
Using Verb Structure for Semantic Variables Control

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Arc CAuLD
Nancy

Montagovian Dynamic Semantic - MDS

P. de Groot

Introduction of left and right contexts in the calculus

$$\lambda o s . s (\lambda x o (\lambda y e \phi . \text{verb } x y \wedge \phi e))$$

Montagovian Dynamic Semantic - MDS

3 classical problems in Semantic:

1. Scope (quantifiers and negation)

2. Anaphora Resolution

3. Temporal structure

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Modelling structural dependencies

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μ -operators allow to *froze* a part of calculus and perform it later in the evaluation

I. Scope

$\lambda\mu$ -calculus is an under-specified representation of scope ambiguities

But in the context of MDS, the resolution of a μ -operator implies to take scope over the right context

A solution:

Introduction of a scope border (SB) for μ -resolution

But... where ?

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From the Computational Semantic perspective, semantic is build under the verb structure

Hyp:

- SB is a structural property which belongs to verb structure
- The μ -operator belongs to the noun definition

SB and μ -operator should be split into:

- lexical noun item
- lexical verb item

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$$\lambda Q e \mu \alpha. \forall x Q(x) \Rightarrow \alpha(x)(x :: e)$$

- lexical verb item

$$\lambda o s. s(\lambda x o(\lambda y e \phi. [verb\ x\ y \wedge \phi\ e]))$$

I. Scope

This is more or less the same treatment I had proposed in Amblard07th where:

Variables are introduced in formulae in two steps:

- position
- realisation

And, this is a marker of the maximal phase of a verb

Phases are the different states of a verb in a syntex/semantic analyse in generative grammar.

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This implies that Semantic needs:

1. information from the syntax
2. a structure which links propositions

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let's see next slide...

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in a computational semantic system, reification is needed (!)

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Event in a very general sense, a better definition should be:
type of semantic unit binders

They are associated to verbs

I. Scope

Introduction of this new type:

1. including more informations like thematic roles, ...
2. data structure which links the verb's variables

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$$\lambda P \lambda x_2 \lambda y \lambda e. P(y, e) \wedge \textit{patient}(e, x_2)$$

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Which kind of data structure ?

What is the semantic of links in this structure ?

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What is the semantic of links in this structure ?

(structure of phases)

2. Subsets for Anaphora Resolution

Hyp: The structure between verbs should:

- contain the list of accessible variables (for a specific verb)
- allow (or not) the accessibility of its variables
(then reduce the size of the set (sub-set) of accessible variables)

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This structure is a point in MDS where classical relations in DRT should be re-introduced.

2. Subsets for Anaphora Resolution

Hyp: The structure between verbs is a Tree.
Accessibility Tree

- The tree might be built in the context part of a term.
- Nodes are relations between verb variables
- Leaf are lists of variables introduced (by a specific verb variable)

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This tree structure could be interpreted as the *right frontier* of DRT

2. Subsets for Anaphora Resolution

This structure captures properties used in DRT to interpret relations.

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One more time: dissociation on atomic relations
(That's why it could not be the exact DRT relation !)

3. Temporal Structure

In this structure, nodes should be used to modelise other relations:

- S-DRT relations
- Temporal structure
- Aspect
- ...

Often, these relations are partial order,

Hyp: Semantic collects information, interpretation of these partials order is delegated to pragmatic ;-)

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All these problems became extraction of partial order representation from structure.

Conclusion

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Introduction of variable's type

Use this type as a semantic unit for computational semantic

Produce (partial) information like:

1. Structure of Discourse
2. Temporal relations
3. Subsets of accessible variables (for anaphora resolution)