Semantics and Pragmatics of NLP
Segmented Discourse Representation Theory

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Outline

1. Present an extension of DRT with rhetorical relations
   - Logic for representing discourse semantics
   - Logic for constructing logical forms
2. Apply SDRT to some semantics tasks

Claims

1. Rhetorical relations are an essential component of discourse semantics
2. *Constructing* logical form doesn't involve full access to the logic for *interpreting* logical form.

   (1) a. There are unsolvable problems in number theory.
       b. Any even number greater than two is equal to the sum of two primes, for instance.

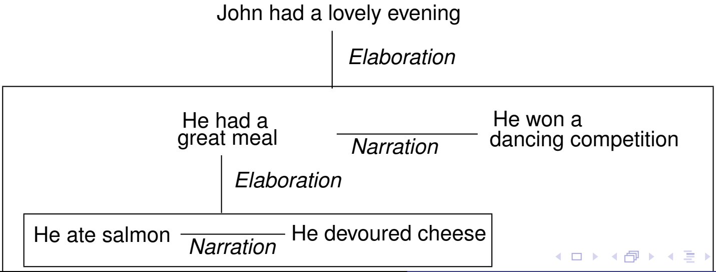
3. In fact, constructing logical form has only partial access to:
   - Lexical semantics, domain knowledge, cognitive states etc.

   for similar reasons.

Need Rhetorical Relations: Some Motivating Data

Pronouns

(2)
a. John had a great evening last night.
b. He had a fantastic meal.
c. He ate salmon.
d. He devoured lots of cheese.
e. He won a dancing competition.
f. ??It was a beautiful pink.



More Motivation for Rhetorical Relations

Tense

(3) Max fell. John helped him up.

(4) Max fell. John pushed him.

(5) John hit Max on the back of his neck. Max fell. John pushed him. Max rolled over the edge of the cliff.

Words

(6) a. A: Did you buy the apartment?
b. B: Yes, but we rented it./ No, but we rented it.

Bridging

(7) a. John took an engine from Avon to Dansville.
b. He picked up a boxcar./He also took a boxcar.

The Strategy

1. SDRSs: Extend DRT with rhetorical relations.
2. $\mathcal{L}_{ulf}$: Supply a separate logic for describing SDRSs (semantic underspecification).
3. *Glue logic:* Construct logical form for discourse via:
    1. default reasoning, over
    2. $\mathcal{L}_{ulf}$-formulae for clauses which are generated by the grammar and
    3. 'shallow' representations of lexical semantics, domain knowledge, cognitive states...

Glue logic entails more consequences about content than the grammar does. These are *implicatures*.

Review of DRT

1. $f[\langle U, \emptyset\rangle]_M g$ iff $dom(g) = dom(f) \cup U$
2. $f[K \oplus \langle\emptyset, \gamma\rangle]_M g$ iff $f[K] \circ [\gamma]_M g$
3. $f[R(x_1, \cdots, x_n)]_M g$ iff $f = g$ and $\langle f(x_1), \cdots, f(x_n)\rangle \in I_M(R)$
4. $f[\neg K]_M g$ iff $f = g$ and there's no h such that $f[K]_M h$
5. $f[K \Rightarrow K']_M g)$ iff $f = g$ and for all h such that $f[K]_M h$ there's an i such that $h[K']_M i$.

Logic of Information Content: Syntax

SDRS-formulae:

- DRSs
- $R(\pi, \pi')$, where R is a rhetorical relation and π and π' are labels.
- Boolean combinations of these

An SDRS is a structure $\langle A, \mathcal{F}, LAST \rangle$

- A is a set of labels
- $\mathcal{F}$ maps labels to SDRS-formulae (i.e., labels tag content)
- $LAST$ is a label (of the last utterance)
- Where $Succ(\pi, \pi')$ means $R(\pi', \pi'')$ or $R(\pi'', \pi')$ is a literal in $\mathcal{F}(\pi)$: A forms a partial order under $Succ$ with a unique root.

