Reverse Transfer in the ATT-Meta System: From Metaphor Understanding to Generation via *Gnidnatsrednu*

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Figurative Language:
Its Patterns and Meanings in Domain-Specific Discourse

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Plan of Talk

- The context: a metaphor generation project,
  in part extending our ATT-Meta approach/system for metaphor understanding.
- The ATT-Meta approach/system.
- *The Principle of Gnidnatsrednu:*
  Need for *reverse transfer* even in metaphor understanding.
- Using ATT-Meta reverse transfer in generation.

Metaphor Generation Project

- *GenMeta*, EU Marie-Curie International Incoming Fellowship for Andrew Gargett, 2013–2015.

  [*Gargett & Barnden 2013, 2014, in press*]
  [`http://www.cs.bham.ac.uk/~gargetad/genmeta-index.html`]

- *Overarching aim:*

  Computational approach to (understanding and) generating metaphor during participation in discourse.

- *Discourse focus:*

  illness/healthcare; political (and other) conflict.

- *Specific work includes:*
  - combining our *ATT-Meta* system for metaphor understanding (conceptual level) with the *Embodied Construction Grammar* system developed by Jerry Feldman and colleagues at ICSI, Berkeley.
  - adapting ATT-Meta for metaphor generation (conceptual level)
  - adding a language generator.

ATT-Meta and Mappings

- Assume: many words/phrases have lexiconized metaphorical senses. Otherwise . . .
- **ATT-Meta is mapping-based, with a small number of already-known, highly general mappings for each of a range of metaphorical views (roughly, conceptual metaphors).**

  under DISEASE AS POSSESSED OBJECT

  being infected by disease D $\longleftrightarrow$
  possessing D (viewed as physical object)

  under MIND AS PHYSICAL REGION

  person P believing something $\longleftrightarrow$
  the believing being physically located somewhere in P's mind (viewed as phys. region)

  under ABSTRACT ENTITY/SITUATION AS PERCEPTIBLE PHYSICAL OBJECT

  being aware of abstract entity/situation X $\longleftrightarrow$
  physically seeing X (viewed as physical object)

- **View-Neutral Mapping Adjuncts** (VNMAs)
- ((**Novel mappings:** not implemented in system, but compatible.))

Example: Constraints as Strings

"There are some strings attached, but they're made of nylon. [John can't see them.]"
{derived form a real discourse example }

- Major meaning components:

