Speaking figuratively

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- psychological therapy [e.g. Fiehler 2002, McMullen 2008]

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- workplace discourse [e.g. Koester 2000, Littlemore et al 2010]
- reconciliation talk [Cameron 2007]
- psychological therapy [e.g. Fiehler 2002, McMullen 2008]
- the language of experts [e.g. Glucksberg 1989, Boerger 2005]

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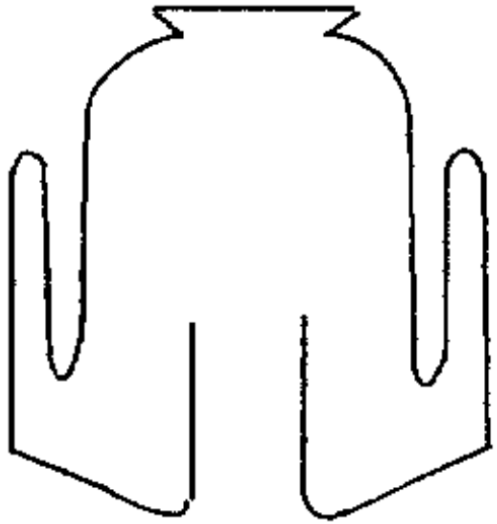
Krauss' studies on descriptions of novel geometric shapes

A: Its like an hourglass with legs on each side

(Krauss & Glucksberg 1977)



Figurative language in dialogue

Psychotherapy sessions

J(therap.): When you have a problem what do you do with it?
H: I usually let it be a problem.
J: Can you look at your own life, kind of on a continuum? Look down the road of that line and see what that's gonna do... in your life?
H: Look on down the road
(Ferrara 1994)

The dynamics of dialogue

clarification

A: Bob left.
B: The accounts guy?
A: Yeah.

correction

A: Bob left.
B: Rob?
A: No, Bob.

The dynamics of dialogue

acknowledgment & reformulation

A: Bob left.
B: Bob?
A: Yeah. The accounts guy.

correction & reformulation

A: Bob left.
B: Rob?
A: No, Bob. The accounts guy.

Conceptual dynamics of dialogue

clarification

Patient: Is there something else I can take for the pain?
Doctor: To be honest, you are already taking a very nice cocktail.
Patient: Stockpile?
Doctor: No, cocktail, of medicines.
Patient: Cocktail.
Doctor: And I don't want to add to this cocktail unless absolutely necessary.
(adapted from Lee 2006)

- medicines as target, cocktail as source

$\rightarrow$ the patient is taking a mixture of a diverse range of medicine

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- Some findings from the literature:

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(3) Use of figurative language is conditioned by communication problems (e.g. Bavelas et al. 2007, Healey 1997, Glucksberg 1989)

Plan of the talk

Grammars for modelling dialogue
- Dynamic Syntax
- Analysis

ATT-Meta

Bringing it all together

Outline

Grammars for modelling dialogue

- Dynamic Syntax (Kempson et al. 2001, Cann et al. 2005):

(1) Goal-directed, fully incremental parsing
(2) Underspecification-plus-enrichment
(3) Context-dependent parsing, & generation