SDRSs allow Plurality

Of Relations: *Contrast*(π_1, π_2), *Narration*(π_1, π_2)

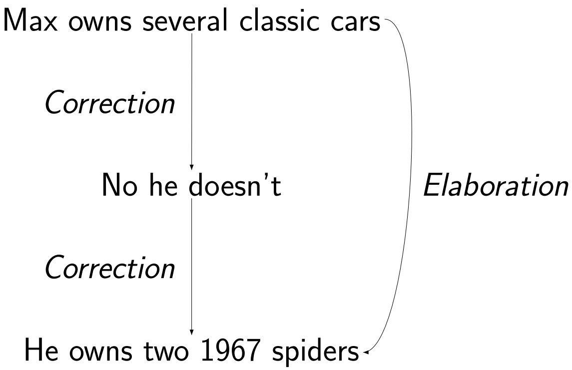
(6)
a. A: Did you buy the apartment?
b. B: Yes, but we rented it.

Of Attachment sites: *Correction*(π_2, π_3), *Elaboration*(π_1, π_3)

(8)
π_1 A: Max owns several classic cars.
π_2 B: No he doesn't.
π_3 A: He owns two 1967 Alfa spiders.

- A single utterance can make more than one *illocutionary contribution* to the discourse.

A Diagram


Max owns several classic cars
Correction
No he doesn't
Correction
He owns two 1967 spiders
Elaboration

Example

(2)

π_1 John had a great evening last night.
π_2 He had a great meal.
π_3 He ate salmon.
π_4 He devoured lots of cheese.
π_5 He then won a dancing competition.

(2)′ $\langle A, \mathcal{F}, LAST \rangle$, where:

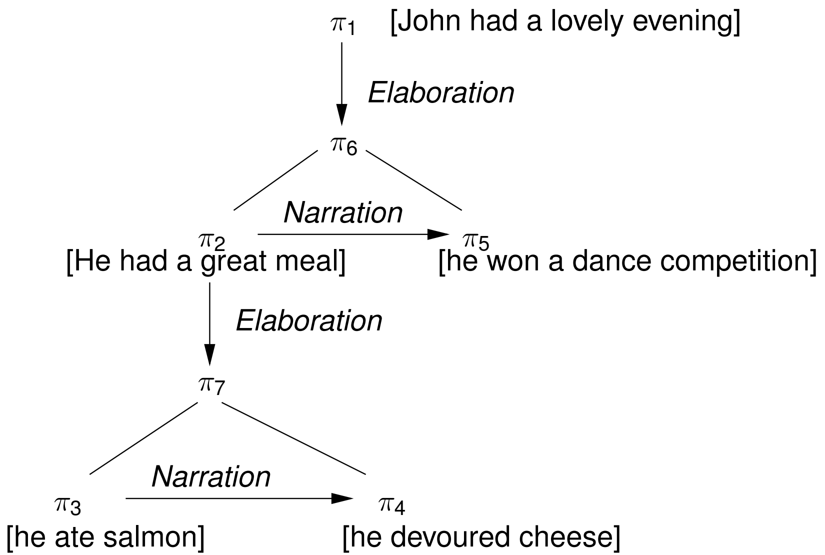
- $A = \{\pi_0, \pi_1, \pi_2, \pi_3, \pi_4, \pi_5, \pi_6, \pi_7\}$
- $\mathcal{F}(\pi_1) = K_{\pi_1}$, $\mathcal{F}(\pi_2) = K_{\pi_2}$, $\mathcal{F}(\pi_3) = K_{\pi_3}$,
  $\mathcal{F}(\pi_4) = K_{\pi_4}$, $\mathcal{F}(\pi_5) = K_{\pi_5}$,
  $\mathcal{F}(\pi_0) = \mathit{Elaboration}(\pi_1, \pi_6)$
  $\mathcal{F}(\pi_6) = \mathit{Narration}(\pi_2, \pi_5) \wedge \mathit{Elaboration}(\pi_2, \pi_7)$
  $\mathcal{F}(\pi_7) = \mathit{Narration}(\pi_3, \pi_4)$
- $LAST = \pi_5$

Other Ways of Showing This

π_0

π_0 :
- π_1, π_6
- $\pi_1 : K_{\pi_1}$
- π_6 :
  - π_2, π_5, π_7
  - $\pi_2 : K_{\pi_2}, \pi_5 : K_{\pi_5}$
  - $Narration(\pi_2, \pi_5)$
  - π_7 :
    - π_3, π_4
    - $\pi_3 : K_{\pi_3}, \pi_4 : K_{\pi_4},$
    - $Narration(\pi_3, \pi_4)$
  - $Elaboration(\pi_2, \pi_7)$
- $Elaboration(\pi_1, \pi_6)$

