DMRS Algebra

Guy Emerson

Towards a DMRS Algebra

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  - Ann Copestake’s draft DMRS Algebra
  - Jonas Groschwitz et al.’s AM Algebra

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  - Ann Copestake’s draft DMRS Algebra
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- Main aim of this talk:
  - DMRS Algebra expressed like AM Algebra

Motivations

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  - Constrain composition in Delph-in grammars

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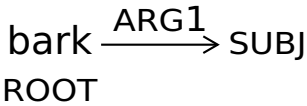
  - Constrain composition in Delph-in grammars (and maybe in neural parsers too)
- Why AM?
  - Encourage cross-framework metalanguage
  - Borrow nice notation

Apply Operation



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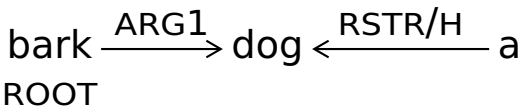

Modify Operation

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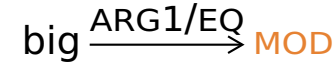

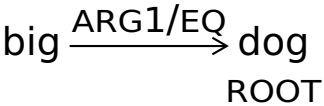

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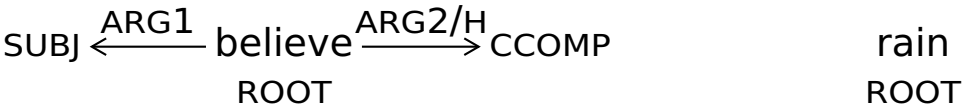


Apply Operation

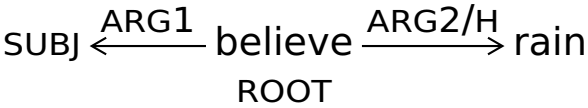
rain

ROOT

Apply Operation

rain

ROOT



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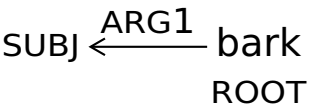

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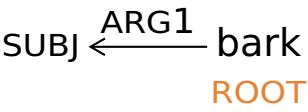

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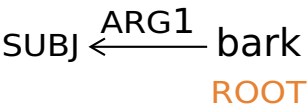

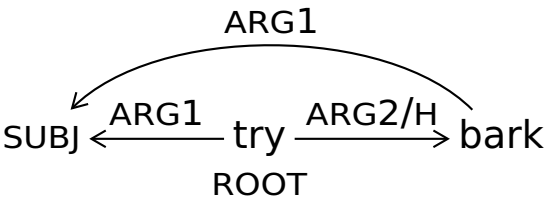

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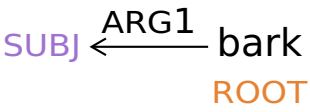

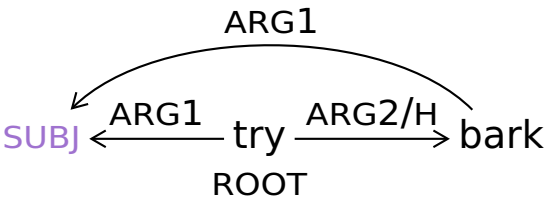

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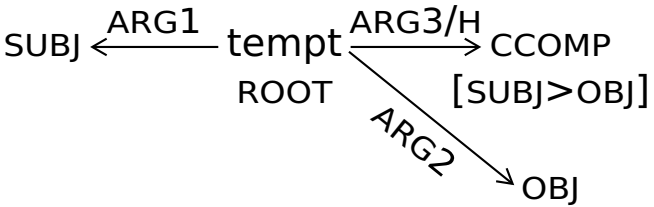

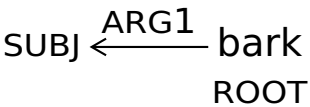

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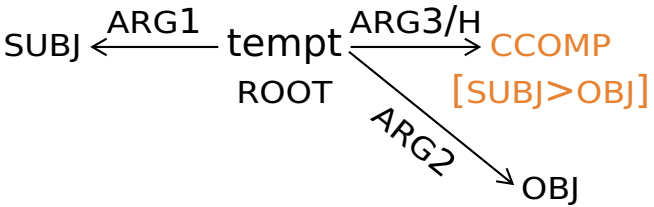

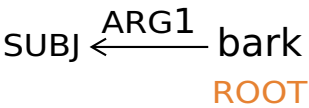

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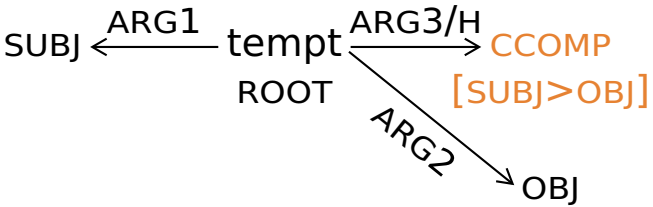

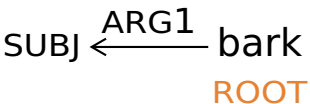

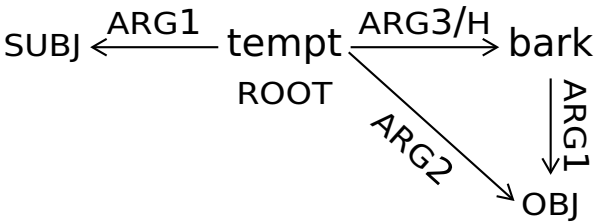

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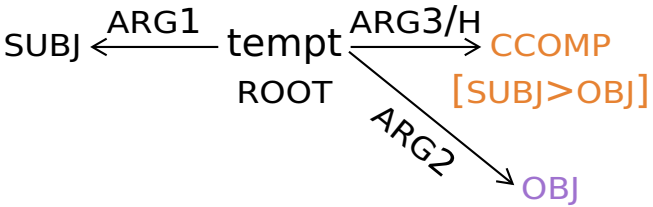

