Discourse Structure in Dialogue

CS 135 - Coherence, Anaphora and the Right Frontier

Slides from Julian J. Schlöder

Why Discourse Structure?

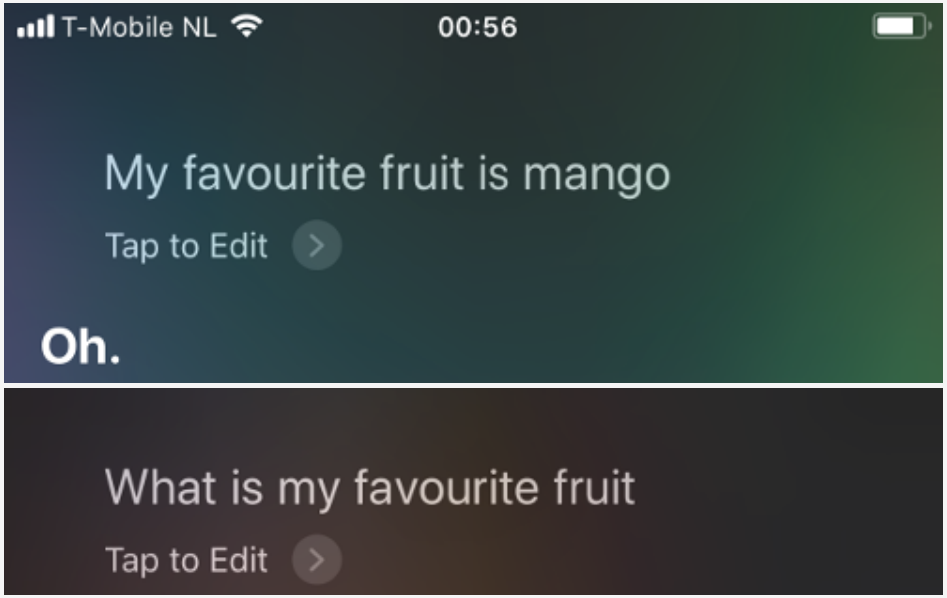
Some Tenets

Meaning doesn't exist in a vacuum.

- Interpretation happens in a context.
- Contexts change.
- Interpretation is negotiated.
- Interpretations can be revised.

– Dialogues are sequences of utterances made by multiple speakers in a context that includes prior utterances in a way that constrains future utterances.

→ All this matters for formal models.



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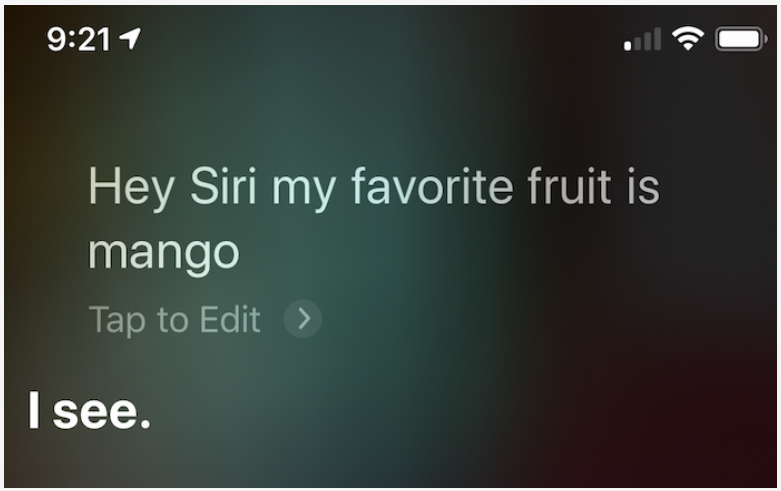

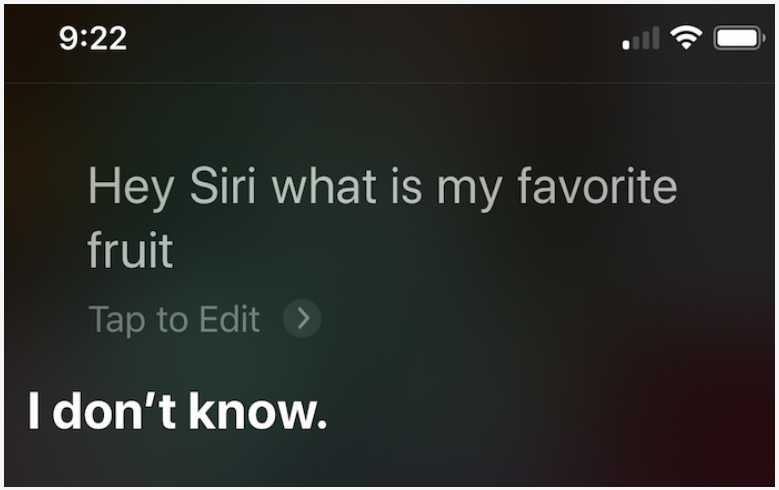

Order Effects

(1)

p. Anne left.

q. Bill cried.

(2)

q. Bill cried.

p. Anne left.

