

Causes for Requesting Clarification in Dialogue

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Clarification Requests

A: I just saw your archenemy.

My what?
My arch-what?
Who?
Peter?

B: { You just did what?
Huh?
Pardon?
You trying to scare me?
Why are you saying that?
...

Clarification Requests

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	My arch-what?	what's an archenemy?
	Who?	who is A referring to?
	Peter?	is A referring to Peter as my „archenemy“?
B: {	You just did what?	what did A say he just did?
	Huh?	what did A say?
	Pardon?	what did A say?
	You trying to scare me?	is A talking to me?
	Why are you saying that?	is A trying to scare me?
...	what's A trying to do?	

what this talk is *not* about

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form function

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• classification of problems that lead to a need for clarification
• computational model of utterance processing that can have these problems

Overview

- Three dimensions for classification
 - level of action / extent / severity
- Dimension 1: Clark's / Allwood + SDRT
- Dimension 3: computational model
 - Generalised confidence scores
- Further Work, Conclusions

Dimension 1: Level of Action

A: I just saw your archenemy.

My what?

- attention problem → is A talking to me?
- acoustic problem → who/what did A say he saw?
- lexical problem → what's an archenemy?
- (semantic) understanding problem → who is A referring to?
- (pragmatic) understanding problem → is A referring to Peter as my „archenemy“?

You trying to scare me? → what did A say he just did?

Why are you saying that? → what did A say?

... → is A trying to scare me? / what's A trying to do?

Dimension 2: Extent

A: I just saw your archenemy.

My what?

problem caused by:

- whole utterance
- or
- part of utterance

B: You just did what? → is A talking to me?

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Dimension 3: Severity

A: I just saw your archenemy.

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Does B maintain a hypothesis, or not?

B: Peter? → is A talking to me?

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Dim.1, current approaches

- *inter alia* (Larsson 2003; Gabsdil 2003)
- based on (Clark 1996) / (Allwood 1995)

Level	Clark	Allwood	
4	proposal & consideration	reaction 2 evocative func.	(prag.) underst. prob.
3	meaning & understanding	understanding	(sem.) underst. prob.
2	presentation & identification	perception	acoustic prob.
1	execution & attention	contact	attention prob.

A fine-grained classification

- Clark / Allwood + SDRT (Asher & Lascarides 2003)

Level	Description
4	recognising speaker's intentions
3c	contextual relevance (= computing rhet. relation)
3b	resolving underspecification:
-i	reference
-ii	tense, scope, presuppositions, lex. amb., etc.
3a	parsing:
-i	determining a <i>unique</i> syntactic structure
-ii	determining syntactic structure
-iii	recognising all words
2	speech recognition
1	establishing contact

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A: Max fell. John pushed him.
 B: Are you saying Max fell *because* John pushed him?

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1	establishing contact

A: Every wire has to be connected to a power source.
 B: Each to a different one, or can it be the same for all wires?

Dimension „Extent“

- e.g. "my arch-what?" vs. "huh?"
- (Clark & Schaefer 1987):

State	1	2	3	4
4	●	●	●	●
3				
2				●
1				
0				

I | just | saw | your | arch | enemy |

Dimension „Severity“

- is hypothesis maintained or not? ("Peter?" vs. "Who?")
- *quality* of hypothesis / confidence in it
- ... old news to people working on SDS: confidence score of speech recognition

reject	confirm	accept
	explicit	implicit

e.g. (San-Segundo *et al.* 2001)

Dimension „Severity“

- is hypothesis maintained or not? ("Peter?" vs. "Who?")
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A: I just met your archenemy.

B: Who? My archenemy?

Dimension „Severity“

- quality of hypothesis / confidence in it needed at *all* levels of processing! (here: reference resolution)

A: I just met your archenemy.

B: Who's that? Peter?

Interdependencies

- not always in discrete state..

Interdependencies

- snowballing: wrong hypothesis at one level will lead to dubious hyps. at higher levels.