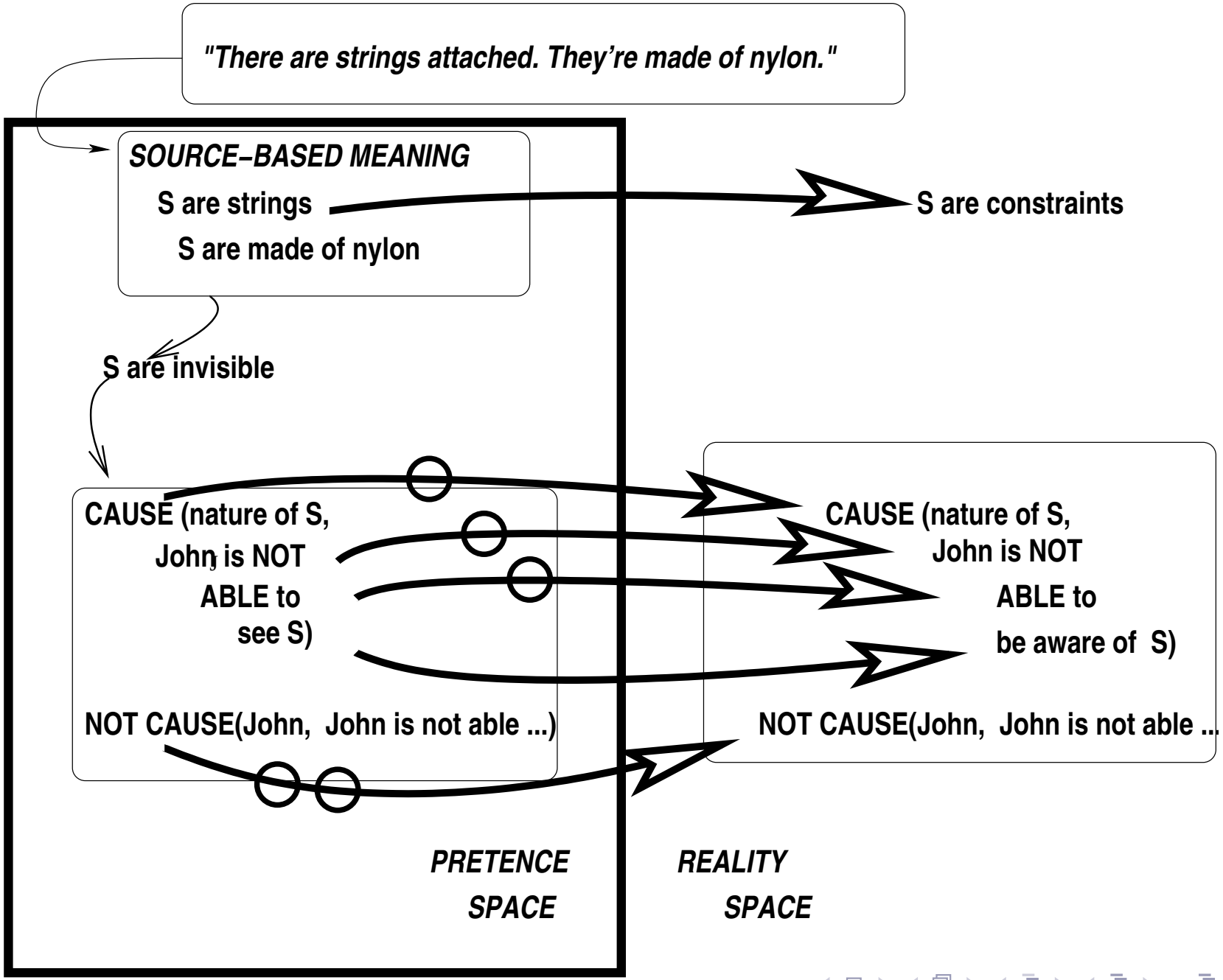
  John is not able to be aware of the constraints. This is because of the nature of the constraints themselves — it's not John's fault.

- A source-side scenario is constructed within a PRETENCE environment, partly/largely through *within-pretence reasoning.*

Inferential Connection to Mappings

In the pretence scenario:

- There are strings.
- They're made of nylon.
- They're invisible
  (because they're made of nylon)
- John is unable to see the strings
  ([given; also,] because they're invisible, and hence because of their nature)
- John's inability is caused by the strings' nature
  John's inability is not his fault (= not caused by him)
  (default inferences based on general knowledge about seeing)


"There are strings attached. They're made of nylon."
SOURCE–BASED MEANING
S are strings
S are made of nylon
S are constraints
S are invisible
CAUSE (nature of S,
John is NOT
ABLE to
see S)
NOT CAUSE(John, John is not able ...)
CAUSE (nature of S,
John is NOT
ABLE to
be aware of S)
NOT CAUSE(John, John is not able ...
PRETENCE
SPACE
REALITY
SPACE

Pretence/Reality Non-Parallelism

- Nylon Strings: The nylon is not plausibly mappable by familiar metaphorical mappings.

  Similarly the red parts in:

- "The managers were getting cricks in their necks from talking up [to some people] and down [to others]."
- "Within the deepest recesses of our mind, lies a fear that sharks will attack us."

Such elements are merely within-pretence tools that help with deriving meanings, via within-pretence reasoning, view-specific mappings (of a very restricted sort), and VNMAs.

There is no need to have, and it could be difficult to construct, mappings for those elements. It's pretence scenarios as *wholes* that are important, rather than every component of them or every discourse element that contributes to the scenario.

((Non-parallelism well-recognized in some of the idiom literature [notably by Langlotz, 2006], and perhaps implicit in Relevance Theory [e.g., Carston & Wearing, 2011] etc., but not extensively discussed in the metaphor literature that rests on mappings.))