Order Effects

(1) *[initial context i]*
p. Anne left.
[context p-in-i]
q. Bill cried.
[context q-in-(p-in-i)]

(2) *[initial context i]*
q. Bill cried.
[context q-in-i]
p. Anne left.
[context p-in-(q-in-i)]

- p-in-i $\neq$ q-in-i (obviously).
- q-in-p-in-i $\neq$ p-in-q-in-i (less obviously).

Anaphora

(found on the internet)

(3) Standing up for women$_1$ means standing up to $^{??}$them$_1$.

Anaphora

(4) a. John's car broke.
b. He got a rental.
c. It had a broken fuel pump.
d. Yeah, it had a broken fuel pump, so he had to go to Hertz.

(5) *it* must be the rental in (c) but not (d)

(5) a. John moved to B-town from A-town.
b. Rent is cheaper there.

- *there* must(?) be B-town.

Implicature

(6) a. I had a great dinner!
b. They had freshly caught salmon at the market.

(7) a. Sue: What did you have for dinner?
b. Bill: I made a huge meal!
b. Bill: Soup, Pasta, Chicken and a pudding dessert!

Why Discourse Structure?

Coherence

Coherence

Motivation

(8) ✓ I'm flying to Gothenburg. I'll teach a course on GL.

(9) ✗ I'm flying to Gothenburg. I own seven pairs of shoes.

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- This is not a problem of grammaticality, consistency, interpretability, resolution, ...
- It just sounds plain odd.

Coherence

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"It is evident that there is a principle of connexion between the different thoughts or ideas of the mind … In our more serious thinking or discourse this is so observable that any particular thought, which breaks in upon the regular tract or chain of ideas, is immediately remarked and rejected. And even in our … very dreams, we shall find … that there was still a connexion upheld among the different ideas, which succeeded each other."

Hume (1748), *An Enquiry Concerning Human Understanding*

Stories

- Not any collection of sentences is a story.
- A story has narrative structure.
- That is, the individual contents of the sentences stand in relation to one another.
- E.g. temporal relation, topic relation, ...
- Like in semantics we study how certain semantic units compose to sentence meanings, here we study how clauses compose to narratives (“discourse meanings”, if you will).

– What relations?

"Though it be too obvious to escape observation, that different ideas are connected together; … there appear to be only three principles of connexion among ideas, namely, *Resemblance*, *Contiguity* in time or place, and *Cause* or *Effect*."

Hume (1748), *An Enquiry Concerning Human Understanding*

– The idea is that these relations are psychological primitives: the basic sortal categories by which we conceptualise the world are the categories by which we form narratives.

Relations

- Call a coherence relation (or, discourse relation, or rhetorical relation) a specific way in which two sentences can relate to form a narrative.

(10) I'm flying to Gothenburg.
I'll teach a course on SDRT.] Cause/Effect

(11) I'm flying to Gothenburg.
And Mary is flying to Paris.] Resemblance

(12) I'm flying to Gothenburg.
Afterwards, it's back to Amsterdam.] Contiguity

(13) I'm flying to Gothenburg.
I own seven pairs of shoes.] *none*

What gives?

- When we gather all these ideas and tie them up in a neat bundle, we get a very powerful notion of context:

> Given a new sentence, the context for that sentence is
> *all possible "ideas" (linguistic and nonlinguistic) that are available, and all the different ways in which the new sentence can relate to them*.

- Many moving parts:
  - → What are these ideas?
  - → Which ones are available?
  - → What are the ways in which one can relate?
  - → How to determine all this in a specific case?

Coherence

Coherence Relations

Coherence Relations

– Humean categories are too coarse:

(14) First came ten soldiers carrying clubs; these were all shaped like the three gardeners, oblong and flat, with their hands and feet at the corners:

next the ten courtiers; these were ornamented all over with diamonds, and walked two and two, as the soldiers did.

After these came the royal children; there were ten of them, and the little dears came jumping merrily along hand in hand, in couples: they were all ornamented with hearts.

Next came the guests, mostly Kings and Queens,

and among them Alice recognised the White Rabbit: it was talking in a hurried nervous manner, smiling at everything that was said, and went by without noticing her.

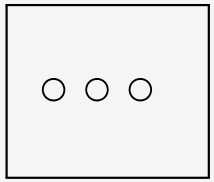
(Lewis Carroll, *Alice's Adventures in Wonderland*)

– These five contiguous parts of the story all contain smaller parts that add detail.

Narrative Structure

- We can distinguish two basic operations in a narrative.
  - → To move forward the narrative: to describe the next event or next scene in our story.
  - → To deepen the narrative: to add additional description to the current event or scene in our story.

There were three circles.



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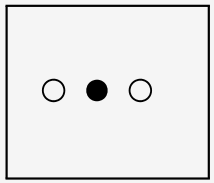
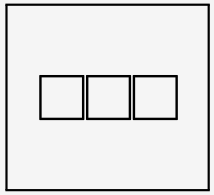


Later, there were three squares.