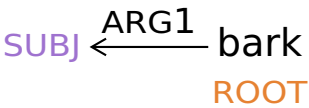

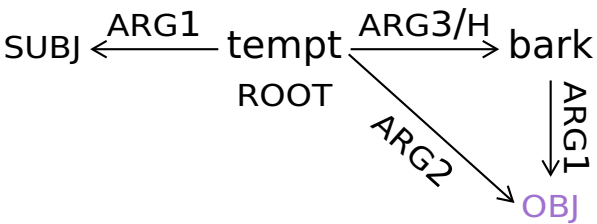

AM Algebra Summary

- Every graph has a *root* and possibly some *slots*
- Two operations: *Apply* and *Modify*
- Functor graph controls slots in argument graph

AM and MRS Common Ground

- Slot-filling as a basic mechanism
- Typing corresponds to grammar principles

AM Algebra Not Enough For DMRS

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  24% of EDS graphs in Open SDP 1.2
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- Lindemann, Groschwitz, Koller (2019):
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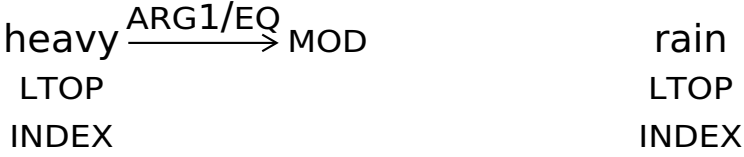
  not decomposable using AM Algebra
- DMRS adds scope to EDS,
  cannot be easier

What is Different in DMRS?

- Two “roots”: LTOP and INDEX
- Predicates from syntax (CCONT)
- Derivation tree given by grammar
- Special XARG slot
- Unary relabelling operations
- SLASH propagation
- Relaxed typing
- (Postprocessing of /NEQ)

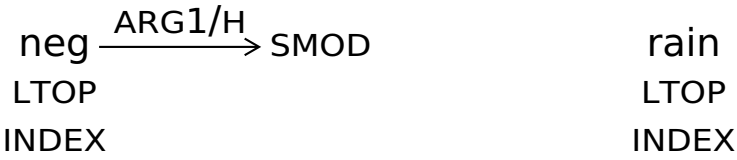
Nonscopal Modification



Nonscopal Modification

Nonscopal Modification

Scopal Modification



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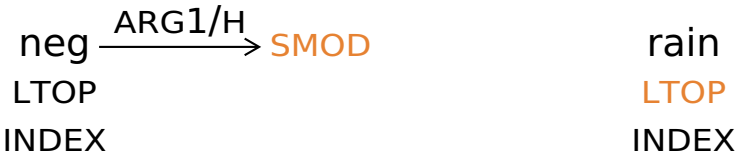

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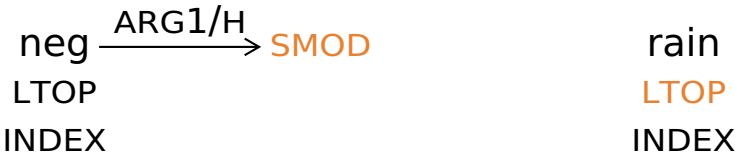

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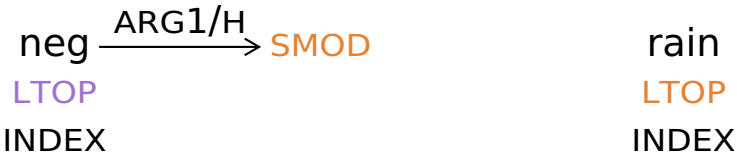

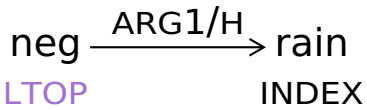

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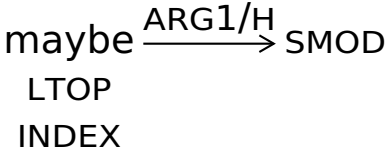

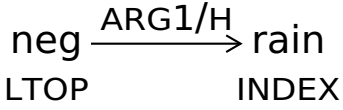

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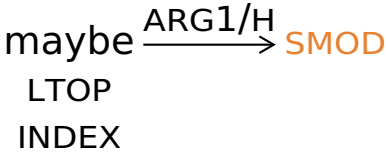

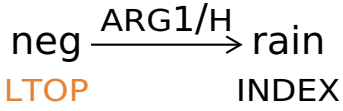

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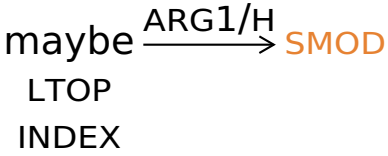

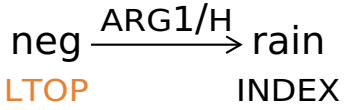

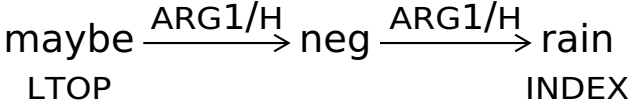

DMRS Composition Operations

Operation	Slot filled by	INDEX from	LTOP from
Apply, nonscopal	INDEX	functor	functor
Apply, scopal	LTOP	functor	functor
Modify, nonscopal	INDEX	argument	argument
Modify, scopal	LTOP	argument	functor

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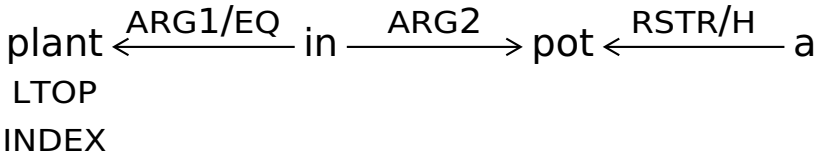
Modify, scopal	LTOP	argument	functor