Other Ways of Showing This



Availability: You can attach things to the right frontier

New information β can attach to:

1. The label $\alpha = \mathit{LAST}$;
2. Any label γ such that:
   1. $\mathit{Succ}(\gamma, \alpha)$; or
   2. $\mathcal{F}(l) = R(\gamma, \alpha)$ for some label l, where R is a subordinating discourse relation
      (*Elaboration*, *Explanation* or $\Downarrow$)

   We gloss this as $\alpha < \gamma$
3. Transitive Closure:
   Any label γ that dominates α through a sequence of labels $\gamma_1, \ldots, \gamma_n$ such that $\alpha < \gamma_1, \gamma_1 < \gamma_2, \ldots, \gamma_n < \gamma$.

Available Anaphora (Not *Parallel* or *Contrast*)

Situation:

- $\beta : K_\beta$;
- K_β contains anaphoric condition φ.

Available antecedents are:

1. in K_β and DRS-accessible to φ
2. in K_α, DRS-accessible to any condition in K_α, and there is a condition $R(\alpha, \gamma)$ in the SDRS such that $\gamma = \beta$ or $Succ * (\gamma, \beta)$ (where R isn't structural).

Antecedent must be DRS*-accessible on the right frontier*

Example: Uses Accessibility from DRT

(9) Every farmer owns a donkey. ??He beats it.

(10) A farmer owns a donkey. He beats it.

DRS for (9):

π_1, π_2

π_1 : [[x | $farmer(x)$] $\Rightarrow$ [y | $donkey(y)$, $own(x, y)$]]

π_2 : [w, z | $beat(w, z)$, $w = ?$, $z = ?$]

$Background(\pi_1, \pi_2)$

DRS for (10):

π_1, π_2

π_1 : [x, y | $farmer(x)$, $donkey(y)$, $own(x, y)$]

π_2 : [w, z | $beat(w, z)$, $w = ?$, $z = ?$]

$Background(\pi_1, \pi_2)$

- *Contrast* and *Parallel* work a bit differently:

Improvement on DRT: The Dansville Example

(7) π_1 John took an engine to Dansville. (π_1)
π_2 He picked up a boxcar (π_2)
π_3 It had a broken fuel pump (π_3)

DRT:

- Flat structure:
  An engine is accessible to *it*

SDRT:

- *Narration*(π_1, π_2);
- So π_1 isn't available to π_3: $R(\pi_1, \pi_3)$ can't hold for any R
- So the engine is not an available antecedent to *it*

Semantics: Veridical Relations — Speech Acts!!

- Satisfaction Schema for Veridical Relations:
  $f[\![R(\pi_1,\pi_2)]\!]_M g$ iff $f[\![K_{\pi_1}]\!]_M \circ [\![K_{\pi_2}]\!]_M \circ [\![\phi_{R(\pi_1,\pi_2)}]\!]_M g$

Veridical:	*Explanation*, *Elaboration*, *Background*, *Contrast*, *Parallel*, *Narration*, *Result*, *Evidence*...
Non-veridical:	*Alternation*, *Consequence*
Divergent:	*Correction*, *Counterevidence*

Some Meaning Postulates: Defining $\phi_{R(\alpha,\beta)}$ for various R

- Axiom on Explanation:

  (a) $\phi_{Explanation(\alpha,\beta)} \Rightarrow (\neg e_\alpha \prec e_\beta)$
  (b) $\phi_{Explanation(\alpha,\beta)} \Rightarrow (event(e_\beta) \Rightarrow e_\beta \prec e_\alpha)$

  Max went to bed. He was sick. Max fell. John pushed him.

- Axiom on Elaboration:

  $\phi_{Elaboration(\alpha,\beta)} \Rightarrow Part\text{-}of(e_\beta, e_\alpha)$

  Max ate a big dinner. He had salmon.

More Meaning Postulates

- `Axiom on Background:`
  $\phi_{Background(\alpha,\beta)} \Rightarrow overlap(e_\beta, e_\alpha)$

  Max entered. The room was dark.

