ROSETTA

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09.05.2017

Rosetta

- Expreimental Machine Translation System
- Interlingual
- Montague Grammar

Background

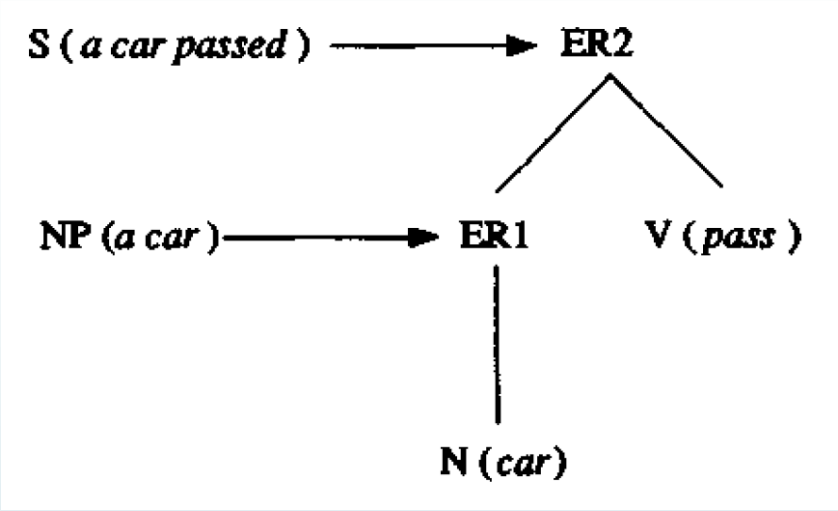
- Research At Philips Laboratory
- Rosetta 1
- Rosetta 2 (1985)
- Rosetta 3 (1988)
- Rosetta 4 (1991)

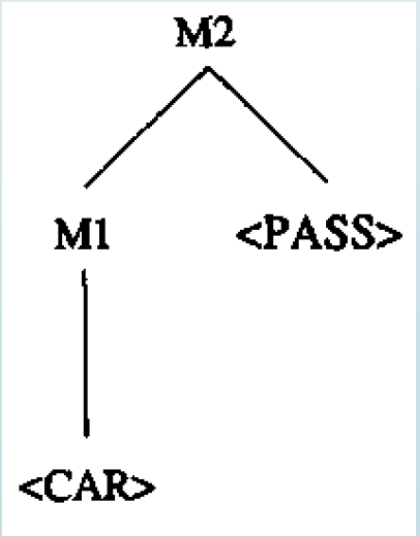
Montague Grammar

- The meaning is composed of meaning of parts
- Links semantics and syntax
- Two components
  - Rules
  - Basic expressions

Montague Grammar Example

- a. ER1 = add article *a* to the start of a noun and resulting in an indefinite singular noun phrase
- b. ER2 = by using a noun phrase and an intransitive verb we can construct a sentence with past tense.
- A car passed



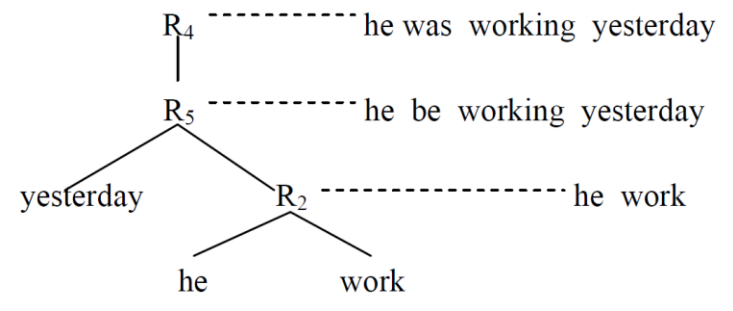


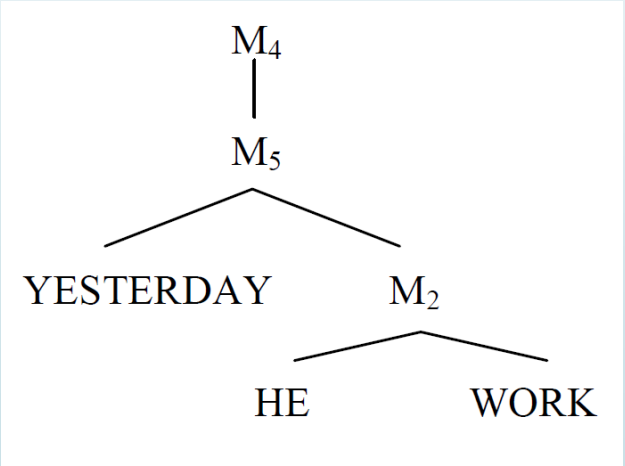
Principles of Rosetta Project

- The Principle of Explicit Grammars
- The Compositionality Principle
- The One Grammar Principle
- The Isomorphy Principle
- The Principle of Interlinguality

