just something they said.
He could not speak, for he had no mouth. He had no nose either. He didn't even have arms or legs. He had no stomach either, and he had no back, and he had no spine, and no intestines of any kind. He didn't have anything at all.
- So it is hard to understand whom we are really talking about. So it is probably best not to talk about him any more.

Discourse with coordinated coherence relations

Falling old ladies (Daniil Kharms)

- Because of her excessive curiosity, an old lady fell out of the window and smashed into the ground.
Another old lady looked out of the window, staring down at the one who was smashed, but out of her excessive curiosity she also fell out of the window and smashed into the ground.
Then the third old lady fell out of the window, then the fourth did, then the fifth.
When the sixth old lady fell out of the window, I got bored watching them and went to Maltsev market where, they say, someone gave a woven shawl to a blind.

Continuations in discourse

- Since coordinating coherence relations **change the scene** while subordinating coherence relations **detail the scene**, **only subordination keeps the things we talk about around, and hence available for anaphora.**
- Put differently: We can't "detail" scenes that have been changed. Hence, **coordinated discourse moves "block" anaphoric potential.**
- **The Right Frontier constraint** governs which discourse units are available to attach new EDUs. (Polanyi 1988)

The anaphora-accessible referents are on the right-most branch of the graphed narrative structure.

Continuations in discourse

- (21) Arash doesn't trust Akna because she lied to him once.
It was about something really important.
So he's not going to let her babysit his kids.
- (22) Arash doesn't trust Akna because she lied to him once.
So he's not going to let her babysit his kids.
It was about something really important.

Segmentation for (21)

π_a : Arash doesn't trust Akna

π_b : She lied to him once

π_c : It was about something really important

π_d : He's not going to let her babysit his kids

Segmentation for (22)

π_a : Arash doesn't trust Akna

π_b : She lied to him once

π_c : He's not going to let her babysit his kids

π_d : It was about something really important

Continuations in discourse

(23) John had a great evening last night.

He had a great meal.

He ate salmon.

He devoured lots of cheese.

He won a dancing competition.

#It was a beautiful pink. (Asher & Lascarides 2003)

Segmentation for (23)

π_a : John had a great evening last night

π_b : He had a great meal

π_c : He ate salmon

π_d : He devoured lots of cheese

π_e : He won a dancing competition

π_f : It was a beautiful pink

Short Assignment:

Provide a graph representation of the discourse below

(24) Ava went mushroom picking.

The weather was shitty.

Large snowflakes were falling.

It was windy.

It was very cold.

She wasn't wearing shoes.

She wasn't wearing a hat.

But she was wearing a coat.

As a result, she didn't get a cold.

- Note: you don't need to label the edges of the graph. You only need to focus on representing EDUs vs. CDUs and the directionality of the graph.