- Scopal arguments have /H (also written /QEQ)

CCONT: Compounds vs. Prepositions



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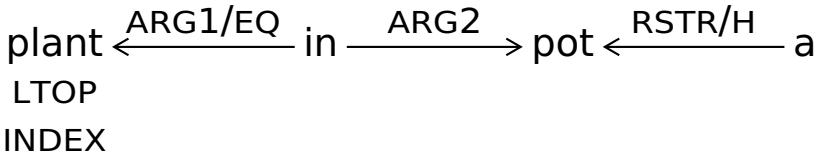

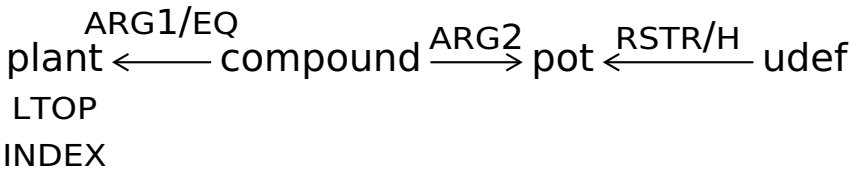

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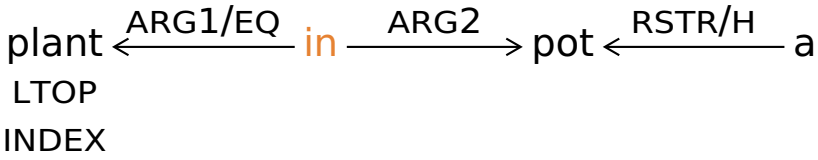

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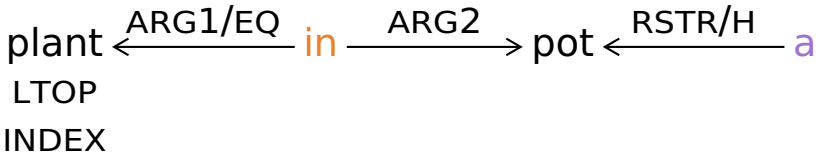

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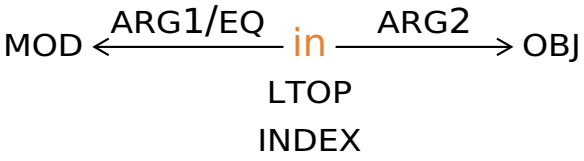

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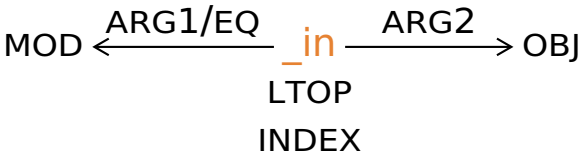

Derivation Trees

- AM Dependency Trees separate:
  - Composition (AM Algebra)
  - Derivation (AM Dependencies)

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    [*not* semantic dependencies]

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- AM Dependency Trees separate:
  - Composition (AM Algebra)
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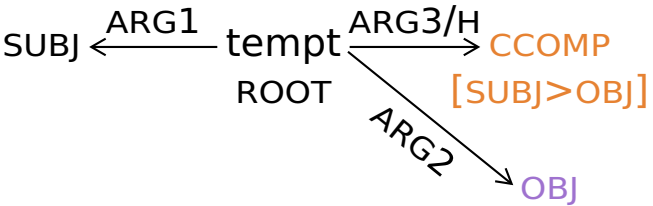
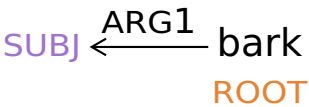
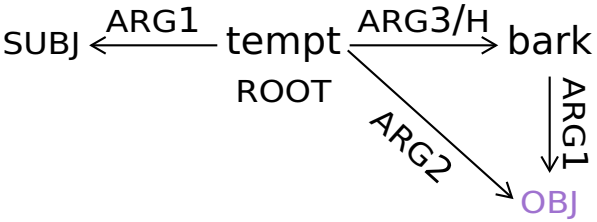
    [*not* semantic dependencies]
- Grammars provide derivation trees
  - … which may interfere with AM Algebra typing

Fixed Derivations & Eager Composition







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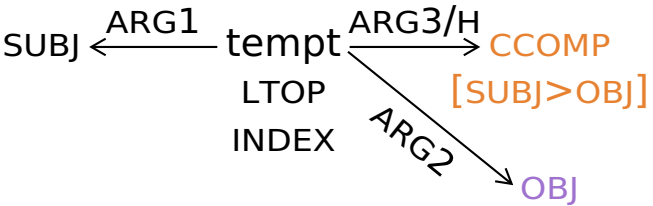

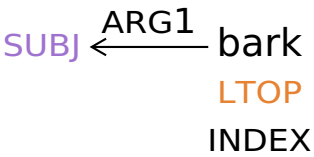

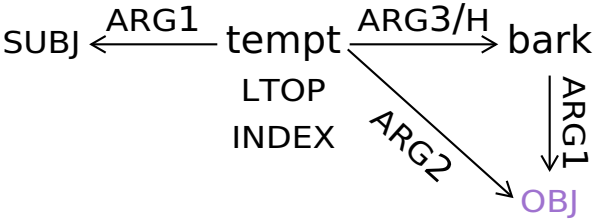

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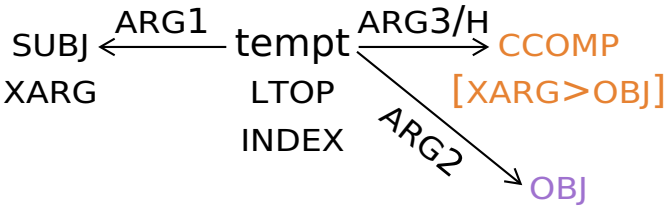