- `Axiom on Narration:`
  $\phi_{Narration(\alpha,\beta)} \Rightarrow$ (a) $e_\alpha \prec e_\beta$ and
  (b) things don't move location between the end of e_α and start of e_β (unless adverbials indicate otherwise).

  Max went to Paris. He visited a friend.

A Simple Example

(7) π_1 John took an engine from Avon to Dansville.
π_2 He picked up a boxcar.

Grammar produces (slightly simplified):

$$\begin{array}{|l|}\hline \pi_1 \\ \hline \pi_1 : \begin{array}{|l|}\hline j, x, e_1, a, d \\ \hline john(j),\ engine(x), \\ avon(a),\ dansville(d) \\ take(e_1, j, x),\ e_1 \prec n \\ from(e_1, a),\ to(e_1, d) \\ \hline \end{array} \\ \hline \end{array} \qquad \begin{array}{|l|}\hline \pi_2 \\ \hline \pi_2 : \begin{array}{|l|}\hline y, z, e_2 \\ \hline y = ?, \\ boxcar(z) \\ pickup(e_2, y, z) \\ e_2 \prec n \\ \hline \end{array} \\ \hline \end{array}$$

Discourse Update: Assume *coherence*!

- Only π_1 is available; so $\pi_0 : ?(\pi_1, \pi_2)$;
  so $y = x$ *whatever* the rhetorical relation.

The Final SDRS

- *Narration*(π_1, π_2) inferred on basis of various clues (more later).
- This has spatio-temporal consequences.

(7)′

$$
\begin{array}{|l|}
\hline
\pi_0 \\
\hline
\pi_0 : \begin{array}{|l|}
\hline
\pi_1, \pi_2 \\
\hline
\pi_1 : \begin{array}{|l|}
\hline
j, x, e_1, a, d \\
\hline
john(j),\ engine(x), \\
avon(a),\ dansville(d) \\
take(e_1, j, x),\ e_1 \prec n \\
from(e_1, a),\ to(e_1, d) \\
\hline
\end{array}
\quad
\pi_2 : \begin{array}{|l|}
\hline
y, z, e_2 \\
\hline
y = x,\ boxcar(z) \\
pickup(e_2, y, z), \\
e_2 \prec n \\
\hline
\end{array} \\
\\
Narration(\pi_1, \pi_2) \\
\hline
\end{array} \\
\hline
\end{array}
$$

Truth Conditions

1. $f[K_{\pi_0}]g$ iff $f[Narration(\pi_1, \pi_2)]g$; iff there are h and k such that:
   1. $f[K_{\pi_1}]h$; and
   2. $h[K_{\pi_2}]k$; and
   3. $k[\phi_{Narr(\pi_1,\pi_2)}]g$
2. By `Axiom on Narration`; (3c) only if
   1. $k[e_1 \prec e_2]k$;
   2. $k[in(z, d)]k$

So $(7)'$ entails more than the compositional semantics of the clauses: Implicatures!

Comparison with DRT

Flat Structure!

j, x, y, a, d, e_1, e_2
$john(j)$, $engine(x)$, $boxcar(y)$, $avon(a)$, $dansville(d)$ $take(e_1, j, x)$, $pickup(e_2, j, y)$, $e_1 \prec e_2 \prec n$

Advantage of SDRT:

- Semantics of *Narration* models implicatures: *Boxcar is in Dansville*.
- And it predicts incoherence.

(11) ??Max entered the room. Mary dyed her hair black.

- Better predictions about pronouns:

(7) John took an engine to Dansville. He picked up a boxcar.
??It had a broken fuel pump.

Constructing Logical Form: A Preview

The grammar

- Produces underspecified LFs for clauses (e.g., $x = ?$); These are *partial descriptions* of logical forms (separate logic)