Types of Coherence Relations

- Accordingly, we distinguish three types of relations:
- Coordinating Relations that move the narrative forward.
  → For instance, *Narration*, *Continuation* and *Result*.
- Subordinating Relations that deepen the narrative.
  → For instance, *Elaboration*, *Explanation* and *Comment*.
- Similarity Relations that compare contents.
  → Exactly two: *Contrast* and *Parallel*.

Cues

– Many relations have cue phrases.

(15) a. John went for dinner.
b. **Then** he went to the cinema.] Narration

(16) a. John went for dinner.
b. **So** he isn't hungry.] Result

(17) a. John likes sports.
b. **In particular** football.] Elaboration

(18) a. John went for dinner.
b. **Because** he was hungry.] Explanation

(19) a. John had pocket aces.
b. **But** he lost the round.] Contrast

... and no Cues

– But frequently they are absent.

(20) a. A: Let's go this way.
b. A: It's shorter. ⌉ Explanation

(21) a. A: This course deals with all kinds of stuff.
b. A: Linguistics, Computer Science, Philosophy, ... ⌉ Elaboration

(22) a. A: The meeting got cancelled.
b. A: Robin stayed at home. ⌉ Explanation **or** Result

Dialogue

– Dialogue has a whole host of special ones.

→ (if used in monologue, then usually rhetorically)

(23) a. A: What's your name?
b. B: My name is B.] Question Answer Pair

(24) a. A: There's a cat outside!
b. B: No, there isn't.] Correction

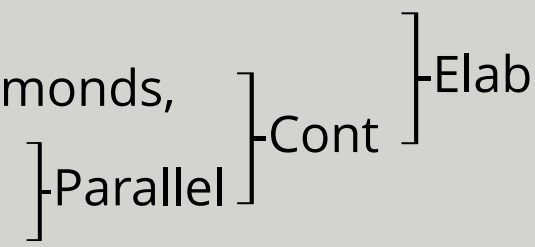
(25) a. A: Can we meet tomorrow?
b. B: Friday would be better.] Plan-Corr

(26) a. A: We're meeting tomorrow.
b. B: Why?] Expl-Q

Complex Structure

- Call anything that can relate by way of a coherence relation a discourse unit.
- In particular, semantic contents of clauses are discourse units. Call these elementary discourse units (EDU).
- Call any other discourse unit a complex discourse unit (CDU).

(27) next the ten courtiers;
these were ornamented all over with diamonds,
and walked two and two,
as the soldiers did.



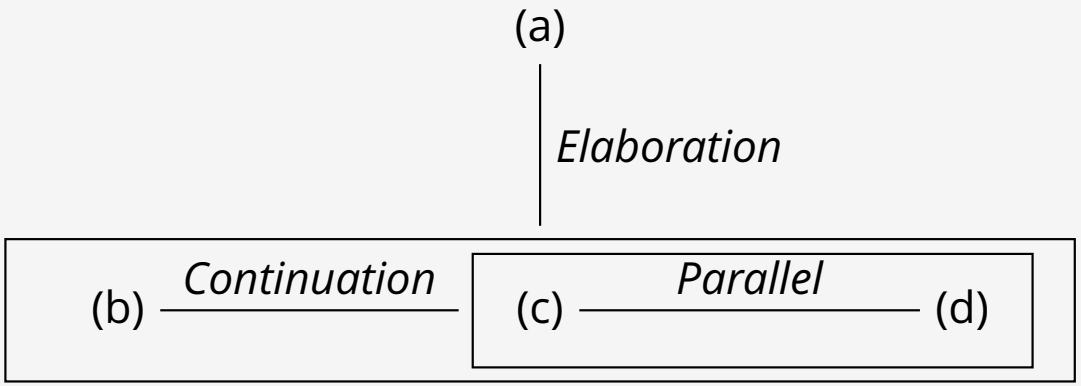
- The *Parallel* segment features as a CDU in the *Continuation* segment, which features as a CDU in the *Elaboration* segment.

Graphing

- It is helpful to graph narrative structures.