Reverse Transfer (The Principle of Gnidnatsrednu)

Reverse transfers (i.e., from Reality to Pretence) are often desirable in metaphor understanding:

- ATT-Meta's reasoning is goal-driven (backward chaining). So, reasoning goals in reality space need to be mapped to become reasoning goals in the pretence.

- It can be useful to "metaphorize" non-metaphorically provided information during understanding.

  Metaphorical and non-metaphorical fragments are often mixed in discourse.

  - If a rich scenario needs to be built up in the pretence anyway, it makes sense to derive pretence info from *non-metaphorically* provided info, by reverse transfer, rather than trying to tie everything together in reality terms.

  This point is amplified by non-parallelism.

Gnidnatsrednu, contd

Variant of nylon-strings example:

> "There are some strings attached, but they're made of nylon. John can't see them. Mary isn't aware of them either."

I claim it is natural to add Mary to the pretence scenario, as not being able to "see" the strings. Can now infer it's not her fault, etc.

It precludes the need to, for example, infer a reality parallel to the general "invisibility" of the nylon strings.

Gnidnatsrednu, contd

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

  Integration of information may be more natural or easier on pretence side than reality side:

  - may have richer background knowledge and inference abilities
  - perhaps have efficient, specialized inference procedures
  - *pretence scenario is artificially simple compared to reality*

From Gnidnatsrednu to Generation

Obviously, for metaphor generation we need to be able to do reality-to-pretence transfer.

So, ATT-Meta is already half-way there (figuratively speaking!).

SIMPLE CASE:

> Given that
>
> John isn't aware of some constraints,
>
> the system could directly infer, via a view-specific correspondence above and a VNMA, that
>
> John doesn't see the [corresponding] strings.

Generation, contd

MORE COMPLEX CASE:

Suppose now the system knows that

John isn't aware of some constraints *because of their intrinsic nature.*

(E.g., the system may have remembered this from a previous discourse event.) By the above view-specific correspondence and VNMAs again, can infer that

John doesn't see the [corresponding] strings because of their intrinsic nature.

This could be used directly to create an output sentence, but it's rather dry and unspecific.

Greater vividness: postulate something specific and familiar about the nature of the strings.

Generation, contd

Possible rough within-pretence reasoning process:

- What feature of strings would cause John not be able to see them?
- Suggestion: physical constitution.
- What physical constitution might strings have?
- Recall knowledge of ordinary string, nylon string, etc.

ALSO NB: the search for vividness and familiarity is may be the very reason that metaphor might be used in the first place here.

A reality scenario could be concocted (e.g., a government department keeping something secret) but it would be relatively elaborate and *over*-specific.

Generation, contd

In GenMeta project, also intend:

- When have produced a pretence scenario, look in a database of conventional metaphorical expressions/templates/*constructions* (and previously encountered ones, even if novel)

  for ones based on the metaphorical views that were used to build that scenario.

- See if the found expressions convey the pretend scenario.

  If not, create a novel expression:

  e.g., "they're made of nylon", "they're very thin"

  or vary an existing expression:

  Suppose "[The strings] are made of tough wire" is found. This is inappropriate, but at least suggests the physical-constitution angle. Replace the tough wire by something translucent.

Summary

- ATT-Meta-style reverse transfer is useful in metaphor *understanding*, let alone generation. Partly because of:
  - Virtues of goal-based, "backwards" reasoning.
  - Mixtures of metaphorically and non-metaphorically conveyed information.
  - Non-parallelism in metaphor.
  - Relative ease of reasoning in pretence versus reality.
- Generation is thus in a sense already entwined with understanding.
- Generation will involve Noitareneg [discuss].

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Further Material

- The following slides, on miscellaneous things, may be useful but may not be self-explanatory. Contact me for clarification.

Other Research Interests in Figurative Language

- Relationship of different types of figurative language to each other — especially metonymy, but also irony and hyperbole.

- A new link between metaphor and hyperbole.

- The role and workings of contrast in figurative language, especially metaphor, metonymy and irony.