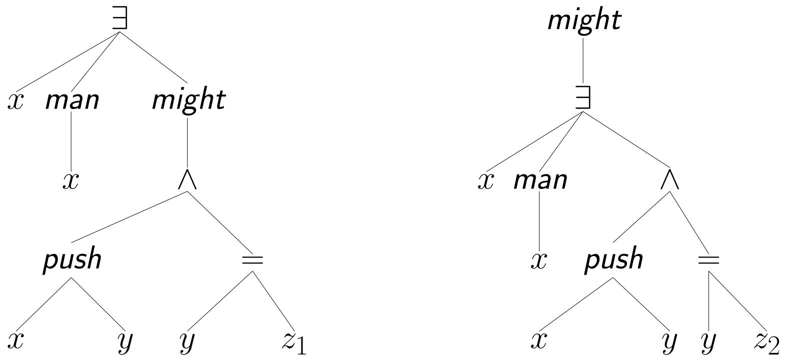
Glue Logic:

- Can only access ULFs;
- Performs the following co-dependent inferences:
  1. Infer (preferred) values of underspecified conditions generated by the grammar;
  2. Infer what's rhetorically connected to what;
  3. Infer the values of the rhetorical relations

Some Formal Details: Underspecification

(12) A man might push him.

Assuming only z_1 and z_2 available, there are four LFs.
Here are two of them:



Strategy: Introduce $\mathcal{L}_{ulf}$

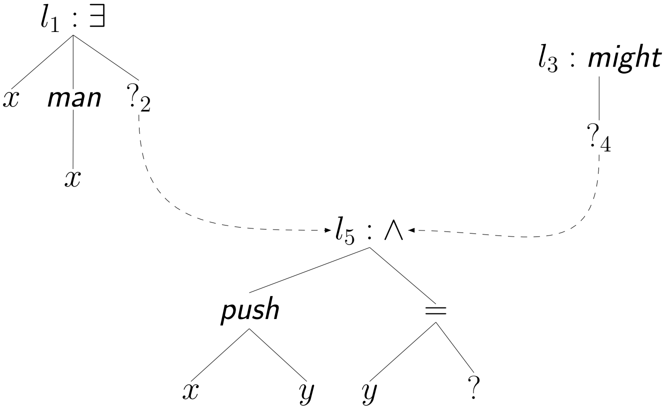
Want to describe just the four trees and no others. So:

- Reify nodes of the tree
- So you can talk about scope independently of predicates
- Introduce variables (written ?) to show where values of symbols are unkonwn.

(12) A man might push him.

(12)′
$$l_1 : \exists(x, \text{MAN}(x), ?_2) \wedge$$
$$l_3 : \text{MIGHT}(?_4) \wedge$$
$$l_5 : \wedge(l_6, l_7) \wedge l_6 : push(x, y) \wedge l_7 : x = ? \wedge$$
$$\text{OUTSCOPES}(?_4, l_5) \wedge \text{OUTSCOPES}(?_2, l_5)$$

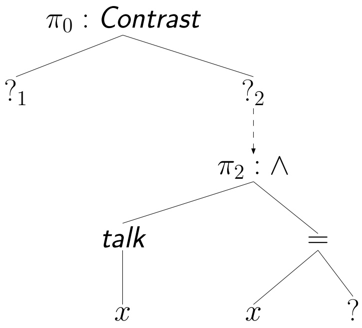
Graphically



Rhetorical Underspecification

(13) But he talks

(13)′ π_0 : $\mathit{Contrast}(?_1, ?_2)\wedge$
$\pi_2 : \wedge(l_1, l_2) \wedge l_1 : \text{TALK}(x) \wedge l_2 : x =?\wedge$
$\text{OUTSCOPES}(?_2, \pi_2)$



Semantics of the ULF-Language $\mathcal{L}_{ulf}$

- Models are the trees.
- So each model corresponds to a unique SDRS.
- $M \models_{\mathcal{L}_{ulf}} \phi$ means
  ϕ is a (partial) description of the SDRS M.

Comparison of Semantics:

SDRSs: dynamic, first-order, modal (though not here)

ULFs: static, extensional, finite first-order

ULFs ‘access’ the *form* of LFs, but not their entailments
(according to the logic of LFs)

From Clauses to Discourse

Discourse update is used to perform three interdependent tasks:

Task 1: Attachment Sites:

a Which π' in the context are possible attachment sites? ***Done!***

b Of these, which does π *actually* attach to?

Task 2: Rhetorical Relations: If π attaches to π', then which rhetorical relation do we use?

Task 3: Augment Content: Apart from old and new information to be added to the update:

a What underspecifications do we resolve; and

b What else do we add?