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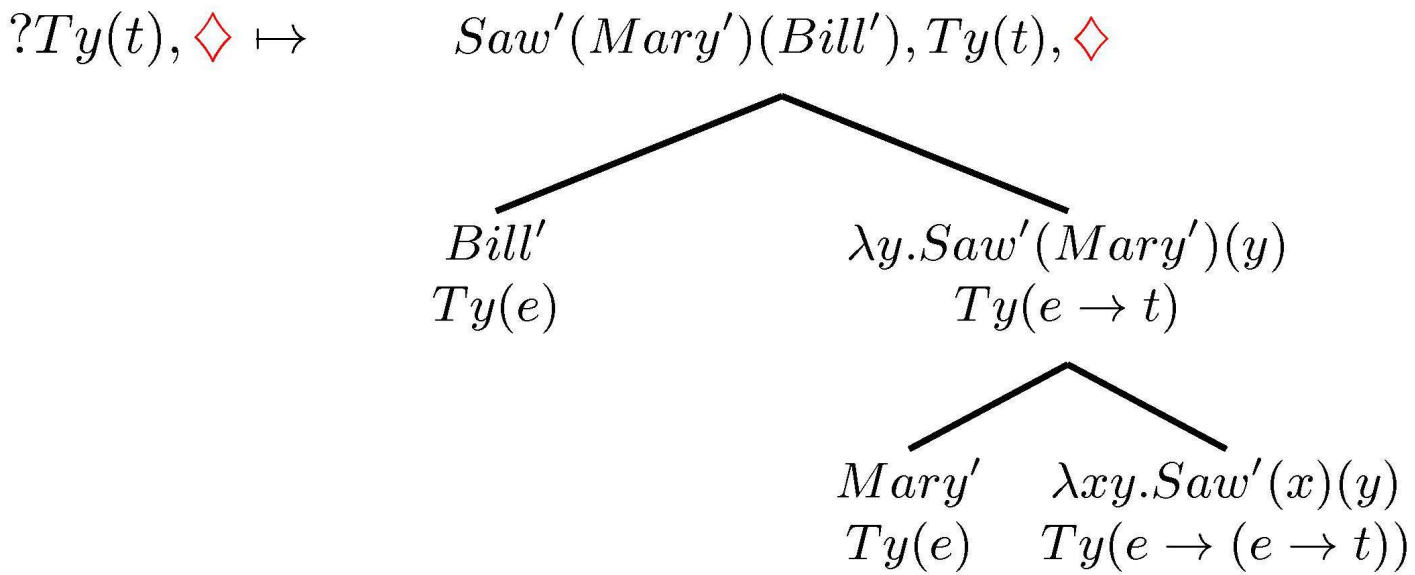
'Bill saw Mary'



Dynamics of person reference in dialogue

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B: The accounts guy? [CURRENT UTTERANCE]
A: mhmm.

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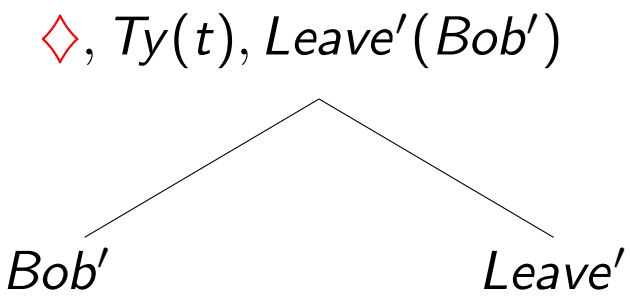

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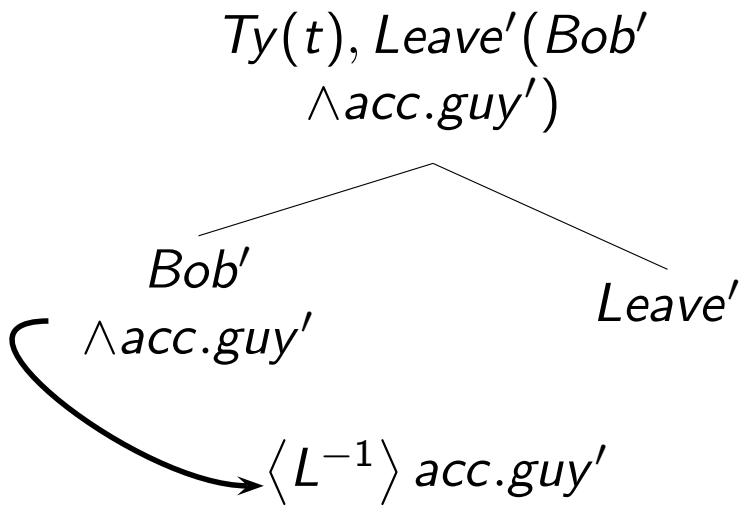