The Compositionality Principle

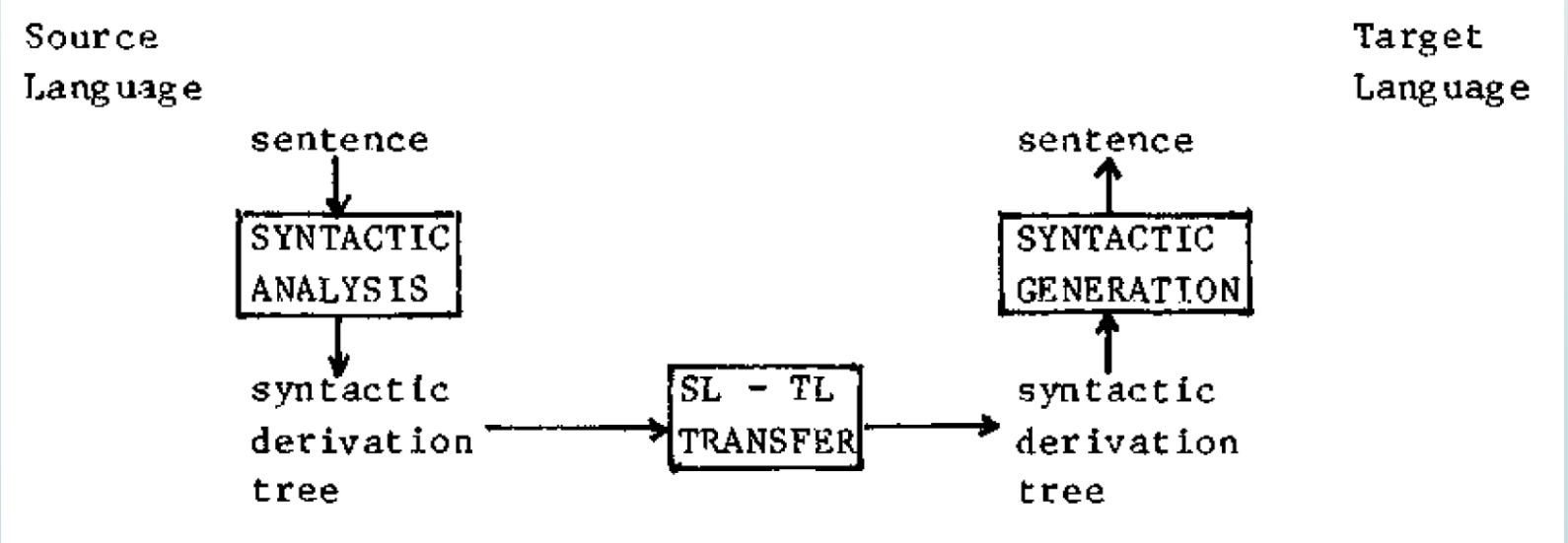
- Adopted from Montague Grammar
- M-grammars, a kind of Montague Grammar
- Syntactic component
- Semantic component
  - Basic meaning
  - Meaning rules