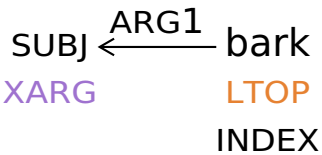

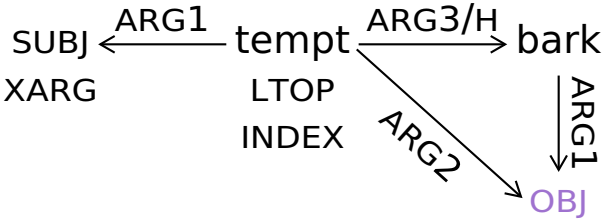

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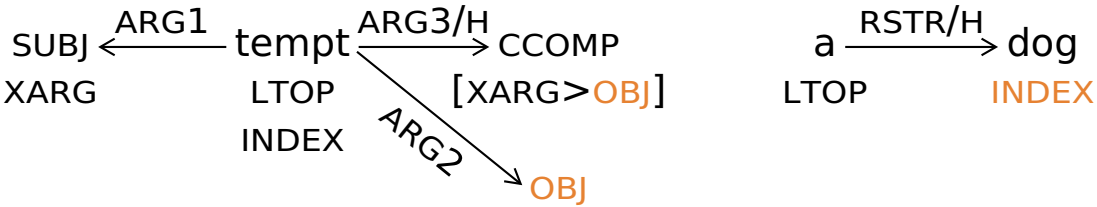

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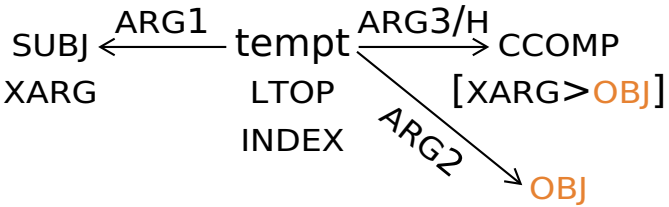

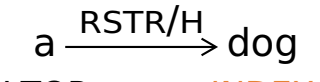

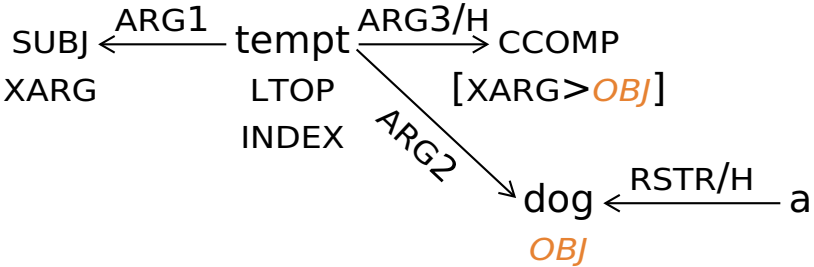

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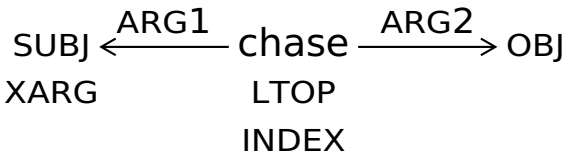

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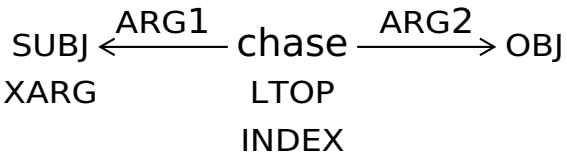

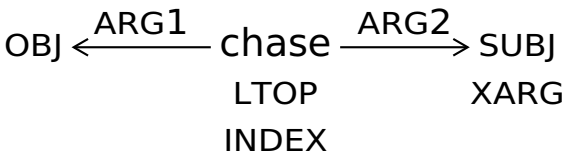

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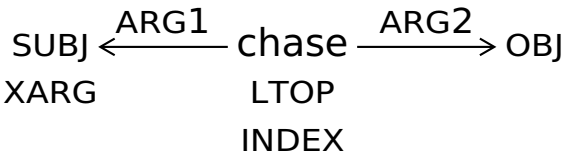

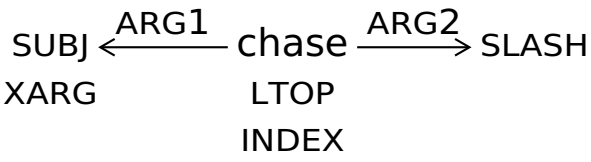

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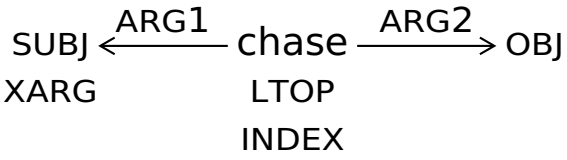

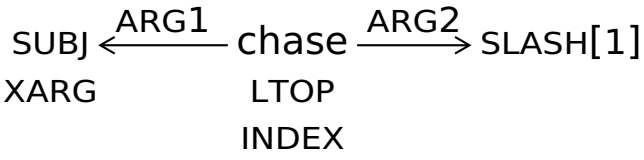

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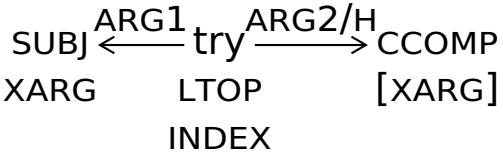

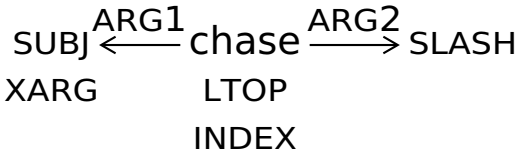

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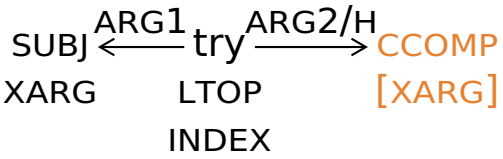