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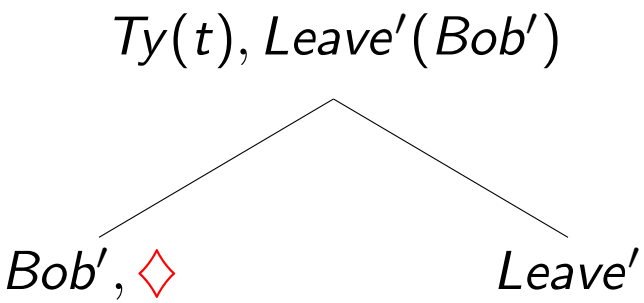

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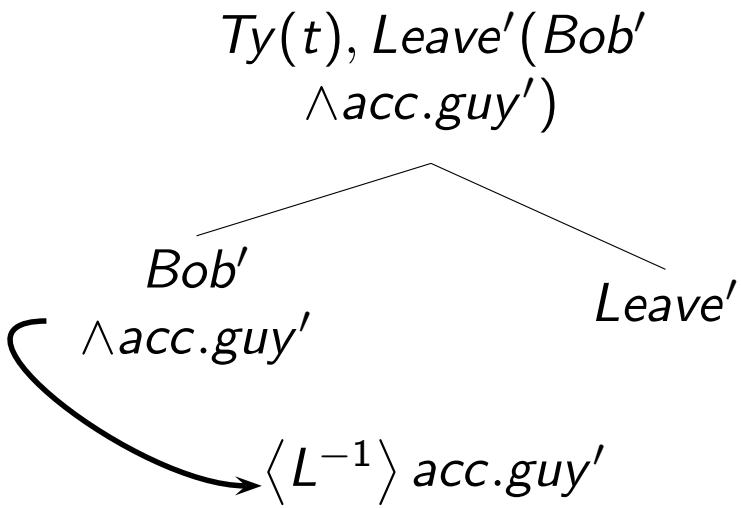

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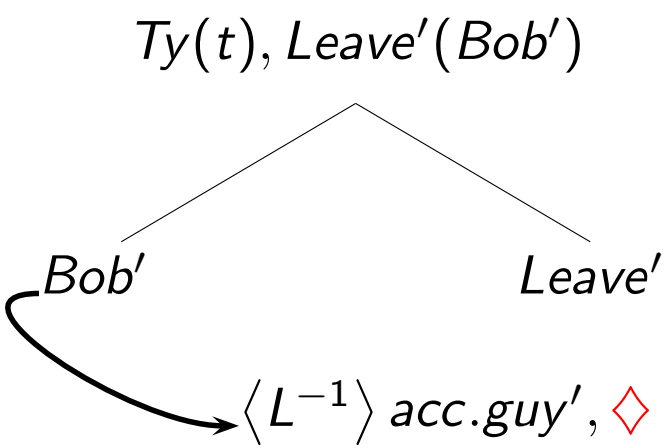

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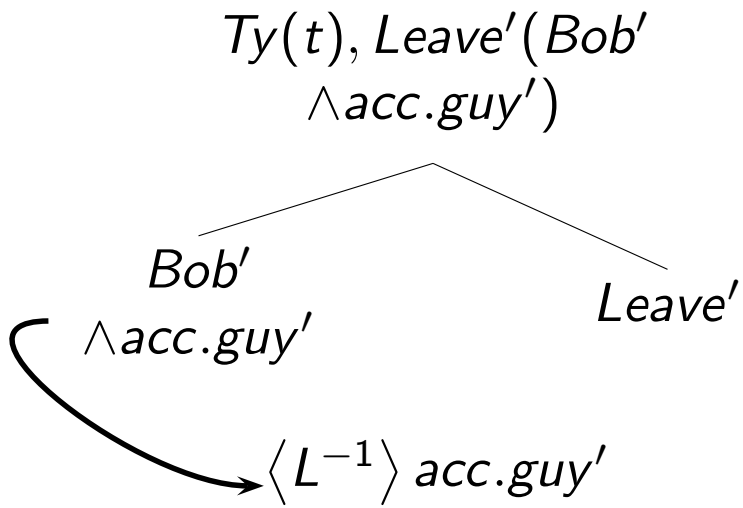