Inferring Rhetorical Relations: Glue Logic

Task 2

- Rhetorical Relations aren't always linguistically marked.
- They depend on:
  - Compositional and lexical Semantics
  - World Knowledge
  - Cognitive states...
- We need to:
  - Encode knowledge used to infer rhetorical relations.
  - Use a logic that supports the inferences we need.

Temporal Relations & Defeasible Reasoning

(14) Max took an aspirin. He was sick.
Background and *Explanation*

(15) Max took an aspirin overdose. He was sick.
Result

- “states are backgrounds” applies to both.
- But this is overridden in (15).
- These are default rules!

Default guess can get Corrected

(16)
a. A: John went to jail. He was caught embezzling funds from the pension plan.
b. B: No! John was caught embezzling funds, but he went to jail because he was convicted of tax fraud.

Default Rules in the Glue Logic

- $A > B$ means "If A then normally B."
- The nonmonotonic validity, $\mid\!\sim_g$, supports intuitive patterns of commonsense reasoning.

The glue logic axioms:

- $(\lambda :?(\alpha, \beta) \wedge$ some stuff$) > \lambda : R(\alpha, \beta)$

To make things computable:

- 'some stuff' rendered with *descriptions* of formulae from richer information sources (e.g., SDRSs, domain knowledge…).

Patterns of Common Sense Reasoning

Closure on the Right:
$A > B, B \rightarrow C \vdash A > C$

$$\frac{\begin{array}{l}\text{Lions walk}\\ \text{Things that walk must have legs}\end{array}}{\text{Lions have legs.}}$$

Defeasible Modus Ponens:
$A > B, A \mid\!\sim_g B$

$$\frac{\begin{array}{l}\text{If Tweety is a bird,}\\ \quad\text{then normally}\\ \quad\quad\text{Tweety flies}\\ \text{Tweety is a bird}\end{array}}{\text{Tweety flies}}$$

Knowledge Conflict

Penguin Principle:
If $C \vdash A$ then
$A > B, C > \neg B, C \mid\!\sim_g \neg B$

If Tweety is a penguin,
then Tweety is a bird
If Tweety is a bird,
then normally Tweety flies
If Tweety is a penguin,
then normally
Tweety doesn't fly
Tweety is a Penguin

Tweety doesn't fly

Nixon Diamond:
$A > B, C > \neg B, A, C \not\mid\!\sim_g B$
(or $\neg B$)

If Nixon is a Quaker,
then normally
he's a pacifist
If Nixon is a Republican,
then normally
he's a non-pacifist
Nixon is a Quaker
Nixon is a Republican

$*$ Nixon is a (non)-pacifist

Some Glue Logic Axioms

- `Narration`
  $(\lambda :?(\alpha, \beta) \wedge \textit{occasion}(\alpha, \beta)) > \lambda : \textit{Narration}(\alpha, \beta)$
- `Scripts for Occasion`
  $(\lambda :?(\alpha, \beta) \wedge \phi(\alpha) \wedge \psi(\beta)) > \textit{occasion}(\alpha, \beta)$.
- `Explanation`
  $(\lambda :?(\alpha, \beta) \wedge \textit{cause}_D(\beta, \alpha)) > \lambda : \textit{Explanation}(\alpha, \beta)$
- `Causation and Change`
  $(\textit{change}(e_\alpha, y) \wedge \textit{cause-change-force}(e_\beta, x, y)) \rightarrow \textit{cause}_D(\beta, \alpha)$

Some Quick Lexical Semantics!

push:

- ORTH : ⟨**push**⟩
- SYN :
  - CAT : **v**
  - SUBJ : **NP** [**x**]
  - SUBCAT : ⟨**NP** [**y**]⟩
- SEM :
  - INDEX : [e] [QUALIA : [LOC : *cause-change-force*([e] , [x] , [y])]]
  - LISZT :
    - **push_rel**
    - EVENT : [e]
    - ARG1 : [x]
    - ARG2 : [y]

fall:

- ORTH : ⟨**fall**⟩
- SYN :
  - CAT : **v**
  - SUBJ : **NP** [**x**]
- SEM :
  - INDEX : [e] [QUALIA : [LOC : *change*([e] , [x])]]
  - LISZT :
    - **fall_rel**
    - EVENT : [e]
    - ARG1 : [x]

An Example of Narrative

The Logical Form of the Sentences

(3) Max fell. John helped him up.

