

COHERENT COREFERRING PRONOUNS

Marten van Schijndel¹ Roi Reichart²

¹The Ohio State University

²Technion- Israel Institute of Technology

October 28, 2014

WHAT IS ‘COHERENCE’?

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A relation that explains why two discourse elements co-occur.

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- 1a) Bill hid John's car keys.
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1a) Bill hid John's car keys.

1b) He was drunk.

2a) Bill hid John's car keys.

2b) He likes spinach.

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When two linguistic phrases refer to the same discourse element.

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EXAMPLES:

1a) Bill hid John's_j car keys.

1b) He_j was drunk.

2a) Guards locked down [the Czechoslovak border]_b.

2b) It_b remained fortified but largely unmanned for many years.

COHERENCE AND COREFERENCE INDEPENDENTLY AFFECT PRONOUN INTERPRETATION.

Kehler and Rohde (2013) compared:

- Coherence-driven interpretation (Hobbs 1979, Kehler 2002)
- The coreference-focused Centering Theory (Grosz et al. 1995)

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They found:

- Coherence informs expectations of which entities are accessible
- Centering informs the likelihood of the form of each entity via topic continuity

...BUT WHAT IS COHERENCE?

Hobbs (1985) and Kehler (2002) define a series of coherence relations that they believe hold in natural language

This work relies on these definitions of coherence because:

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This work relies on these definitions of coherence because:

- Kehler and Rohde (2013) used them
- There is a joint coherence/coreference corpus based on it (Wolf et al. 2003)
- RST is tree-based and coherence can have crossed dependencies (Wolf and Gibson 2003)

COHERENCE IS...

ELABORATION

- There is a train on Platform 1.
- Its destination is Rome.

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CONTRAST

- Train 1 is going to Rome.
- Train 2 is going to Paris.

COHERENCE IS...

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- There is a train on Platform 1.
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TEMPORAL

- We first saw the steam come over the hill.
- At last, we saw the train.

COHERENCE IS...

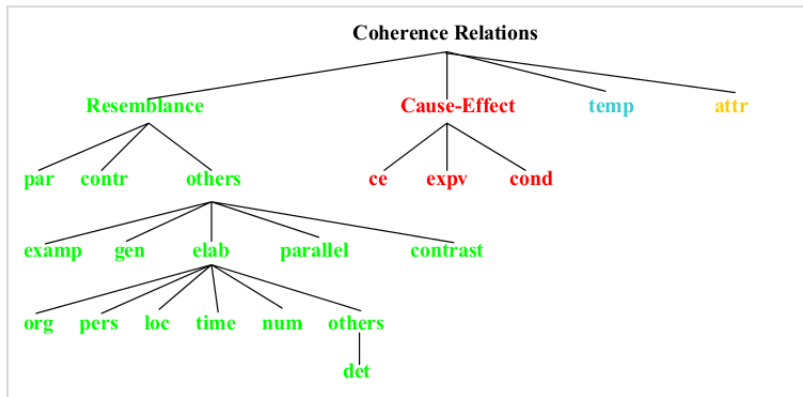


Figure 3. Coherence relations used in the Discourse Graphbank.

HOW IS COHERENCE ACTUALLY USED?

[Model diagram]

LET'S FOCUS ON PRONOMINALIZATION

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Use Naïve Bayes

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 - listener cares about coherence and topic
 - speaker only cares about grammar and topic

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Production, but we'll pretend there is no difference

USE THE C-3 COHERENCE COREFERENCE CORPUS

(Nicolae et al. 2010)

Additional annotation of Discourse Graphbank (Wolf et al. 2003)

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Composed of:

- AP Newswire
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- GRE texts
- SAT texts

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Additional annotation of Discourse Graphbank (Wolf et al. 2003)

Composed of:

- AP Newswire
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- GRE texts
- SAT texts

Contains:

- Entity/Mention annotations
- Coreference annotations
- Coherence annotations

WHAT SORT OF MENTION ANNOTATION?