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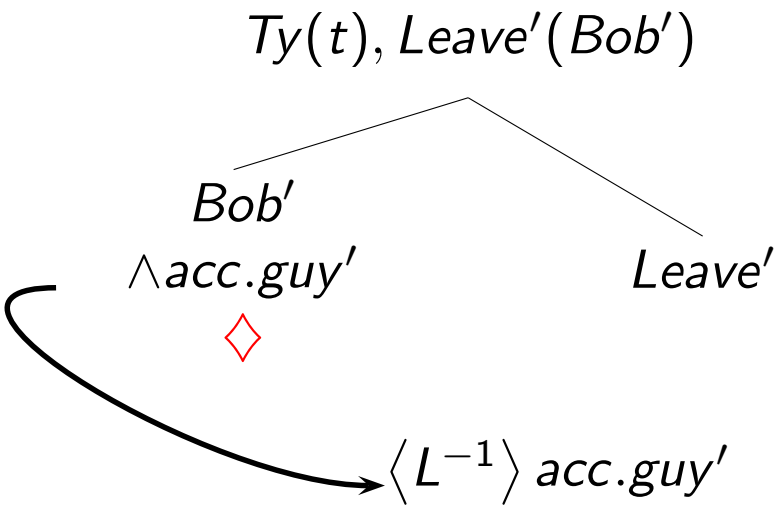

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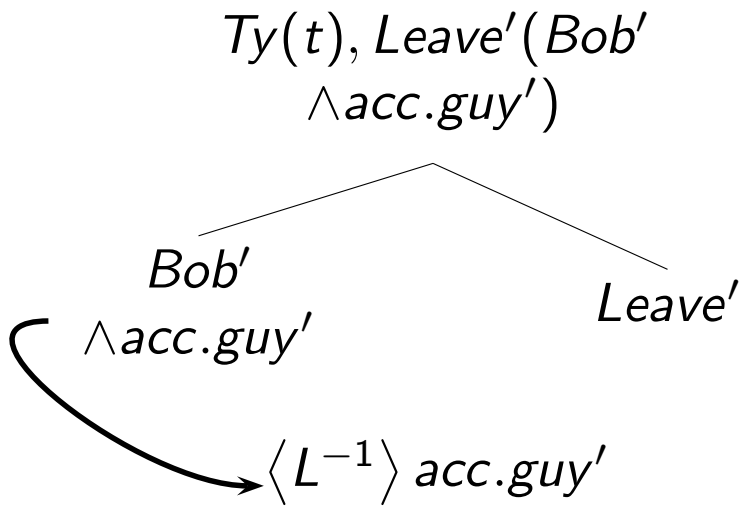

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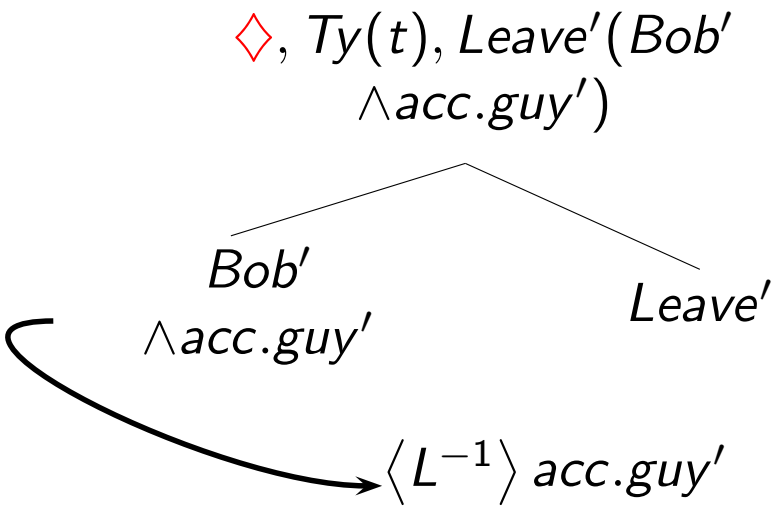