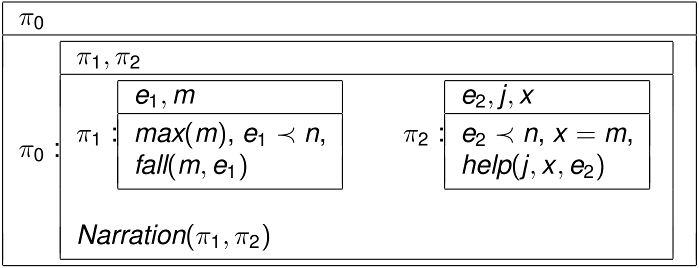
π_1 $max(m), e_1 \prec n, fall(m, e_1)$

π_2 $e_2 \prec n, x = ?, help(j, x, e_2)$

Assume Coherence: $\pi_0 : ?(\pi_1, \pi_2)$

1. $x = ?$ resolves to $x = m$
2. scriptal information $\mid\!\sim$ OCCASION(π_1, π_2)
3. DMP on `Narration` yields π_0 : NARRATION(π_1, π_2)

Minimal SDRS Satisfying the $\mathrel{|\!\sim}_g$-consequences



- By 'minimal' I mean minimum number of nodes.
- This entails $e_1 \prec e_2$; John and Max in the same 'place'.

Another Narration

(7) a. John took an engine from Avon to Dansville.
 b. He picked up a boxcar...

- DMP on `Narration` gives *Narration*(α, β).
- The spatial constraint on Narration means that John is in Dansville when he starts to pick up the boxcar.
- So by the lexical semantics of *pick up*, this means that the boxcar is in Dansville (when it's picked up).
  - This is a bridging inference!
- $e_\alpha \prec e_\beta$ is entailed too.

An Explanation

(4) Max fell. John pushed him.

π_1 $max(m), e_1 \prec n, fall(m, e_1)$

π_2 $e_2 \prec n, x = ?, push(j, x, e_2)$

Assume coherence: $\pi_0 : ?(\pi_1, \pi_2)$

- MP on `Causation and Change`: $cause_D(\pi_2, \pi_1)$
- DMP on `Explanation`: $\pi_0 : Explanation(\pi_1, \pi_2)$ is inferred.

The SDRS

π_0

π_0 :

> π_1, π_2
>
> π_1 : e_1, m
>
> $max(m),\ e_1 \prec n,\ fall(m, e_1)$
>
> π_2 : e_2, j, x
>
> $e_2 \prec n,\ x = m,$
> $push(e_2 j, x)$
>
> $Explanation(\pi_1, \pi_2)$

Entailments: Both clauses are true; $e_2 \prec e_1$

Constructing SDRSs: Simple Discourse Update $+$

- You update a set σ of SDRSs with $\lambda :?(\alpha, \beta)$, where $\mathcal{K}_\beta$ is the ULF for β
- $\textsc{Th}(\sigma) =_{def} \{\phi : \forall s \in \sigma, s \models_{\mathcal{L}_{ulf}} \phi\}$
- The result is a set σ' of SDRSs
- $+$ is monotonic: $\sigma' \subseteq \sigma$ (or $\textsc{Th}(\sigma) \subseteq \textsc{Th}(\sigma')$)

$$\sigma + \lambda :?(\alpha, \beta) = \{\tau : \text{ if } Th(\sigma), \mathcal{K}_\beta, \lambda :?(\alpha, \beta) \mid\!\sim_g \phi \text{ then } \tau \models_{\mathcal{L}_{ulf}} \phi\}$$

So you just add glue-logic consequences to the ULFs, and $\tau \in \sigma'$ must satisfy those.

Rhetorical Relations are in the Update!

Suppose:

$$Th(\sigma), \mathcal{K}_\beta, \lambda :?(\alpha, \beta) \mid\!\sim_g \lambda : R(\alpha, \beta)$$

Then:

$$\forall \tau \in update, \mathcal{F}_\tau(\lambda) \rightarrow R(\alpha, \beta)$$

This justified putting *Narration*(π_1, π_2) in SDRS for (3).