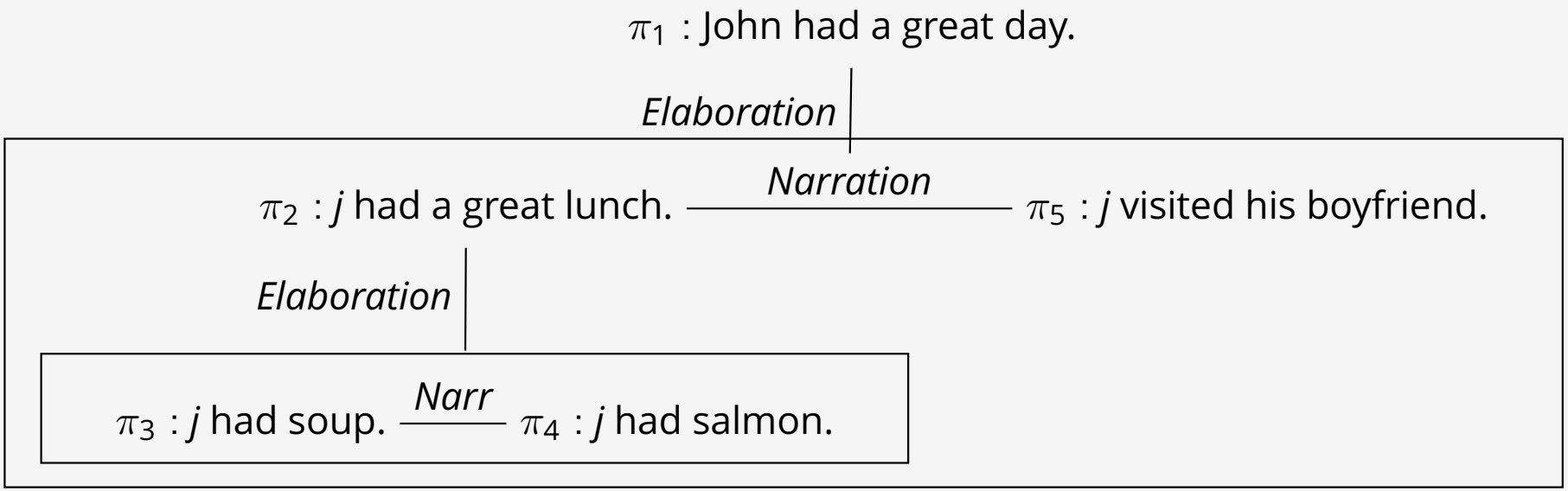
  → Technically, these are hypergraphs.

- Typically, one graphs CDUs as boxes, subordinating relations as vertical edges, and coordinating/similarity relations as horizontal edges.



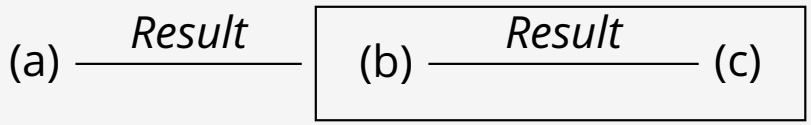
A classic example

(28) π_1 : John had a great day.
π_2 : He had a great lunch .
π_3 : He had soup.
π_4 : Then he had salmon.
π_5 : Afterwards, he visited his boyfriend.

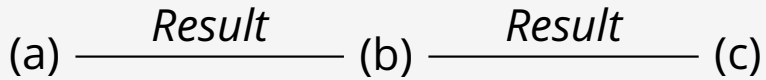


Subtleties

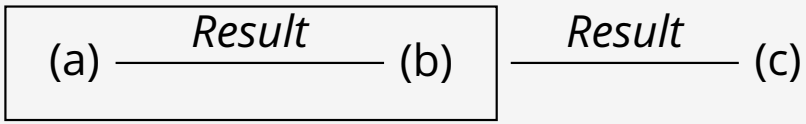
(29) a. John overslept.
b. So he missed his flight.
c. So he got angry at himself.



(30) a. John overslept.
b. So he missed his flight.
c. So he took a train instead.



(31) a. John overslept.
b. So he missed his flight.
c. Because of this, he bought an alarm clock.



Coherence Relations

The Right Frontier

The Right Frontier

One of the most exciting facts in all of linguistics

Anaphora follow narrative structure

- Suppose we have a context (a structured narrative) and want to add a new EDU that contains an anaphor.
- Clearly, the referents in the immediately previous EDU is available.
- Which but which other EDUs are available to resolve this anaphor?

Coordination blocks anaphora

(32) a. Mary had dinner with an old friend.
✓c. She knows him from college.
✓c.′ They go way back.
✓c.″ It was Italian food.

(33) a. Mary had dinner with an old friend.
b. Then she went home.
✗c. She knows #him from college.
✗c.′ #They go way back.
✗c.″ #It was Italian food.

] Narration

Subordination does not block anaphora

(34) a. Mary had dinner with an old friend.
b. She didn't want to sit home alone.
✓c. She knows him from college.
✓c.′ They go way back.
✓c.″ It was Italian food.

] Explanation

– (Similarity relations are funky. We'll need to wait for the formal model.)

The Right Frontier Constraint

– These observations lead to the Right Frontier Constraint:

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

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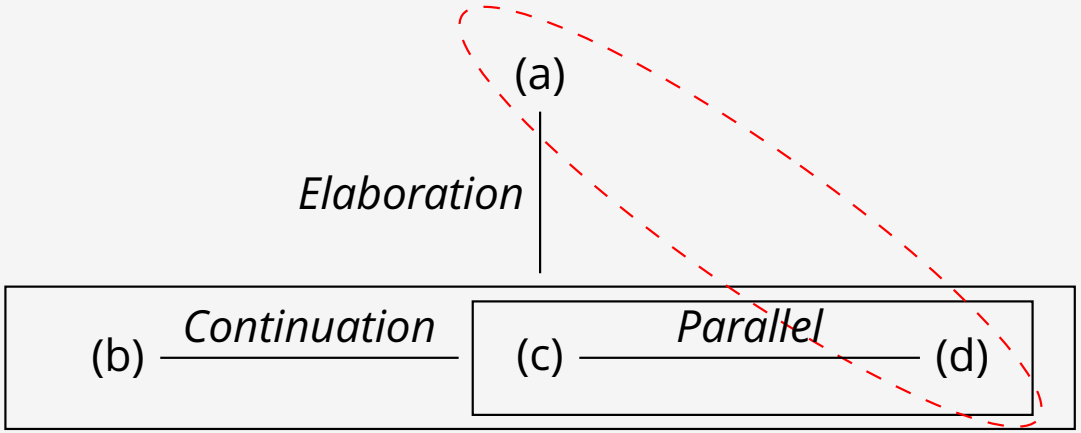
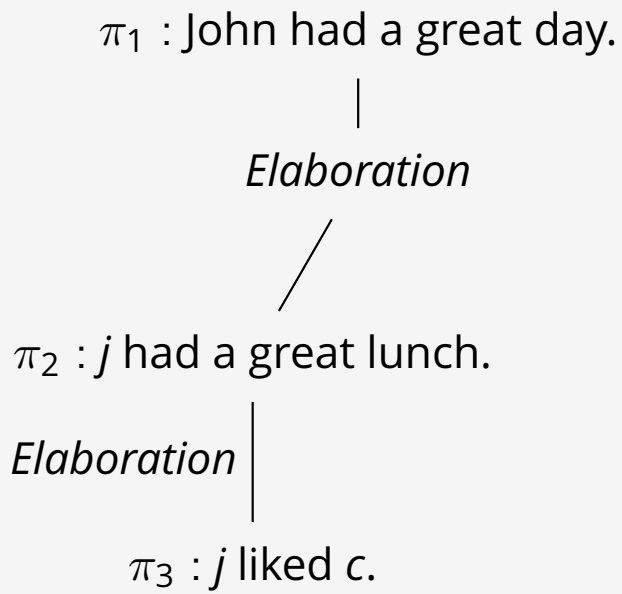
– That is: referents in the immediately previous EDU; and referents in all superordinate EDUs.



Right Frontier (extended example)

(35) π_1 : John had a great day.
π_2 : In particular, he had a great lunch .
π_3 : He particularly liked the cheese.



Right Frontier (extended example)

(35) π_1 : John had a great day.
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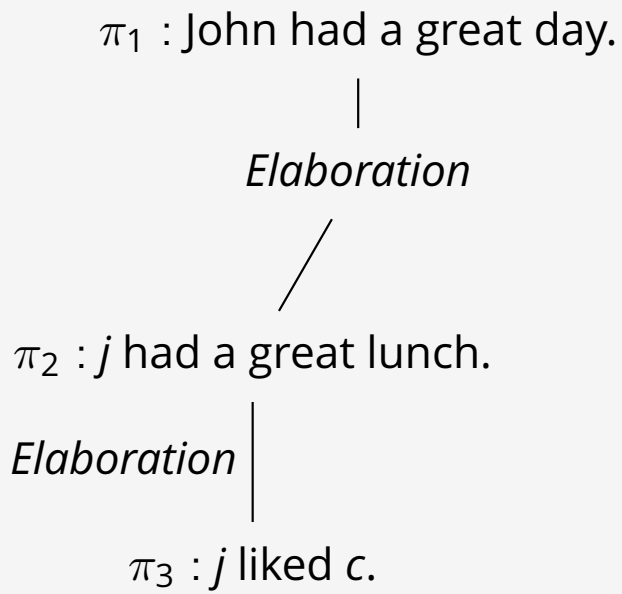
π : It [the cheese] was a Dutch Gouda.



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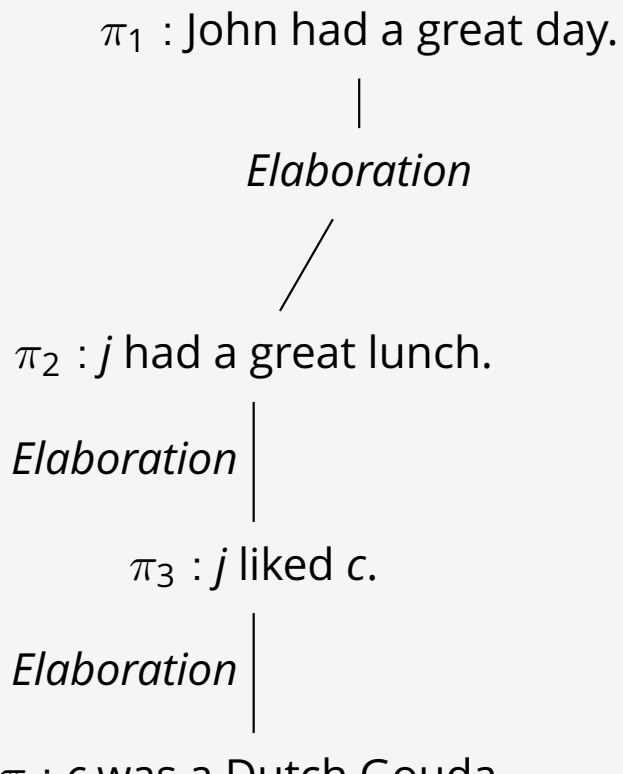