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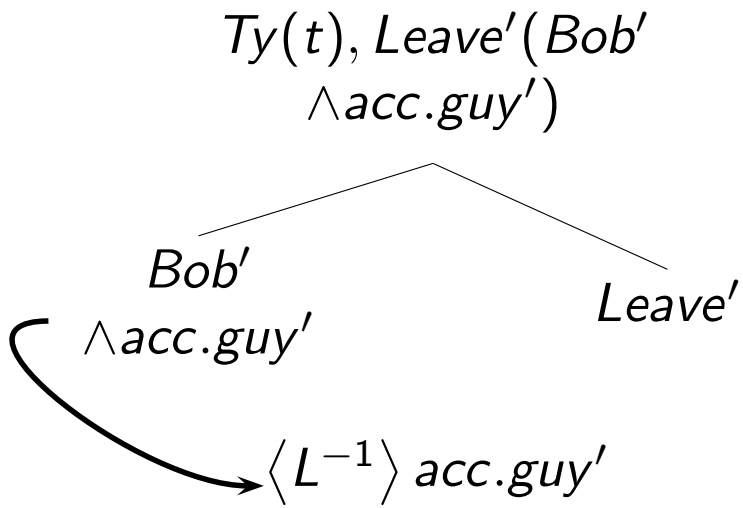

Outline

ATT-Meta Approach, System and Related Matters
Support & Selected References

EPSRC grants 1999–2003 and 2005–2008
Leverhulme Trust 2010–2013

Agerri, R. Barnden *et al.* (2007). Default inferences in metaphor interpretation. In B. Kokinov *et al.* (Eds), *Modelling and Using Context: 6th International and Interdisciplinary Conference*. Lecture Notes in Artificial Intelligence, Vol. 4635, pp.1–14. Springer.

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Introduction

- ATT-Meta = theoretical approach and an AI system partially implementing it.
- System: just reasoning, no natural-language front-end (before Andrew came along!).
- Not specifically geared towards dialogue, but naturally extensible to it.

Role of Mappings

- Of course, many words and phrases can have entrenched and hence lexicalized ("lexiconized") metaphorical meanings. But otherwise ...
- ATT-Meta is mapping-based, with already-known mappings for a range of metaphorical views (roughly, conceptual metaphors).

  A view: IDEAS AS PHYSICAL OBJECTS
  A mapping for it: *mental usage* $\longleftrightarrow$ *physical operation*

- Also: **View-Neutral Mapping Adjuncts** (VNMAs)
  e.g. for logical structure, event relationships, value judgments, ...

- Novel mappings: not implemented in system, but compatible with the general approach.

Emphasis on Map-Transcending Metaphor

resting on a metaphorical view but going beyond the mappings available for that view

"The idea was in the far reaches of Anne's mind."

"Can you look at your own life, kind of on a continuum? Look down the road of that line and see what that's gonna do... in your life?"

"I don't think strings are attached. If there are any they're made of nylon."

"Part of Mary was insisting that Mike was adorable."

"The managers were getting cricks in their necks from talking up [to some people] and down [to others]."

"McEnroe starved Connors to death."

Source/Target Non-Parallelism

"The idea was in the far reaches of Anne's mind."

- What's the overall meaning?

  It would be very difficult for Anne to use the idea in her conscious thinking.

- Claim: the "far reaches" are merely a mental tool towards that meaning via existing mappings such as:
  mental usage $\longleftrightarrow$ *physical operation*.

- There is no need to, and it could be difficult to, find mappings for "far reaches".

Inferential Connection: Map-Transcending to Mappings

"The idea was in the far reaches of Anne's mind."

- Instead: inference within a PRETENCE environment is used to infer

  Anne's conscious self has only a **very low degree** *of* **ability** *to OPERATE PHYSICALLY on the idea.*

- Then mappings are used to infer the following in the REALITY environment:

  Anne has only a **very low degree** *of* **ability** *to CONSCIOUSLY MENTALLY USE the idea.*

Two Physical Knowledge Rules: Informal Expression

IF O is a physical object AND O is in a physical region RO
AND P is a person AND P is in a physical region RP
AND RO and RP are far apart

THEN {presumably}
NOT(O is physically accessible to P to at least degree *low*).