Constructing SDRSs: Discourse Update

$\mathit{update}_{\text{sdrt}}$ abstracts over choices about what attaches to what:

1. Make a new choice about what β attaches to (you can choose more than one label).
2. Compute the results of $+$ with your choice.
3. Go back to step 1 and repeat…
4. $\mathit{update}_{\text{sdrt}}(\sigma, \mathcal{K}_\beta)$ is the union of all the results from step 2

Conservative!

- $\mathit{update}_{\text{sdrt}}(\sigma, \mathcal{K}_\beta)$ doesn't pick what β *actually* attaches to;
- Nor does it pick which underspecifications to resolve

So How do We Make Remaining Choices?

Go for as many connections as possible:

(17) a. Max had a lovely evening.
b. He had a fantastic meal.
c. He ate salmon

(6) a. A: Did you buy the apartment?
b. B: Yes, but we rented it.

Prefer discourse relations higher in the (discourse) ranking:

(18) a. John annoys Fred.
b. He calls all the time/never calls/
calls on Fridays.

Maximise Discourse Coherence (MDC)

An SDRS is better if it:

1. Contains relations higher in the ‘ranking’
2. Contains more rhetorical relations
3. Contains fewer underspecifications
4. Has a minimal number of labels.

Always interpret discourse so that coherence is maximsed!
I.e., Prefer highest-ranked SDRSs in update_{sdrt}.

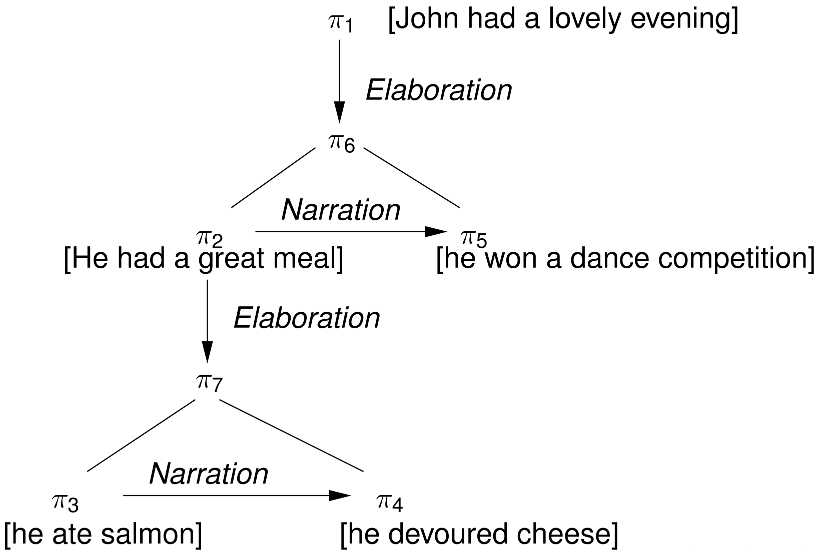
Discourse Popping

(2) π_1 Max had a lovely evening last night.
π_2 He had a fantastic meal.
π_3 He ate salmon.
π_4 He devoured lots of cheese.
π_5 He won a dancing competition.

Attaching π_5:

- Alternative choices of attachment sites would not have maximised rhetorical connections or minimised underspecification

A Diagram


π_1
[John had a lovely evening]
Elaboration
π_6
Narration
π_2
[He had a great meal]
π_5
[he won a dance competition]
Elaboration
π_7
Narration
π_3
[he ate salmon]
π_4
[he devoured cheese]

Word Senses

(6) a. A: Did you buy the apartment?
b. B: Yes, but we rented it.

If *rent* is rent-from:

- Get *Contrast*, but nothing else.

If *rent* is rent-to:

- Get *Contrast* and *Narration*

MDC: update resolves *rent* to rent-to sense, because this gets more connections.

Summary

- There are problems with DRT's account of anaphora:
    1. Needs discourse structure given by rhetorical relations.
    2. LF construction should involve reasoning with non-linguistic information.
- There are also problems with the unmodular way AI-theories like Hobbs *et al* tackle task 2.
- SDRT attempts to combine 'best practices' of both:
    1. Improves constraints on anaphora for both frameworks.
    2. Maintains a separation between the logic of LF construction and the logic of LF interpretation.
    3. Choices modelled within the logic rather than via weights.