Varieties of specification and underspecification: A view from semantics

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The technique of underspecification I

- Presupposed: in semantics, specification involves a narrowing-in of an interpretational range
- In computational linguistics and much work in formal semantics, underspecification is simply a technique which allows us to represent semantic information in an (ideally) compact format.
- Motivation: if one cannot decide on an interpretation in context, this technique allows one to proceed processing without making uninformed decisions.
- Underspecified representations must be logically transparent and allow for deductions and the inclusion of truth conditions

The technique of underspecification II

- The most prominent examples involve scope ambiguities
- Applicable to any kind of lexical ambiguity (apart from vagueness)
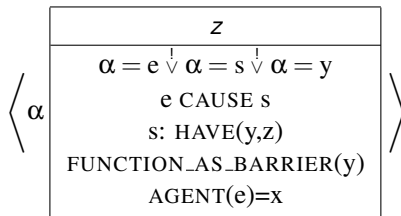- no opposition between underspecification and ambiguity

Interpretation of German homonymous *Bank* ('bank', 'bench')

Bank $\rightsquigarrow$ financial_institution(x) $\overset{!}{\vee}$ seating_accommodation(x)

(1)   a.   *Wir haben den ganzen Abend auf der Bank gesessen.*
           'We spent the whole evening on the bench.'
        b.   *Die Bank wurde gestern ausgeraubt.*
            'The bank was robbed yesterday.'

The technique of underspecification III

Referential arguments of *Absperrung* (event, object, state)

$$
\left\langle \alpha \; \begin{array}{|c|} \hline z \\ \hline \alpha = e \stackrel{!}{\vee} \alpha = s \stackrel{!}{\vee} \alpha = y \\ e \; \text{CAUSE} \; s \\ s: \text{HAVE}(y,z) \\ \text{FUNCTION\_AS\_BARRIER}(y) \\ \text{AGENT}(e)=x \\ \hline \end{array} \right\rangle
$$

(2) a. **event:** *Die Absperrung des Gebiets wurde von Demonstranten behindert.*

   'The cordoning-off (of the area) was hampered by protesters.'

   b. **state:** *Die Absperrung des Gebiets wird noch aufrecht erhalten.*

   'The cordoning-off of the area is still sustained.'

   c. **object:** *Die Absperrung wird morgen abgebaut.*

   'The barrier will be dismantled tomorrow.'

Underspecification reflecting psychological reality

- In linguistics (and in linguistic semantics in particular) a view is prominent where what is (represented as) underspecified should also have a common mental basis.
- Remark: processing assumptions motivate the CL approach, too.
- From this perspective, it makes no sense to treat cases of homonymy as underspecified, since the two interpretations of *Bank* have nothing in common (from a synchronic point of view)
- No reasonable, common inferences available in the case of *Bank*
- For e.g. the state interpretation of *Absperrung*, this could be different, though: it necessarily involves (i.e. presupposes) an event of blocking
- Underspecification (shared semantic core) vs. ambiguity/homonymy (no shared features)
- Where do we draw the line with respect to psychological reality?
- Monosemy as a methodological principle (Charles Ruhl)

Alternative: uninformed specification and revision

- We do indeed make uninformed decisions based on preferences. Revision must occur whenever the following context contradicts what has been assumed.
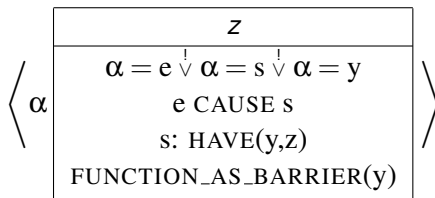
(3) a. *Auf dem Marktplatz wurde alle fünf Minuten ein Mann angerempelt.*
   'Every five minutes a man was bumped into at the market.'
   b. *Das hat ihn sehr gestört.*
   'That annoyed him immensely.'

- In (3a), the $\forall\exists$ reading is strongly preferred: every five minutes some, but not necessarily the same man was bumped into.
- If (3a) is followed by (3b), this ordering has to be reversed into $\exists\forall$: a certain man was bumped into every five minutes.
- Prediction: Revision strategy should be more costly in terms of processing than underspecification.

Disambiguation I

- If underspecification involves disjunction or conjunction, disambiguation may be viewed as a process of disjunct or conjunct reduction

DRS for three-way ambiguous *Absperrung* (simplified)

$$\left\langle \alpha \left| \begin{array}{c} z \\ \hline \alpha = e \overset{!}{\vee} \alpha = s \overset{!}{\vee} \alpha = y \\ e \text{ CAUSE } s \\ s: \text{HAVE}(y,z) \\ \text{FUNCTION\_AS\_BARRIER}(y) \end{array} \right. \right\rangle$$

(4)   a.   abbauen 'dismantle': $\alpha = e \overset{!}{\vee} \alpha = s \overset{!}{\vee} \alpha = y$
      b.   aufrecht erhalten 'sustain': $\alpha = e \overset{!}{\vee} \alpha = s \overset{!}{\vee} \alpha = y$
      c.   behindern 'hamper': $\alpha = e \overset{!}{\vee} \alpha = s \overset{!}{\vee} \alpha = y$

Coercion I

(5)   a.   Yesterday, I began a book by Ror Wolf.
        b.   *Kann mir jemand bitte mit dem Rechner helfen?*
             'Could someone please help me with the computer?'