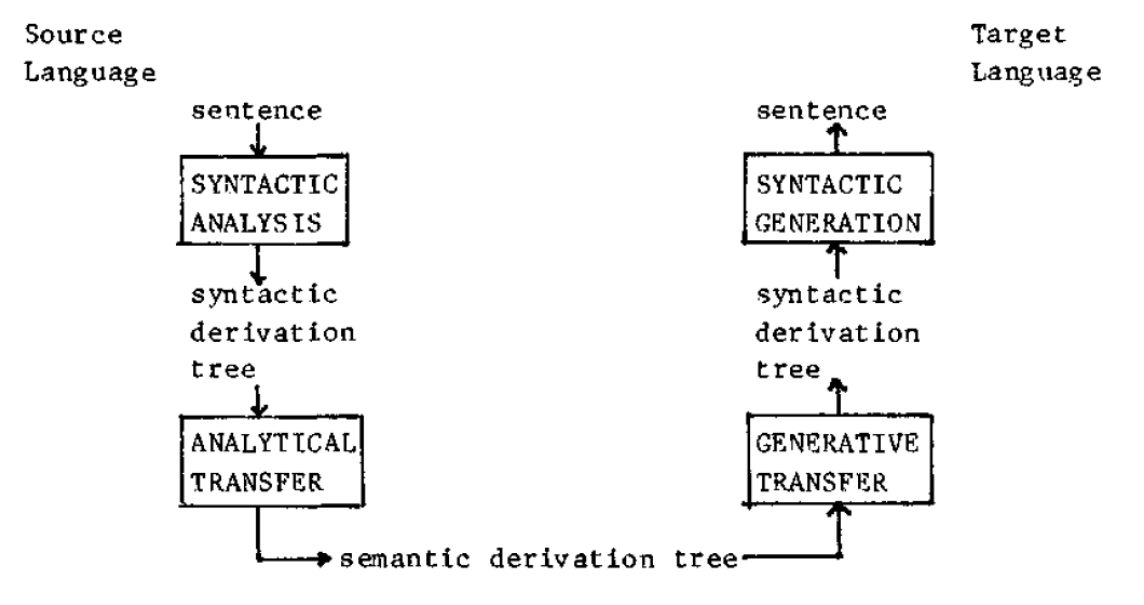
The One Grammar Principle

- The analysis and the generation component for a specific language are based on the same grammar
- Reversibility Principle
- Pros: bidirectional systems
- Cons: cannot guarantee the system to give at list one translation



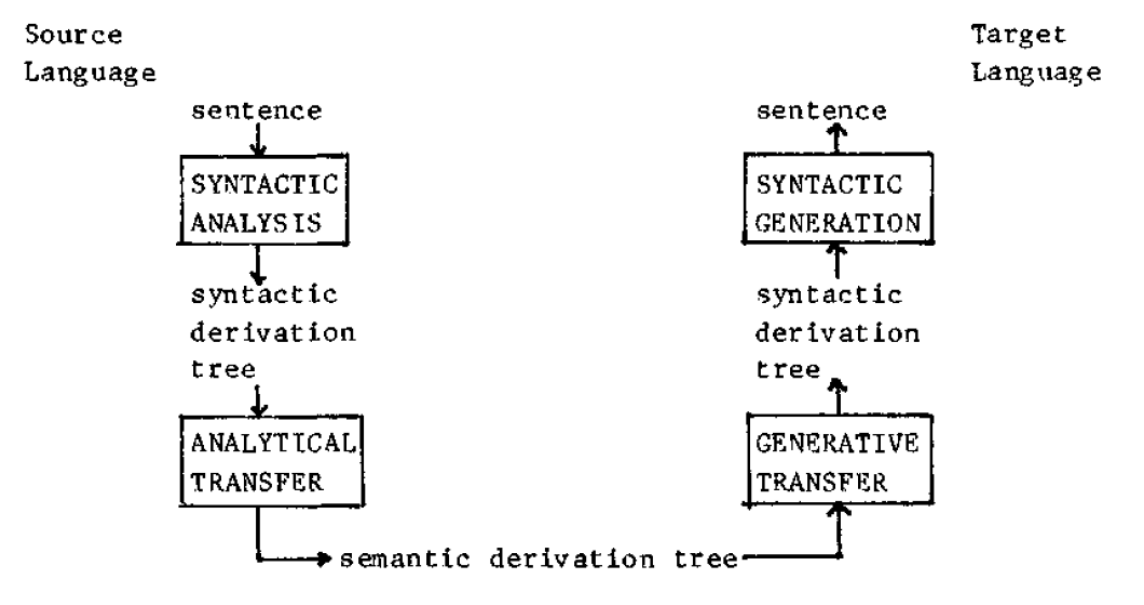
The Isomorphy Principle

- two sentences are translations of each other if their meaning derived in the same way from the same basic meanings
- two sentences are translation pairs if they have the same semantic derivation tree