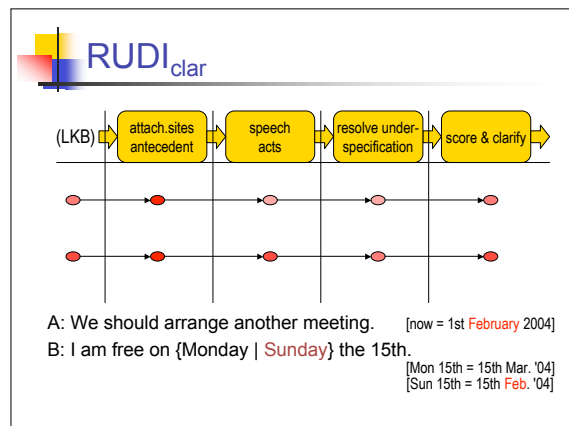
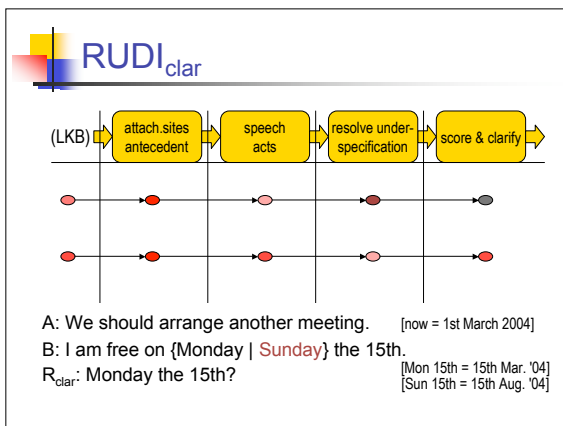
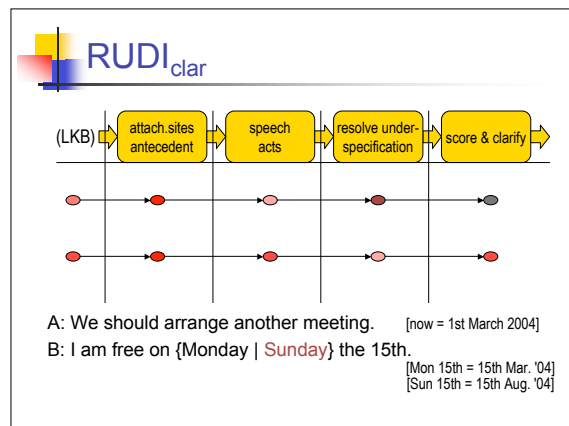
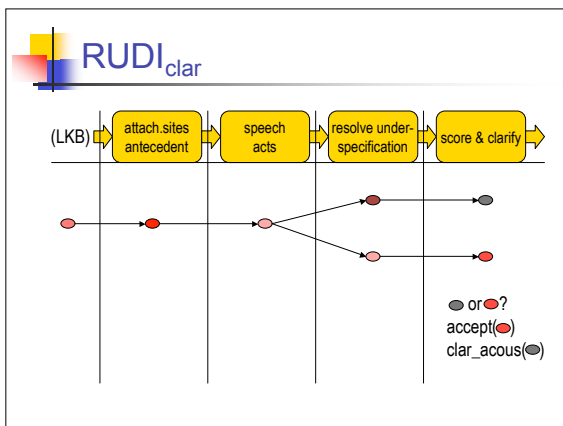
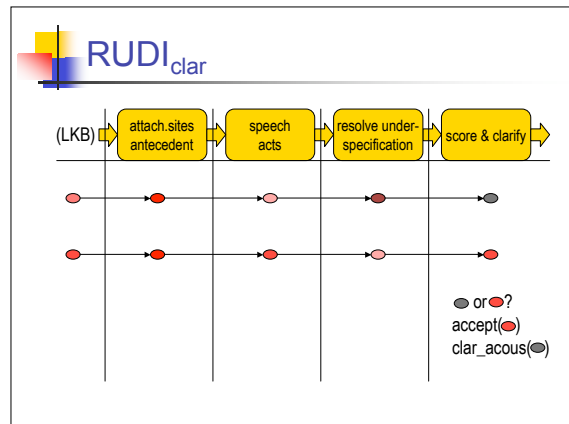
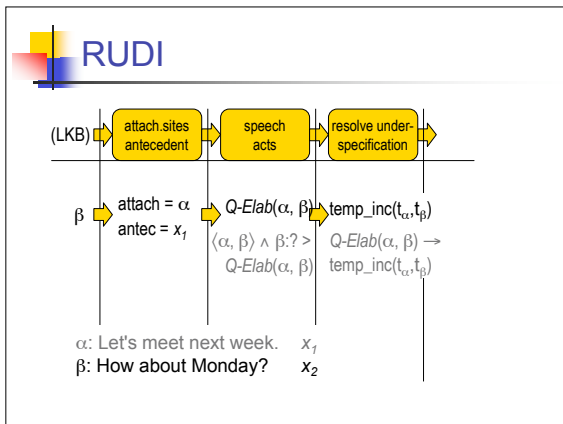
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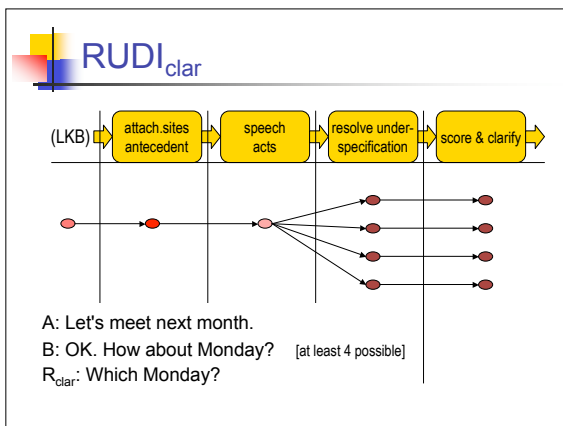
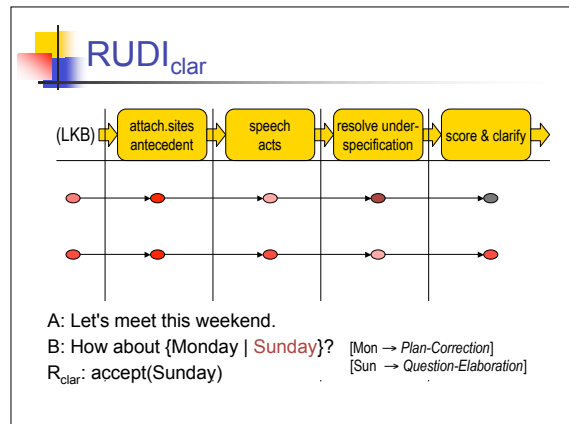
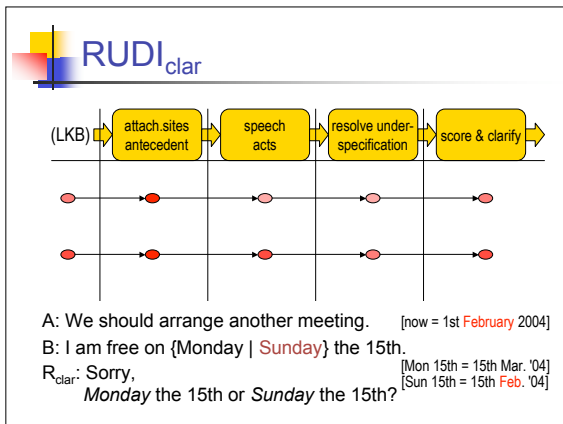
- SR confidence + NLU features: (Duff, Gates & LuperFoy 1996), (Walker, Wright & Langkilde 2000), (Gabsdil 2004)
- generalised to other levels: (Paek & Horvitz 1999)

A Computational Model

- RUDI_{clar}, based on RUDI (Resolving Underspecification using Discourse Information, (Schlangen *et al.* 2000))
- RUDI implements SDRT, computes:
 - rhetorical relations
 - bridging relations

Q-Elab [A: Let's meet next week.
B: How about Monday? [= Monday of next week.]





Conclusions

- multi-dimensional classification of problems that lead to a need for clarification
 - level of action
 - extent
 - severity

Peter finagled a raise


- computational model of utterance processing that can have these problems, using a principled theory of dialogue semantics & pragmatics

Further work

- learn best combination of conf. scores
- not only model interactions btw. levels, but also model *costs* (cost of misunderstand. vs. cost of clarifying)
 "I'm busy on Monday, because ..."

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- **evaluation!!**
 (different grammar, more robust, ...)



Thank you!

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