[Ask me for references if interested]

Emphasis on Map-Transcending Metaphor

Map-Transcending= (perhaps) resting on one or more familiar metaphorical views but going beyond the specific mappings available for those views

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

"Within the deepest recesses of our mind, lies a fear that sharks will attack us."

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

"My car thinks it's on holiday."

Lazy Car: Inferential Connection to Mappings

"John's car is on holiday."

(simplification of an example implemented in system)

[cf. "Your car is on holiday too!" seen on a hotel website]

A source-side scenario is constructed within a PRETENCE environment, partly/largely through *within-pretence reasoning:*

In this scenario:

- The car is on holiday
- The car is a person
  (because it is on holiday)
- She is not engaging in her work
  (because she is on holiday)
- She is *persistently not doing her normal function*
  (because she is not engaging in her work)

Lazy Car, contd.

- Assume mapping rules:

  IF [pretend] entity X corresponds to [real] entity Y
  THEN {presumably}
  [pretend] *doing-normal-function*(X) corresponds to [real] *doing-normal-function*(Y).

  IF [pretend] episode E corresponds to [real] episode F
  THEN {presumably}
  [pretend] COMPLEMENT-E corresponds to [real] COMPLEMENT-F.

  IF [pretend] activity A corresponds to [real] activity B
  THEN {presumably}
  [pretend] *time-aspect*(A,T) corresponds to [real] *time-aspect*(B,T).

- Then infer: IN REALITY the car is *persistently not doing its normal function.*

View-Neutral Mapping Adjuncts

- The above mappings of normal functions, abilities and complements are some of the *view-neutral mapping adjuncts* (VNMAs).
- VNMAs do not rely on any specific metaphorical view.
- A VNMA is parasitic on existence of one or more suitable correspondences, and uses them to construct a new correspondence.
- VNMAs can be recursively compounded at will.

Focus of (Other) VNMAs

- Degrees (of holding of situations).
- Time relationships between situations, durations of situations, and rates of process-like situations.
- Aspectual shape of situations: persistence, termination, intermittency, gradualness, etc.
- Change relationships between situations.
- Causation, enablement/prevention, helping, ability, attempting.
- Modality, such as ought-to, required-to, etc.
- Mental/emotional states and value judgments (both of the understander and of agents within situations).
- Logical structure (not just negation).
- Choice.
- Qualitative set size.

Power of VNMAs

Through examination of many examples, I have found that ...

- The *point* of many metaphors is about

  normal functioning, ability/enablement/causation, affect, mental states, time-course, ...

- Many metaphors transfer their most important or even all information via VNMAs, not via view-specific mappings:

  view-specific mappings often merely form a matrix on which the VNMAs can work.

View-Specific Mappings: Nylon Example

The only *view-SPECIFIC mappings* needed are

IF (IN REALITY) P is a person AND X is an abstract entity
AND (IN THE PRETENCE) X is a physical object

THEN {presumably}

(IN PRETENCE) P seeing X

corresponds to

(IN REALITY) P being aware of X

When the correspondence has been created, it, together with VNMAs, can be used to infer that

John is unable to be aware of the constraints

This inability is caused by the nature of the constraints themselves, and is not his fault.

Non-Parallelism, contd

- It's source scenarios as *wholes* that are important, rather than every component of them or every discourse element that contributes to the scenario.

- It's a mistake to think that the task of metaphor understanding is to translate each metaphorical bit of a discourse into target-side terms.

- ((The issue becomes yet more important with larger chunks of discourse. Various sentences may contribute to a source scenario. Whole sentences can lack a parallel: *Not every metaphorical sentence has a usefully separable meaning of its own in target terms.*))

Non-Parallelism, contd

- *"Everyone is a moon, and has a dark side which he never shows to anybody."* [Mark Twain]

  A possible variant:

- *"Everyone is a moon. Everyone has a dark side which he never shows to anybody."*

- The clause/sentence "Everyone is a moon" does not (need to) be given its own target-side meaning.

- Rather, it conspires with the other clause/sentence to convey an overall source-side scenario.