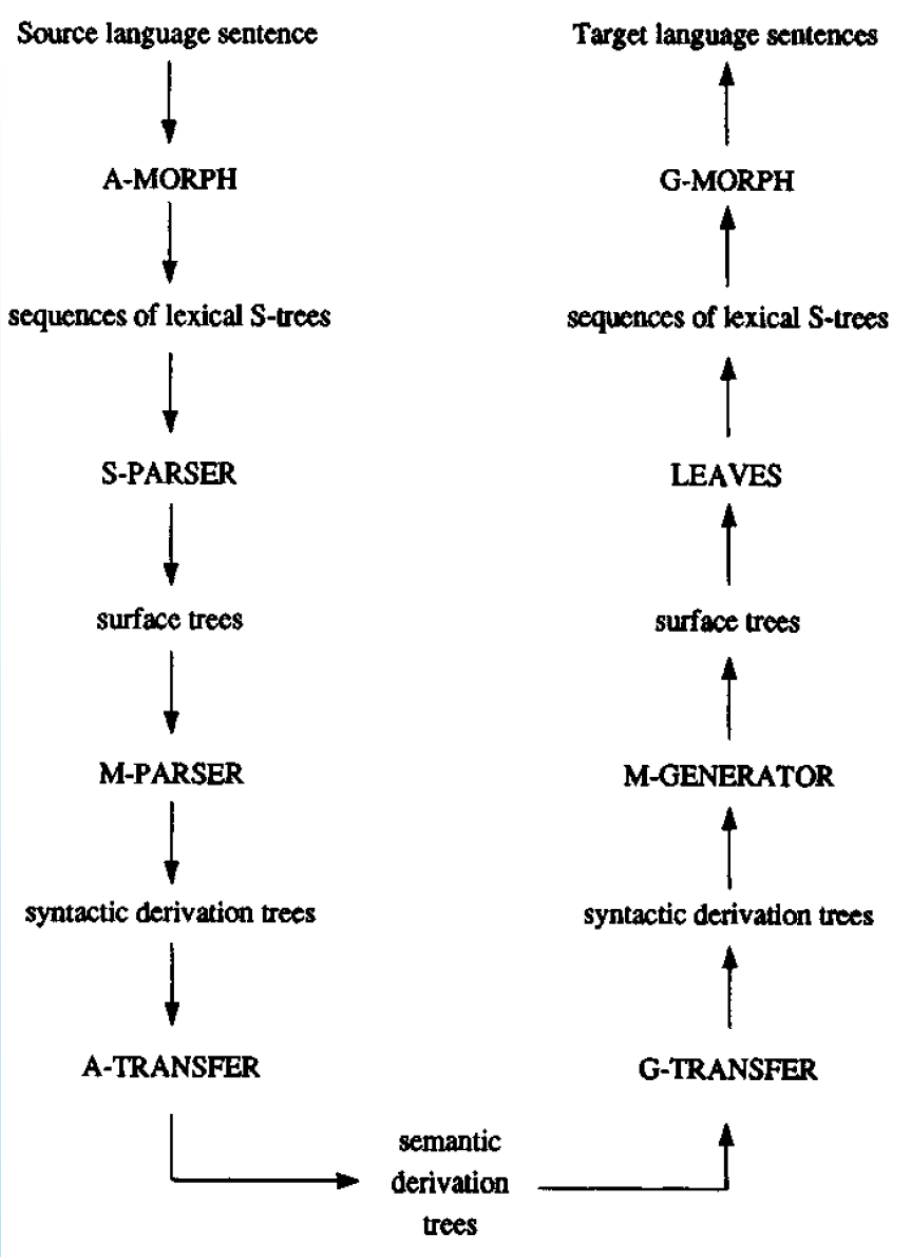
The Principle of Interlinguality

- Intermediate language
- Translation of many grammars
- Analytical transfer component(A-TRANSFER)
- Generative transfer component(G-TRANSFER)