- Coercion is triggered by type conflict/category mismatch
    - Criterion for identifying cases of coercion
    - Depending on (lexical) type specifications, there will be conflicting views on when coercion is necessary, (5a) vs. (5b)

- To resolve the conflict, additional material must be introduced, no direct type changes or overwriting, as shown by (6):

(6)   Yesterday, I began a book by Ror Wolf. It has 150 pages.

- Type preservation, embedding in covert material
- Motivated by linguistic and non-linguistic knowledge

Coercion II

Decomposing coercion

1. Threat: type conflict
   $F_{<\alpha,\beta>}(p_\gamma)$
   "book" does not describe event

2. Saviour/Repair

   (i) embedding of argument: $F_{<\alpha,\beta>}(H_{<\gamma,\alpha>}(p_\gamma))$
   "book" as argument of an event predicate

   (ii) embedding of functor: $J_{<<\alpha,\beta>,<\gamma,\beta>>}(F_{<\alpha,\beta>})(p_\gamma)$
   "begin" as predicate of entities?

3. Specification
   What are the more specific characteristics of the intervening functor?
   a "book" is (e.g.) read or written, "book by Ror Wolf" is read

Coercion III

- Alternatively, dotted types?

(7) a. $F_{<\alpha,\beta>}(p_{\alpha \cdot \gamma})$
     b. $G_{<\gamma,\beta>}(p_{\alpha \cdot \gamma})$

   - No need to assume coercion, because there is no type conflict.
   - Still underspecified event predication in the case of *begin*, though.

Selective vs. additive specification

Disambiguation
"selective" specification
conjunct/disjunct reduction: $\alpha \overset{!}{\lor} \beta$

Coercion
"additive" specification
introduction of new material: $P(a) \rightarrow P(\mathbf{H}(a))$

(8)   a.   *Meine Freundin hat eigenhändig die Absperrung abgebaut.*
           'My girlfriend dismantled the barrier on her own.'
     b.   *I have just begun a new book.*
     c.   *Kann mir jemand (von euch Ganoven) mit der Bank Ecke*
           Proskauer/Rigaer helfen?
           'Could anyone help me with the (i) bank/(ii) bench on the
           corner of Proskauer and Rigaer street?'

Disambiguation and monotonicity/incrementality I

- Is disambiguation/specification "reversible"?

(9) a. abbauen 'dismantle': $\alpha = e \overset{!}{\vee} \alpha = s \overset{!}{\vee} \alpha = y$
     b. aufrecht erhalten 'sustain': $\alpha = e \overset{!}{\vee} \alpha = s \overset{!}{\vee} \alpha = y$
     c. behindern 'hamper': $\alpha = e \overset{!}{\vee} \alpha = s \overset{!}{\vee} \alpha = y$

- Based on data involving anaphora resolution, we claim that a naive deletion view of disambiguation is not adequate, since it makes false predictions for these data.

Disambiguation and monotonicity/incrementality II

(10) *Die Absperrung des Rathauses wurde vorgestern von Demonstranten behindert. Wegen anhaltender Unruhen wird* **sie** *auch heute aufrecht erhalten.*
'The cordoning-off of the town hall was disturbed by protesters the day before yesterday. Due to continuing unrest, it [the state of being cordoned off] is sustained today as well.'

- predicate *behindern* 'hamper' restricts the ambiguity of *Die Absperrung des Rathauses* and fixes an event reading
- The matrix predicate in the second sentence, *aufrecht erhalten* 'sustain', only allows the referential argument of *sie* to be a state
- Problem: If the fixation of the event reading involves the irreversible deletion of other possible referential arguments, there should be no appropriate discourse referent for *sie* to pick up, contrary to intuitions.

Disambiguation and monotonicity/incrementality III

- We investigate two alternative approaches to dealing with this challenge:
    - **thinning:** disambiguation should be allowed to be local, no real disjunct deletion
    problem: overgeneration?
    - **reambiguation:** non-monotonicity of interpretation: disambiguation is reversible
    problem: how do we know which representations may be restored?
- General discussion
    - Differences between (i) intraphrasal, intrasentential (B1, B3, B4, D1, current phase) and (ii) intersentential contexts?
    - Direction of process of specification? If it is reversible, is it cyclic or unidirectional?