- Indeed, the moon clause/sentence really just consolidates the info from the other segment. [Or would do if it were astronomically accurate! "Dark" should be "back" or something.]

- The moon clause/sentence is difficult to interpret in isolation.

Metaphorization

I tried not to run down Phil too much - I felt bad enough as it was, what with screwing his girlfriend and all. But it became unavoidable, when Jackie expressed doubts about him. I nurtured those doubts as if they were tiny, sickly kittens. Eventually they became sturdy, healthy grievances. These cats had their own cat-flaps. This allowed them to wander in and out of our conversation at will.
[adapted from Nick Hornby, High Fidelity, 1995]

The cat-flaps and at-willness don't themselves need target parallels. They just emphasize, via the source scenario, the non-deliberateness (on the part of the conversants) with which the grievances occurred in the conversations.

Even the cat-ness in the source scenario has no target-side parallel. It just provides a framework for describing a process in which doubts become strong grievances.

Cats, contd

"These cats had their own cat-flaps."

This sentence does not (need to) have its own target-side meaning.

It is intuitively natural to build in one's mind a scenario of the sickly kittens becoming healthy kittens or adult cats.

But where is this biological recovery and growth implied? Answer: in the sentence "Eventually they became sturdy, healthy grievances."

And if we claimed that the integration should instead happen on the target side, then there'd be more pressure to convert all sentences including "These cats had their own cat-flaps" into target terms.

A Conversation Rule: Prolog Form

```
rule(
     the_episode(bel_states, null_time, P, Z, presumed),

         [belongs_to_reality,

          the_episode(being_person, P),
          the_episode(saying, P, Z, M),
          the_episode(being_positive_manner, M)
         ],

     presumed, r_believe_if_say_positively).
```