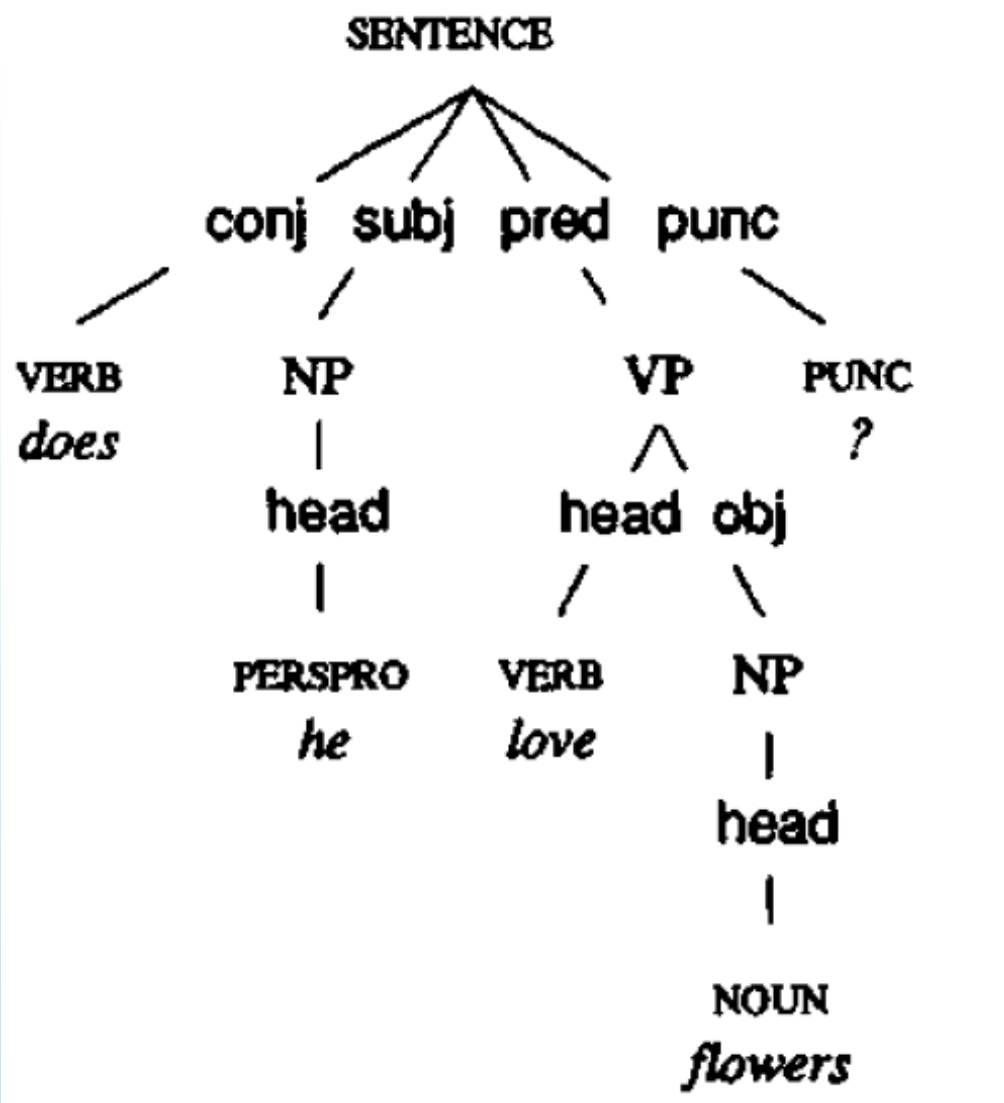
Translation Process

- English: Does he love flowers?
- Dutch: Houdı hij van bloemen?