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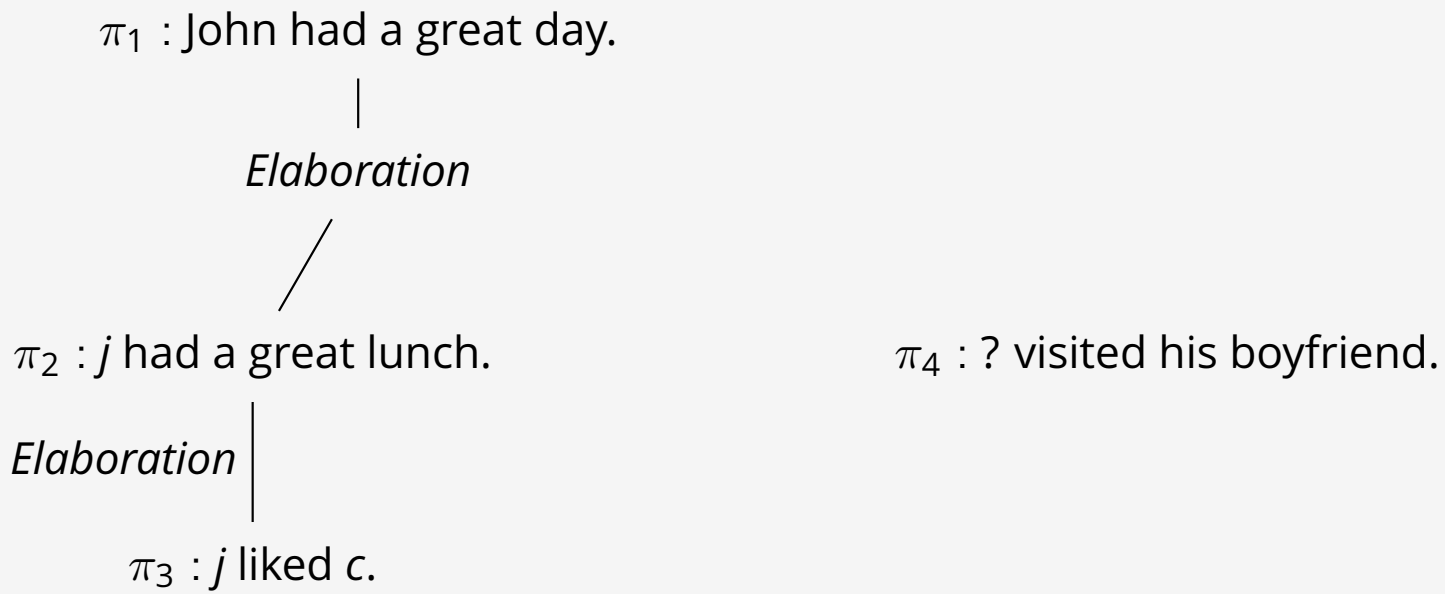

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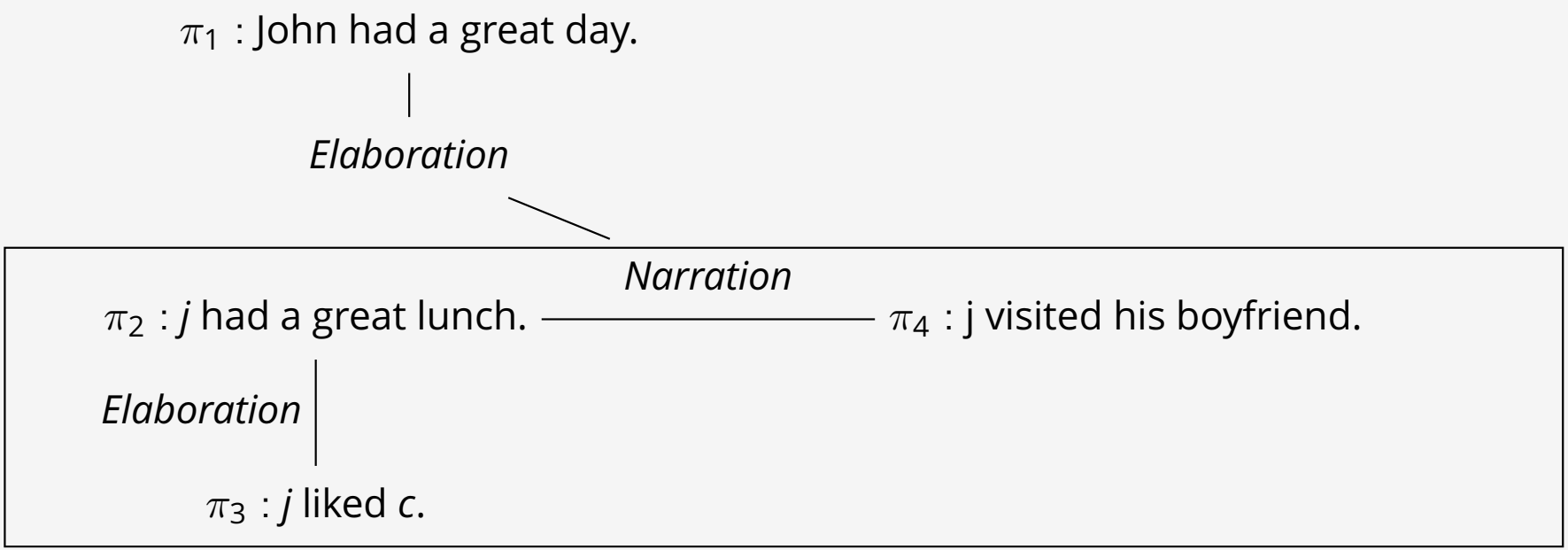