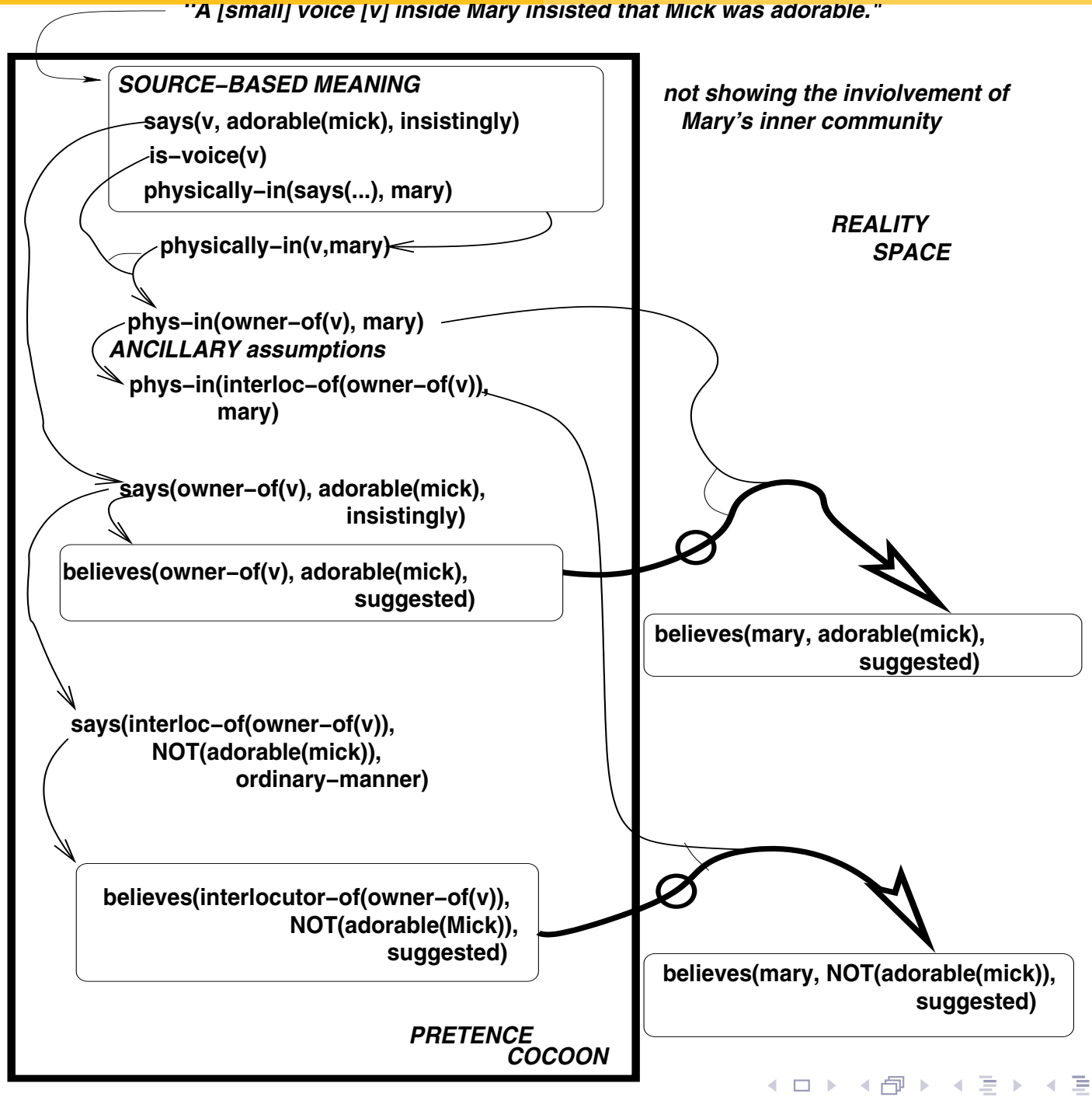
Car Thinks Boot Is Open

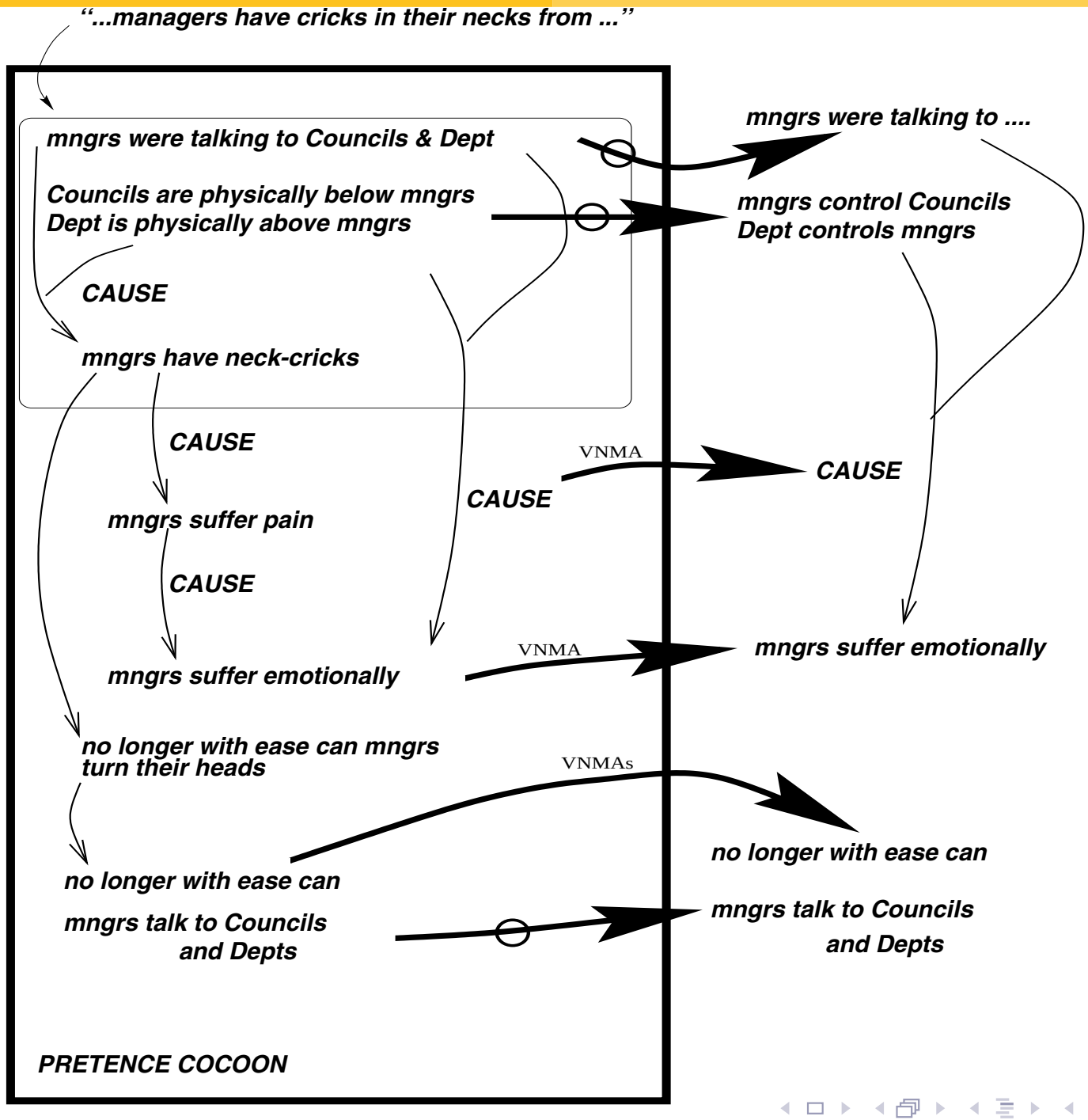
- Slide title is a blog item title on `http://www.audi-sport.net/vb/audi-s4-a4-a4-cab-b7-chassis/109109-car-thinks-boot-open.html`