Type (# in dev): example

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- Names (89): *Libya*

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Type (# in dev): example

- Pronouns (115): *it*
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- Premodifier mentions (38): *Soviet* consumers

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Type (# in dev): example

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- WHQ (40): wh- question words and *that*
- Quantified nominals (92): *the captain*
- Names (89): *Libya*
- Premodifier mentions (38): *Soviet* consumers
- Bare nominals (9): *money funds*
- Appositives (5): *Launius' wife, Susan*
- Complex appositives (5): (appositives containing a relative clause)
- Headless mentions (3): *the very angry* who are ...
- Partitives (2): *one of the engines*
- Conjoined (0): *headlights and blinkers*

Total dev size = 398 (jackknifed)

Total corpus size = 2661

FACTORS OF INTEREST

- Mention
 - Coherence
 - Topic (LDA via Mallet)
 - GCG category

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 - First word of sentence
- Antecedent
 - Antecedent lexeme
 - Antecedent GCG category

DIRECT 10-CLASS PREDICTION RESULTS

	Pro	Total
base (chance)	0.1	0.1
base (ml)	0.0	0.231
coherence	0.617	0.241
topic	0.478	0.251
coh+top	0.530	0.256
prev word	0.383	0.261
first word	0.609	0.291
cat	0.574	0.445
full	0.739	0.472
prev+first+cat	0.696	0.528

Omitted: Sentence position and antecedent models

DIRECT BINARY PREDICTION RESULTS

	Pro	Total
base (chance)	0.5	0.5
coh+top	0.006	0.598
base (ml)	0.0	0.611
coherence	0.077	0.611
full	0.045	0.621
topic	0.103	0.641
cat	0.490	0.714
prev+first+cat	0.613	0.799

Omitted: Models worse than baselines

INTERIM CONCLUSIONS

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- Speaker-biased Centering influences are apparent

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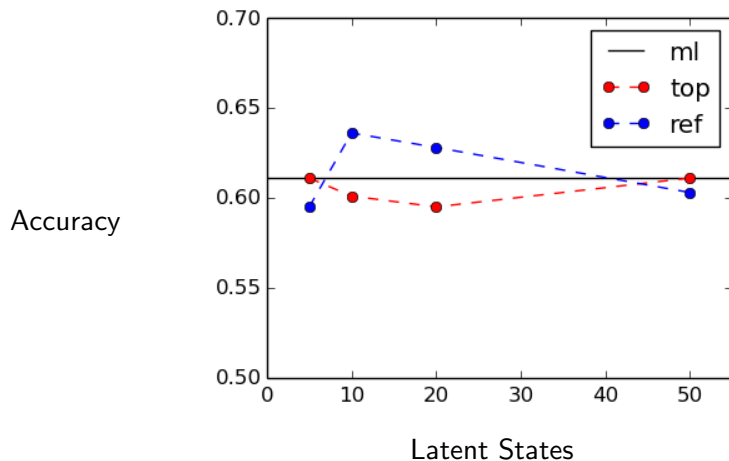
- Speaker-biased Centering influences are apparent
- Topic/Coherence not great direct PRO predictors

MODELING KEHLER AND ROHDE (2013)

Now that we have some ideas about how each factor affects the task, we'll try to better model Kehler and Rohde (2013).

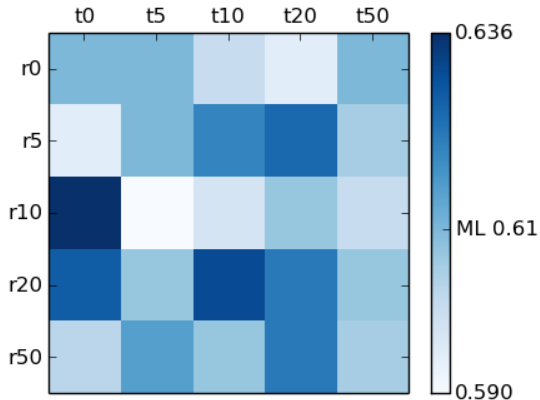
[Model Diagram]