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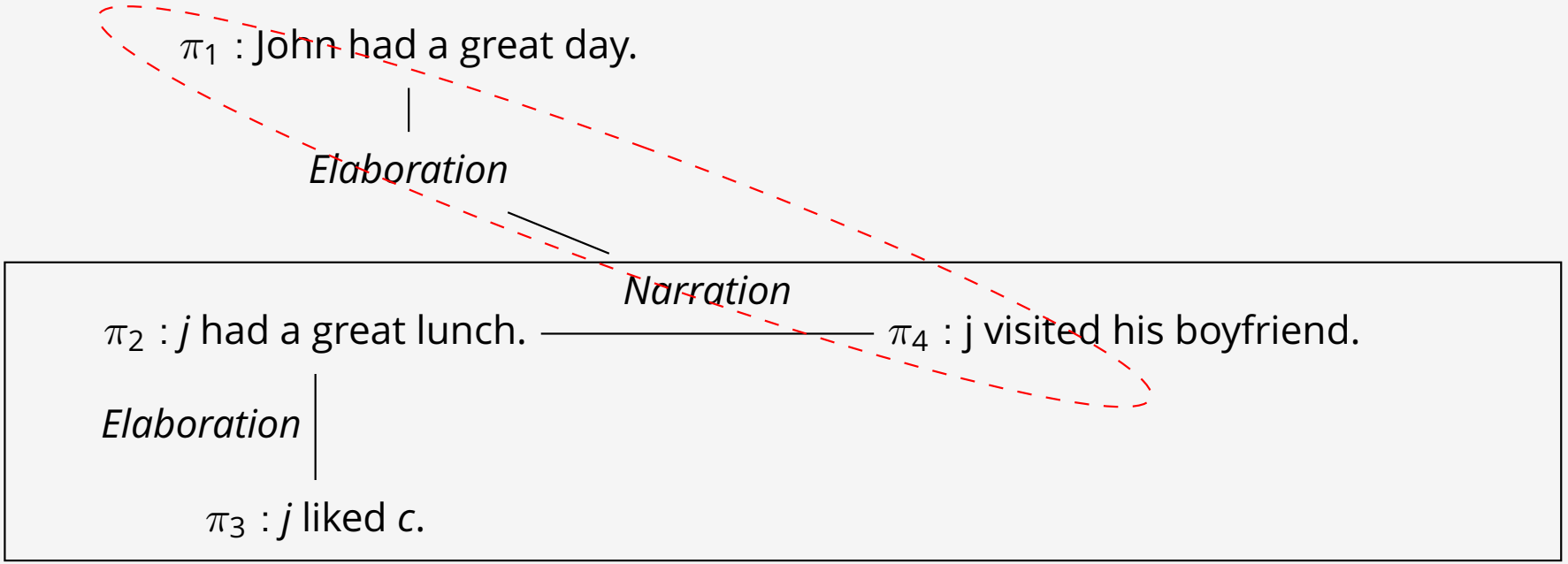
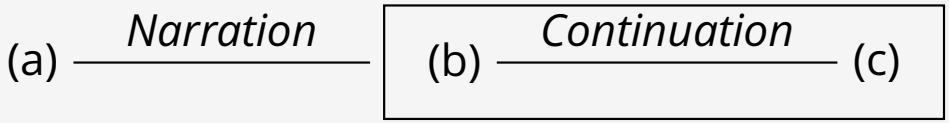


π : ? was a Dutch Gouda.

Intonation is a bit funky

(36) a. Mary and John had breakfast.
b. Then SHE went to work.
c. And HE stayed at home.

- This is this structure:



- So, *John* is hidden behind a *Narration* and shouldn't be accessible to *he*.

But really intonation is the culprit here

– In general, this structure indeed does block anaphora:

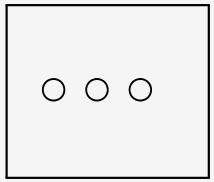
(37) a. Mary and John had breakfast.
b. Then she went to WORK.
✗c. And #he stayed at HOME.