IF O is a physical object AND P is a person
AND NOT(O is accessible to P to at least degree Δ)

THEN {presumably}
NOT(P is able to physically operate on P to at least degree Δ).

A Physical Knowledge Rule: Prolog Form

```
rule([not,
       to_degree(at_least(Degree),
            the_episode(agent_being_able,
               the_episode(physically_operating, P, O)))],

   [the_episode(being_physical_object, O),
    the_episode(being_person, P),

    [not,
      to_degree(at_least(Degree),
           the_episode(being_physically_accessible_to, O, P))
    ]
   ],

   presumed,    r_lack_phsyopabil_from_lack_physaccess).
```

The View-Specific Mapping Used

IF [really] J is an idea
AND [pretendedly] J is a physical object

AND [really] P is a person
AND [pretendedly] P's conscious self is a person

THEN {presumably}

conscious-self-of(P) physically-operating-upon J [pretendedly]
corresponds to
P consciously-mentally-using J [really].

Mapping Used: Prolog Form

```
rule(
  specific_m4mapping(
    the_episode(physly_operating,  conscious_self_of(P),  J),
    the_episode(conscly_mentally_operating,  P,  J) ),

  [currently_within_metaphor_pretence,

   in_outer_space(the_episode(being_idea, J)),
   the_episode(being_physical_object, J),

   in_outer_space(the_episode(being_person,  P)),
   the_episode(being_person, conscious_self_of(P))
  ],

  presumed,     r_IAPO_MAPPING_physop_WITH_consc_op).
```

Some View-Neutral Mapping Adjuncts

IF [pretend] action-episode X corresponds to [real] action-episode Y
THEN {presumably}
[pretend] AGENT-ABLE(X) corresponds to [real] AGENT-ABLE(Y).

IF [pretend] episode X corresponds to [real] episode Y
THEN {presumably}
[pretend] COMPLEMENT-X corresponds to [real] COMPLEMENT-Y.

IF [pretend] episode X corresponds to [real] episode Y
THEN {presumably}
[pretend] X-TO-DEG $\geq \Delta$ corresponds to [real] Y-TO-DEG $\geq \Delta$.

Reverse Transfer (i.e. from Reality to Pretence)

Reverse transfers are often desirable or necessary in metaphor understanding:

- To enable non-metaphorical information and metaphorical discourse fragments to create a coherent, holistic scenario in the *pretence* from which reality information can be opportunistically drawn.

  One reason: not all metaphorical fragments are susceptible to being individually translated into reality terms, making integration more natural on pretence side than reality side.

- To propagate changes of certainty levels between pretence-side inference and reality-side inference.

Towards Dialogue

- Reverse-transfer: was for *understanding*, but good for *generation.*
- Choosing metaphorical views: largely an open problem.
  - But prevailing metaphorical views automatically "switch on" relevant mappings.
  - And could extend a pretence to similar pretence about a similar thing: e.g. if one idea viewed as physical object, could so view other ideas.
- ATT-Meta's representations $\longleftrightarrow^{EASY}$ logical forms of DS (as used by Gargett)
- ATT-Meta: needs to become dynamic with respect to incoming utterances.

  Already context-orientated: reliance on backwards reasoning from context-supplied reasoning goals.

Outline

Processing Figurative Lang. in Task-Oriented Dialogue
a proposed project

- adding an account of how prevailing issues are extracted from context, to guide ATT-Meta's goal-oriented reasoning
- making ATT-Meta incremental & dynamic
- how to decide: (i) when to use metaphorical expression, (ii) what metaphorical views to use
- negotiation of the meaning of a metaphor that crops up
- accounting for other dialogue participants' beliefs and attitudes in understanding & generating metaphor
- relationship of metaphor to other fig. language (e.g. metonymy & hyperbole) and to to non-fig. phenomena (e.g anaphora)

Summary

- Figurative language is a key phenomenon in dialogue, especially in task-oriented dialogue
- We have a way of modelling phenomena from dialogue incrementally and context-dependently, using little more than the core resources of the grammar
- We have an implemented AI system for reasoning about figurative language
- We propose to combine both of these to model the dynamics of figurative language in task-oriented dialogue