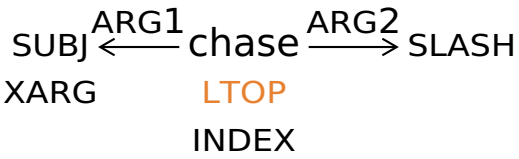

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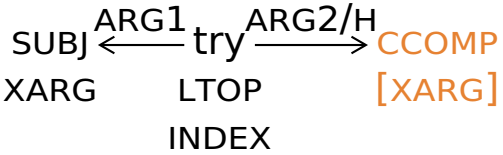

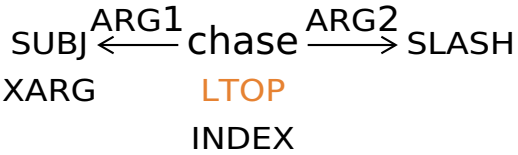

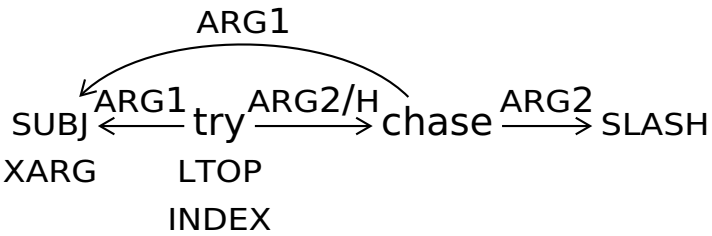

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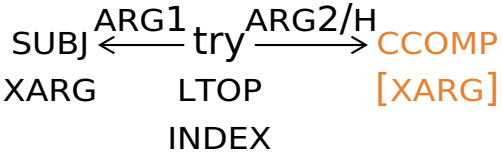

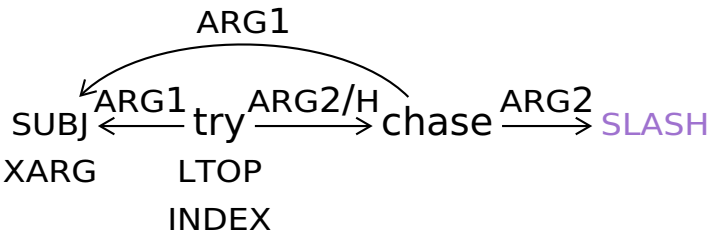

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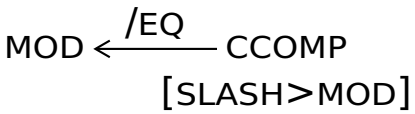

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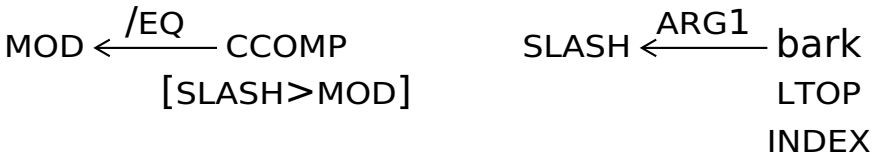
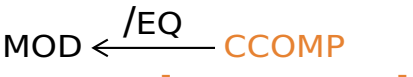
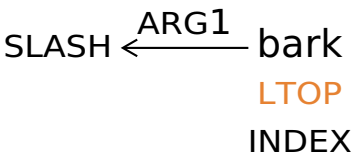
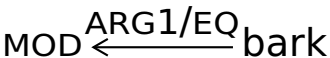


Relative Clauses

Relative Clauses







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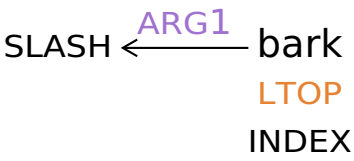
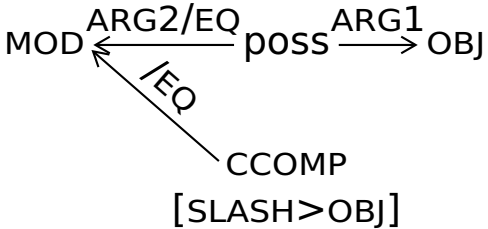


Relative Clauses

Possessive Relative Clauses



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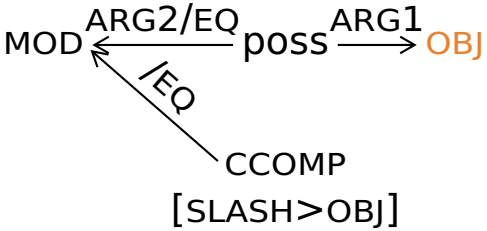

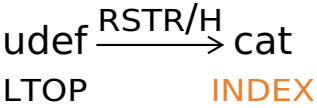

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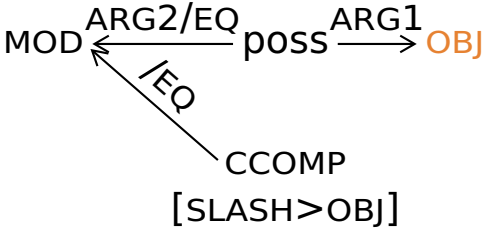