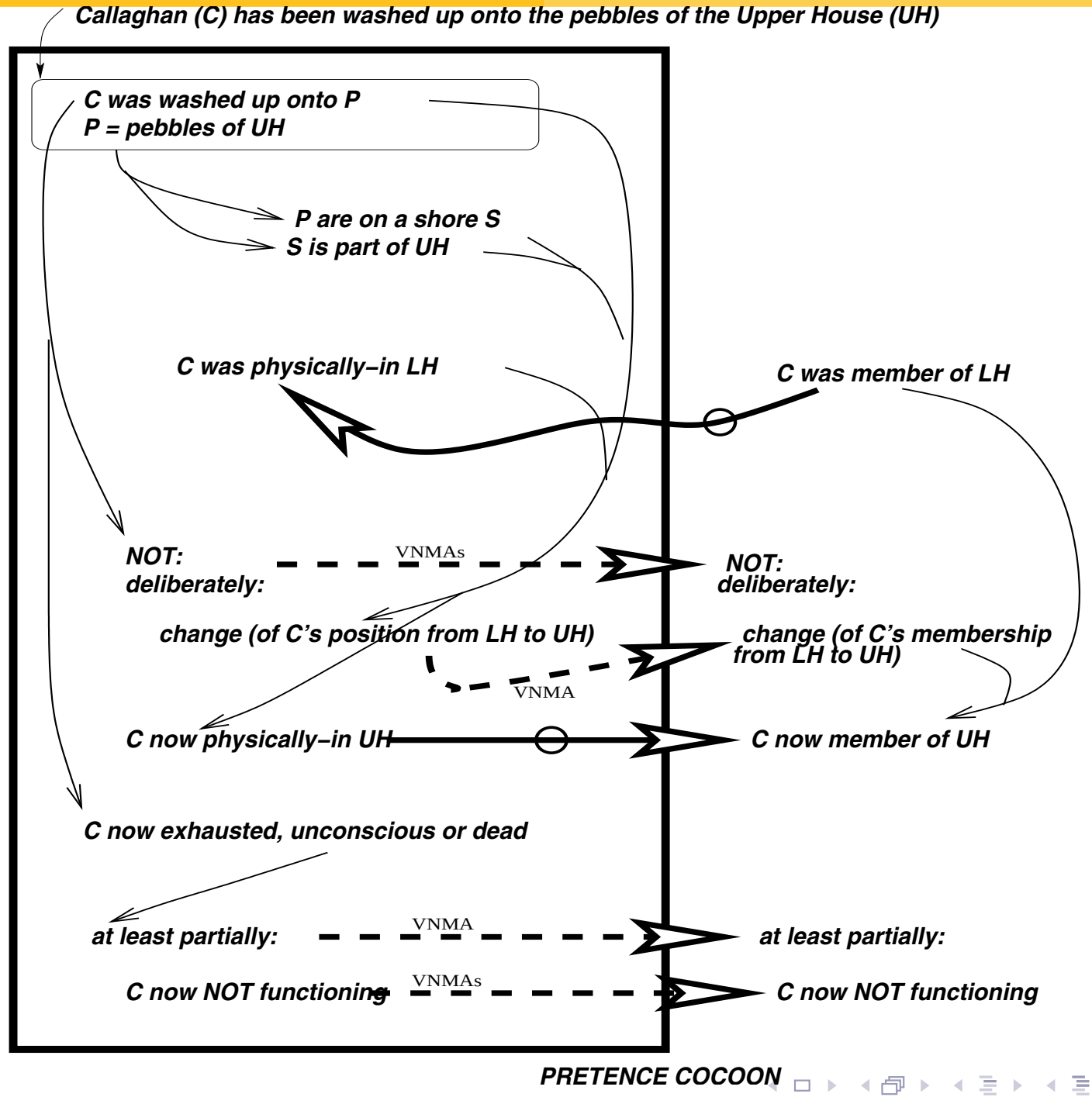
- The mental state VNMA says that IF a cognitive agent in the real situation corresponds to a *cognitive agent* in the pretence, then their mental states correspond, *modulo* translation of their contents according to correspondences.