(38) a. Mary had breakfast with John.
b. Then she went to work.
✗c. And called #HIM from the car.

This makes sense (if you think about it)

- Our motivation for coordination/subordination was that the latter change the scene and the others detail the scene.
- So (only) subordination keeps the things we talk about around, and hence available for anaphora.

There were three circles.



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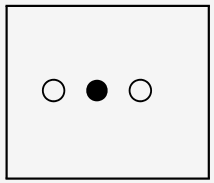

$\Rightarrow$

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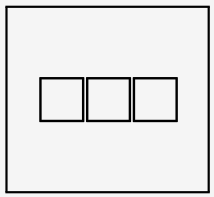

Discourse Accessibility

- Generalising just a little bit:
- We also can't "detail" scenes hat have been changed.

So the right frontier constraint also governs which discourse units are available to attach new EDUs!

Cases in point

(39) a. Mary had dinner with an old friend.
b. Then she went to bed.
✗c. Then she went home.

] Narration

(40) a. Mary had dinner with an old friend.
b. She didn't want to sit home alone.
✓c. Then she went home.

] Expl
] Narr

(41) a. Mary had dinner with an old friend.
b. She didn't want to sit home alone.
✓c. And she knew he was in town.

] Expl
] Cont

Definite Descriptions

- The idea with the “changing scenes” is not entirely exact.
- We can further detail a previous scene by referring back to it with *the*.

(42) First came ten soldiers carrying clubs; these were all shaped like the three gardeners, oblong and flat, with their hands and feet at the corners:

next the ten courtiers; these were ornamented all over with diamonds, and walked two and two, **as the soldiers did**.

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- We’ll return to this when we tackle presuppositions (which are kinda anaphora and kinda not anaphora).

The Right Frontier

Truth-Conditions and Context

The Right Frontier

Truth-Conditions and Context

What have we gained?

- We have a pretty good idea of what a context is (a structured prior narrative).
- We also know what to do with a new utterance: find a right-frontier attachment point and the right discourse relation.

  → How precisely we find the “best” or “right” attachment and relation will occupy us a lot longer, however.

  → Small spoiler: we interpret to the *most plausible narrative* or “best story”.

- But what does that do for us?

Truth-conditions of *narratives*

- We assign truth conditional meaning postulates to the discourse relations themselves.

  → These postulates tell us something about the constituent units of a relation.

- (this is in fact perfectly analogous to “modes of composition” in Fregean-Montogovian semantics)

A selection

- Q-A-Pair(α, β) requires that
  $\rightarrow$ α is a question, β is an assertion and β answers α.
- Elaboration(α, β) requires that
  $\rightarrow$ both α and β are assertions and β rhetorically entails α.
- Contrast(α, β) requires that
  $\rightarrow$ either β rhetorically entails *not* α, or β and α have similar structure with dissimilar content (details soon).
- Correction(α, β) requires that
  $\rightarrow$ both α and β are assertions and not both can be true
- Continuation(α, β) requires that
  $\rightarrow$ both α and β share a common topic.
- Narration(α, β) requires that
  $\rightarrow$ both α and β share a common topic, β and α are spatio-temporally close, and β is after α.

Veridicality

- Most discourse relations are veridical: they compose to content that entails their parts.
- Exceptions:
- *Correction* is veridical only in its right-hand part.
- *Result* is veridical, but *Consequence* is not.

(43) a. John overslept.
b. So he missed his flight.
] Result

(44) a. If John overslept,
b. he missed his flight.
] Consequence

More than the sums of their parts

(45) a. A: I roasted it and we couldn't eat it [...]
b. B: Could not? Why could you not eat it?
c. A: That was bull beef.
d. B: Oh right.
]-Explanation
(BNC, K65, 284–299)

(46) a. A: We'll roast that beef and eat it.
b. B: No, it's bull beef.
]-Correction

(47) a. A: Max owns several classic cars.
b. B: No he doesn't.
c. A: He owns two 1967 spiders
]-Counterevidence
]-Correction
]-Elaboration

(48) a. Why is Kale healthy?
b. Lots of folic acid.
]-Q-A-Pair

More than the sums of their parts

(49) a. B: I had a great dinner.
b. B: I made steak.
] Elaboration

(50) a. A: What did you have for dinner?
b. B: I made steak.
] Question-Answer

– B *ate* the steak. This is an implicature:

(51) a. B: I burned my dinner.
b. B: I made steak.
] Background

(52) a. A: What did you have for dinner?
b. B: I made steak.
] Contrast
c. B: But my dog snatched it.
] Comment

More than the sums of their parts

(53) a. John had a paper in *Nous*.
b. But he didn't get tenure.] Contrast

(54) a. Sue was wondering where John is.
b. Max said he was out getting cash.
c. Indeed, she found him at the bank (*fin institution*).] Narration

(55) a. Sue was wondering where John is.
b. Max said he was out getting cash.
c. But she found him at the bank (*area near water*).] Contrast

Formalisation

- All this can be formalised.
- How that goes, will keep us occupied for this course.