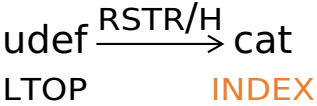

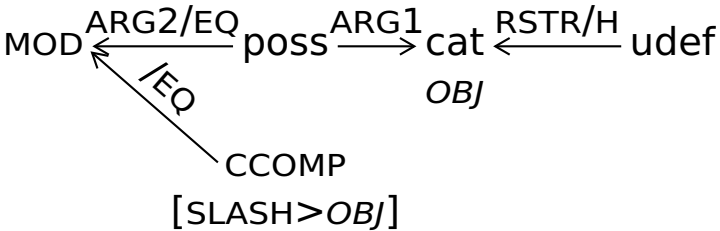

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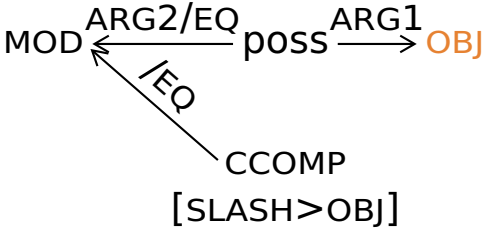

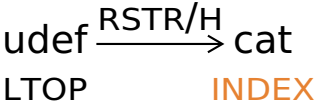

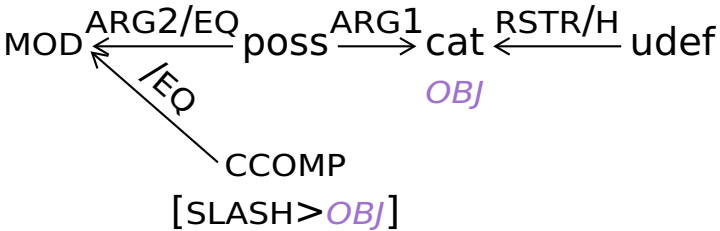

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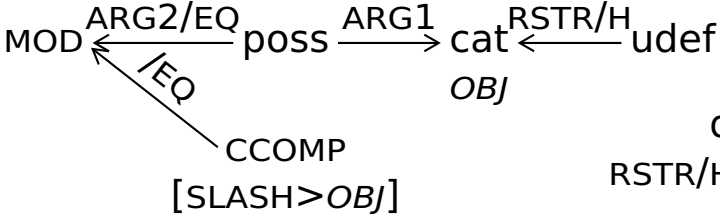

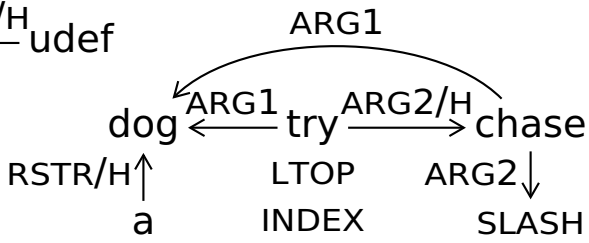

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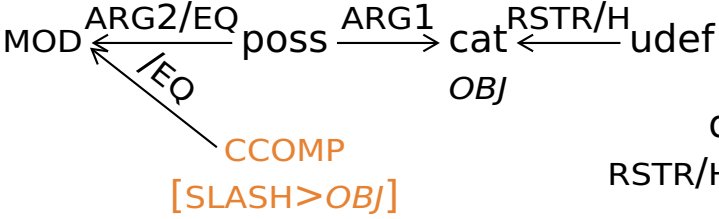

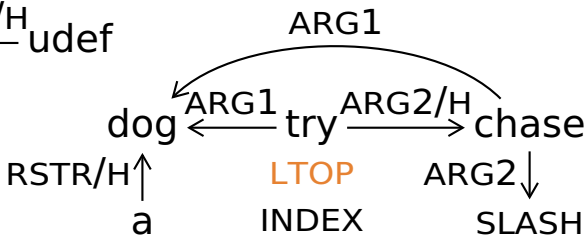

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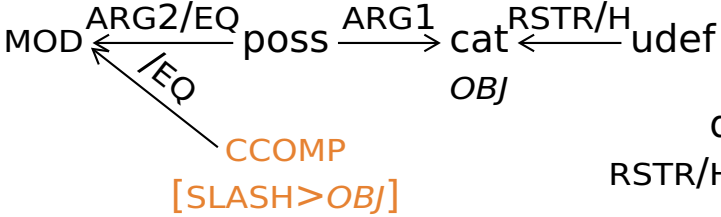
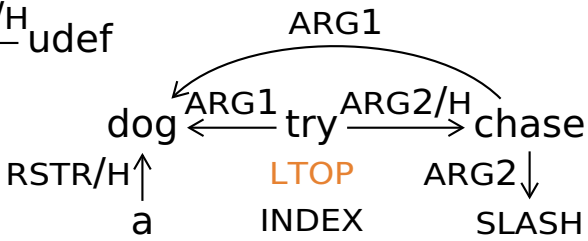
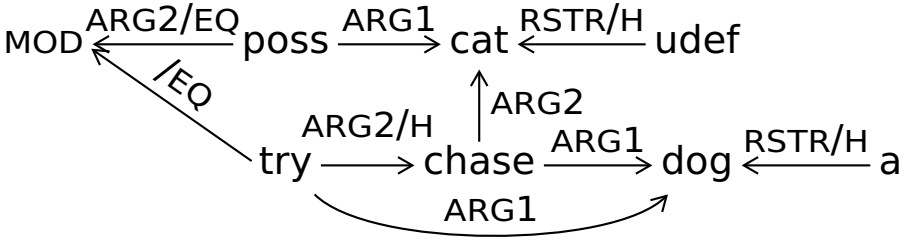
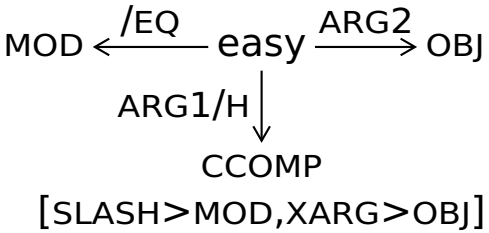
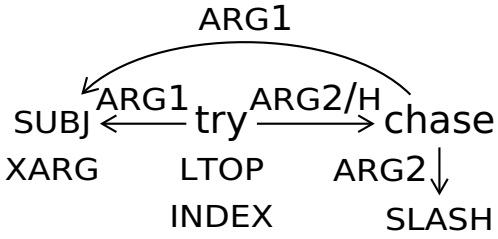