- But this doesn't apply in present example, because in reality the car is NOT a cognitive agent, even though it IS a cognitive agent in the pretence.

- There can be a view-specific mapping between an artefact thinking something in the pretence and the artefact behaving in reality as if the something were true.


"A [small] voice [v] inside Mary insisted that Mick was adorable."
SOURCE–BASED MEANING
says(v, adorable(mick), insistingly)
is–voice(v)
physically–in(says(...), mary)
not showing the inviolvement of Mary's inner community
REALITY SPACE
physically–in(v,mary)
phys–in(owner–of(v), mary)
ANCILLARY assumptions
phys–in(interloc–of(owner–of(v)), mary)
says(owner–of(v), adorable(mick), insistingly)
believes(owner–of(v), adorable(mick), suggested)
believes(mary, adorable(mick), suggested)
says(interloc–of(owner–of(v)), NOT(adorable(mick)), ordinary–manner)
believes(interlocutor–of(owner–of(v)), NOT(adorable(Mick)), suggested)
believes(mary, NOT(adorable(mick)), suggested)
PRETENCE COCOON


"...managers have cricks in their necks from ..."
mngrs were talking to Councils & Dept
Councils are physically below mngrs
Dept is physically above mngrs
CAUSE
mngrs have neck-cricks
CAUSE
mngrs suffer pain
CAUSE
mngrs suffer emotionally
no longer with ease can mngrs turn their heads
no longer with ease can
mngrs talk to Councils and Depts
PRETENCE COCOON
mngrs were talking to ....
mngrs control Councils
Dept controls mngrs
VNMA
CAUSE
CAUSE
VNMA
mngrs suffer emotionally
VNMAs
no longer with ease can
mngrs talk to Councils and Depts


Callaghan (C) has been washed up onto the pebbles of the Upper House (UH)
C was washed up onto P
P = pebbles of UH
P are on a shore S
S is part of UH
C was physically–in LH
C was member of LH
NOT:
deliberately:
VNMAs
NOT:
deliberately:
change (of C's position from LH to UH)
change (of C's membership from LH to UH)
VNMA
C now physically–in UH
C now member of UH
C now exhausted, unconscious or dead
at least partially:
VNMA
at least partially:
C now NOT functioning
VNMAs
C now NOT functioning
PRETENCE COCOON