BINARY ACCURACY WITH 1 LATENT VARIABLE



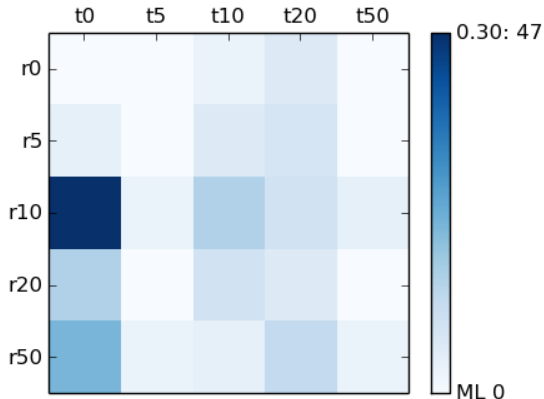
BINARY ACCURACY WITH 2 LATENT VARIABLES

rX - ref states
tX - topic states

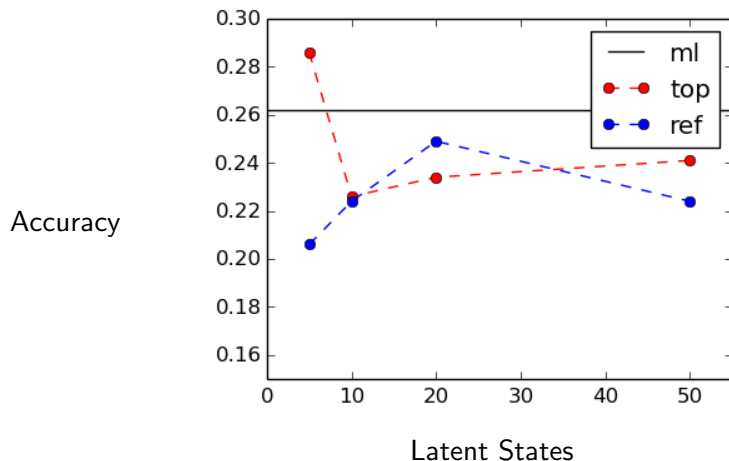


BINARY PRO ACCURACY WITH 2 LATENT VARIABLES

rX - ref states
tX - topic states

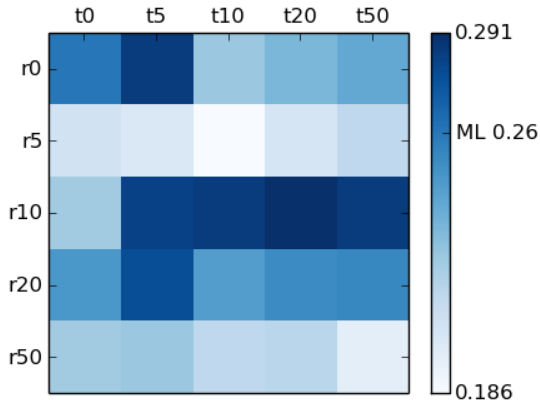


10-CLASS ACCURACY WITH 1 LATENT VARIABLE



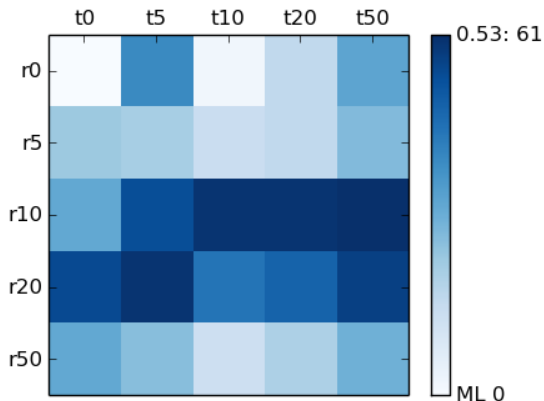
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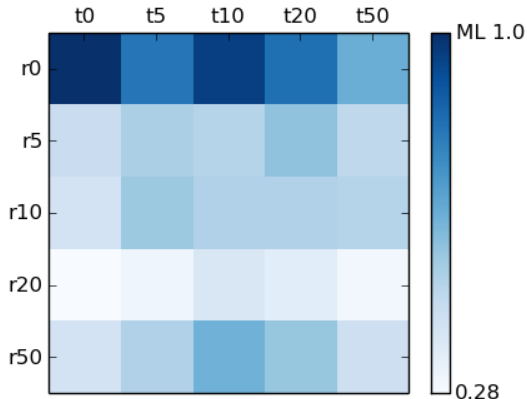
10 PRO ACCURACY WITH 2 LATENT VARIABLES

rX - ref states
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10 NOM ACCURACY WITH 2 LATENT VARIABLES

rX - ref states
tX - topic states



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- Speaker-biased Centering influences are apparent
- Role may exist for coherence in production contra Rohde and Keller (2014) May stem from editing

FUTURE WORK IDEAS

- Try best system + latent REF
- Filter out premodifier mentions
- Separate different domains
- Pool WHQ and PRO in 10-class (or filter out WHQ altogether)
- Try to predict first word of discourse segment
- Use GCG category of mention span
- Predict syntactic constructions (cleft, passive, etc)
- Give system choices with PRO and non-PRO and see how often it prefers actual sentence

THANKS!

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ant cat	0.330	0.271
first word	0.609	0.291
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DIRECT BINARY PREDICTION RESULTS

	Pro	Else	Total
antecedent	0.110	0.247	0.193
prev word	0.374	0.379	0.377
first word	0.310	0.432	0.384
base (chance)	0.5	0.5	0.5
sent position	0.026	0.951	0.590
coh+top	0.006	0.975	0.598
ant cat	0.258	0.963	0.598
base (ml)	0.0	1.0	0.611
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topic	0.103	0.984	0.641
cat	0.490	0.856	0.714
prev+first+cat	0.613	0.918	0.799

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