Easy Adjectives





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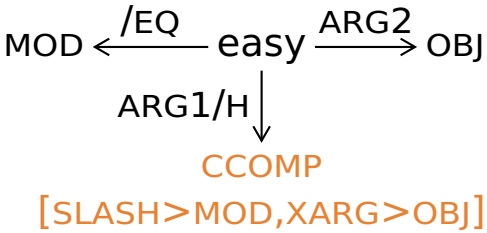

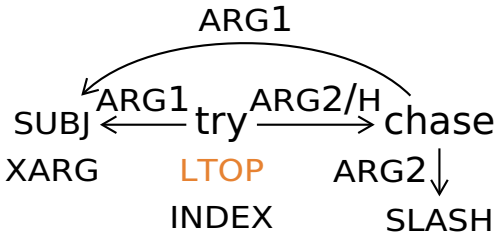

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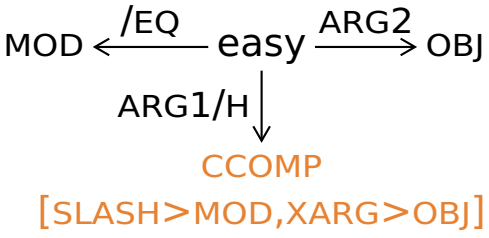

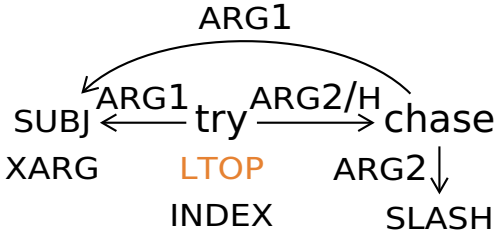

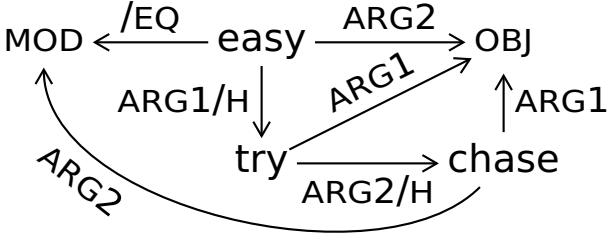

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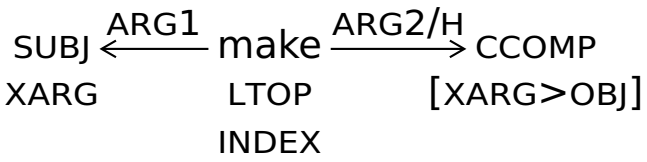

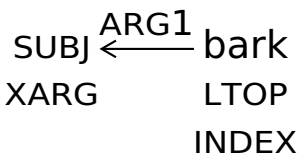

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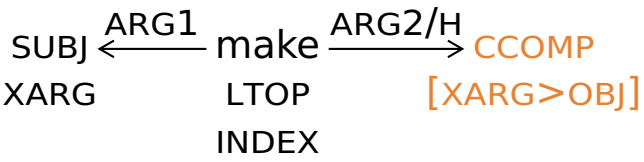

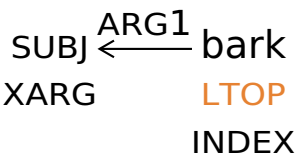

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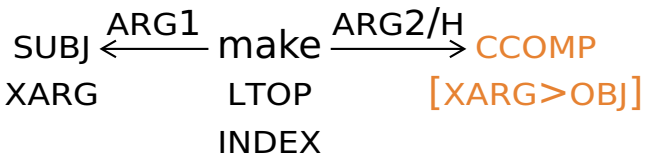

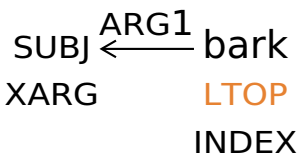

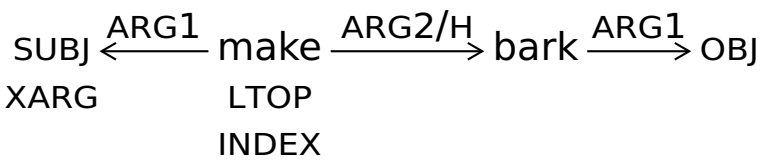

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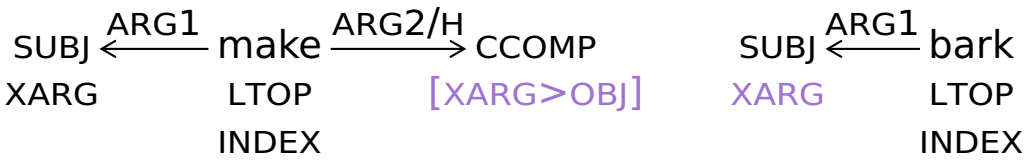
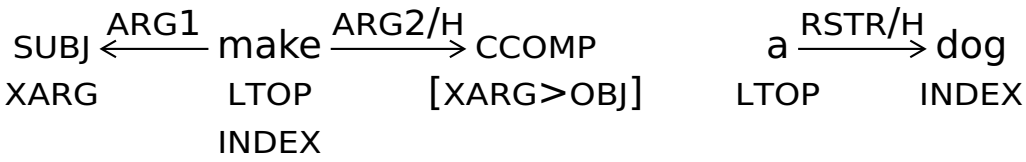


Relaxed Typing & Eager Composition



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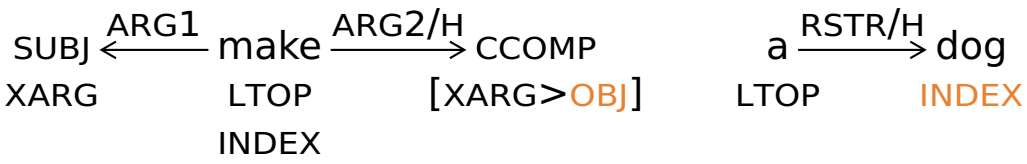

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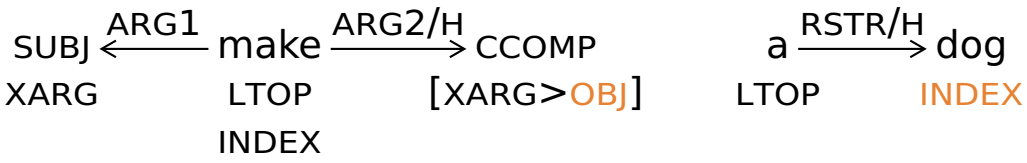
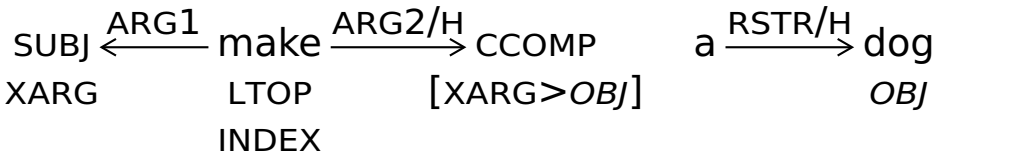
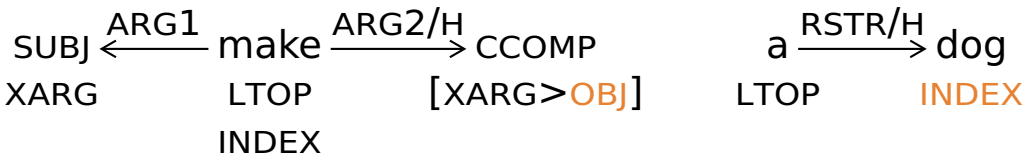
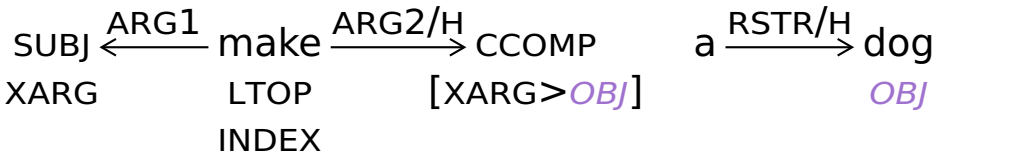


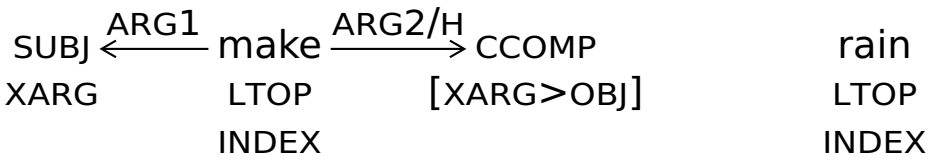


Relaxed Typing & Eager Composition

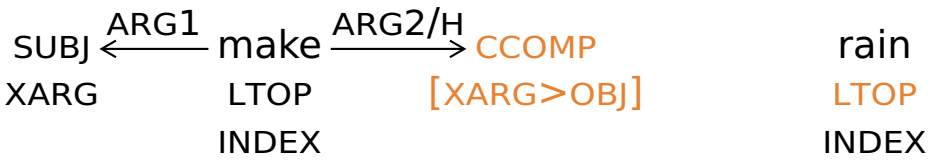




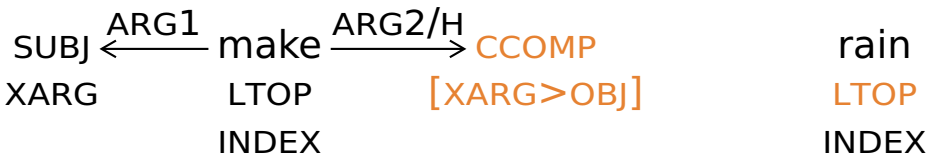
Relaxed Typing: Expletive Pronouns

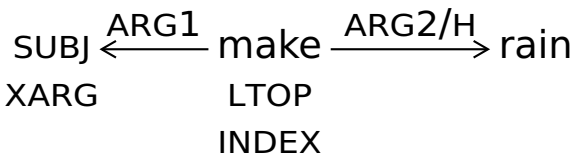


Relaxed Typing: Expletive Pronouns

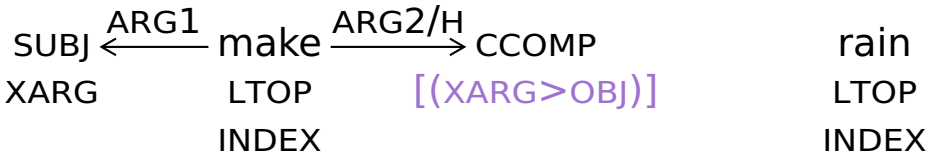


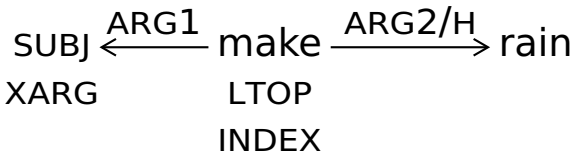
Relaxed Typing: Expletive Pronouns





Relaxed Typing: Expletive Pronouns





Summary

- AM Algebra helpful guide for formalising DMRS Algebra

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- Requires linguistically interesting extensions!