S-PARSER

- Morphological analyzer(A-MORPH)
- S-PARSER
- lexical S-trees



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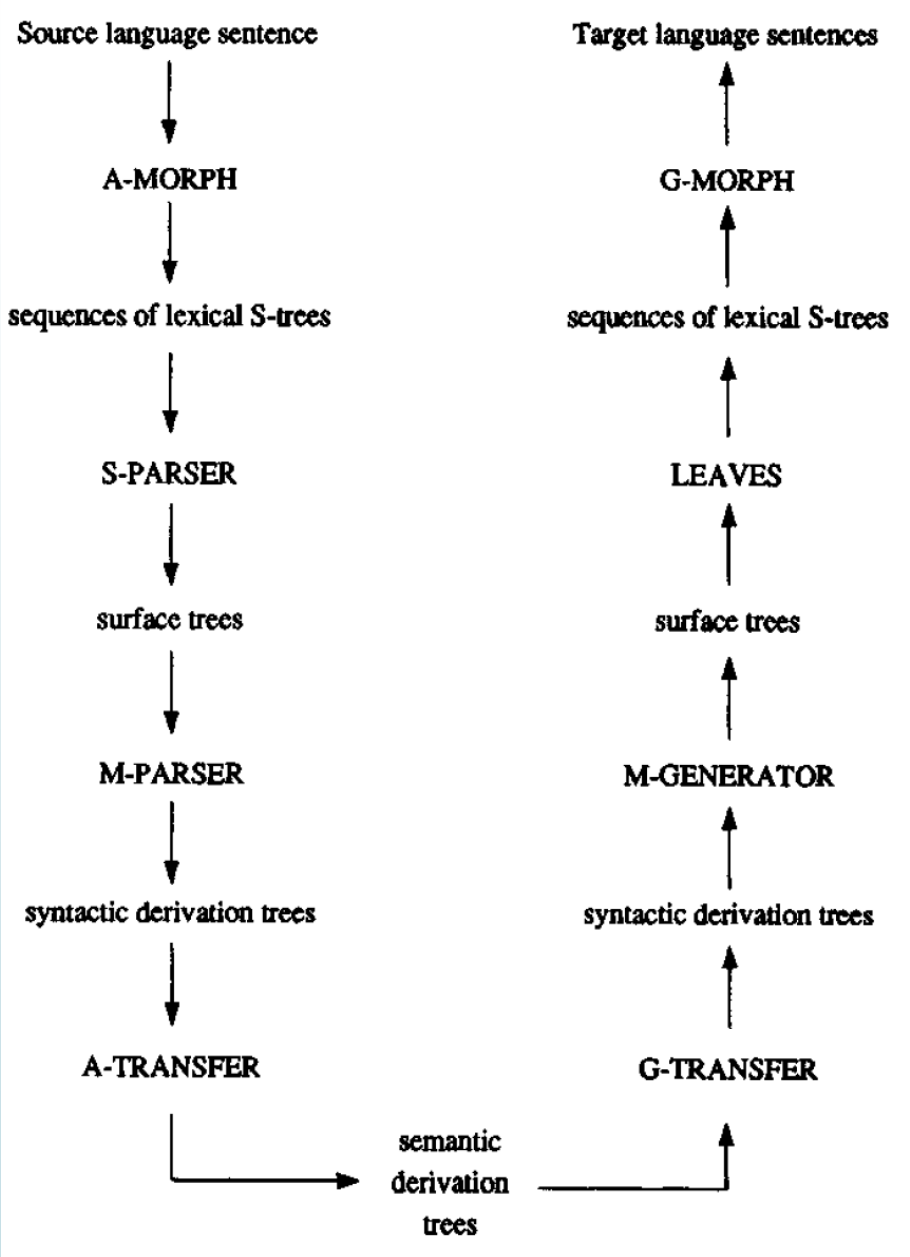
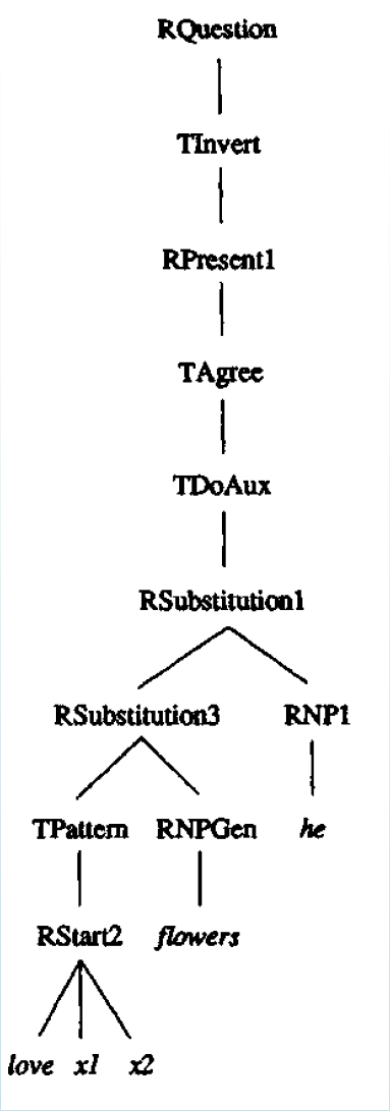


M-PARSER

- Selects syntactically correct surface tree structures
- RQuestion : ‘Does he love flowers’
- TInvert: ‘He does love flowers’
- TAgree: ‘He do love flowers’
- TDoAux: ‘‘he love flowers’



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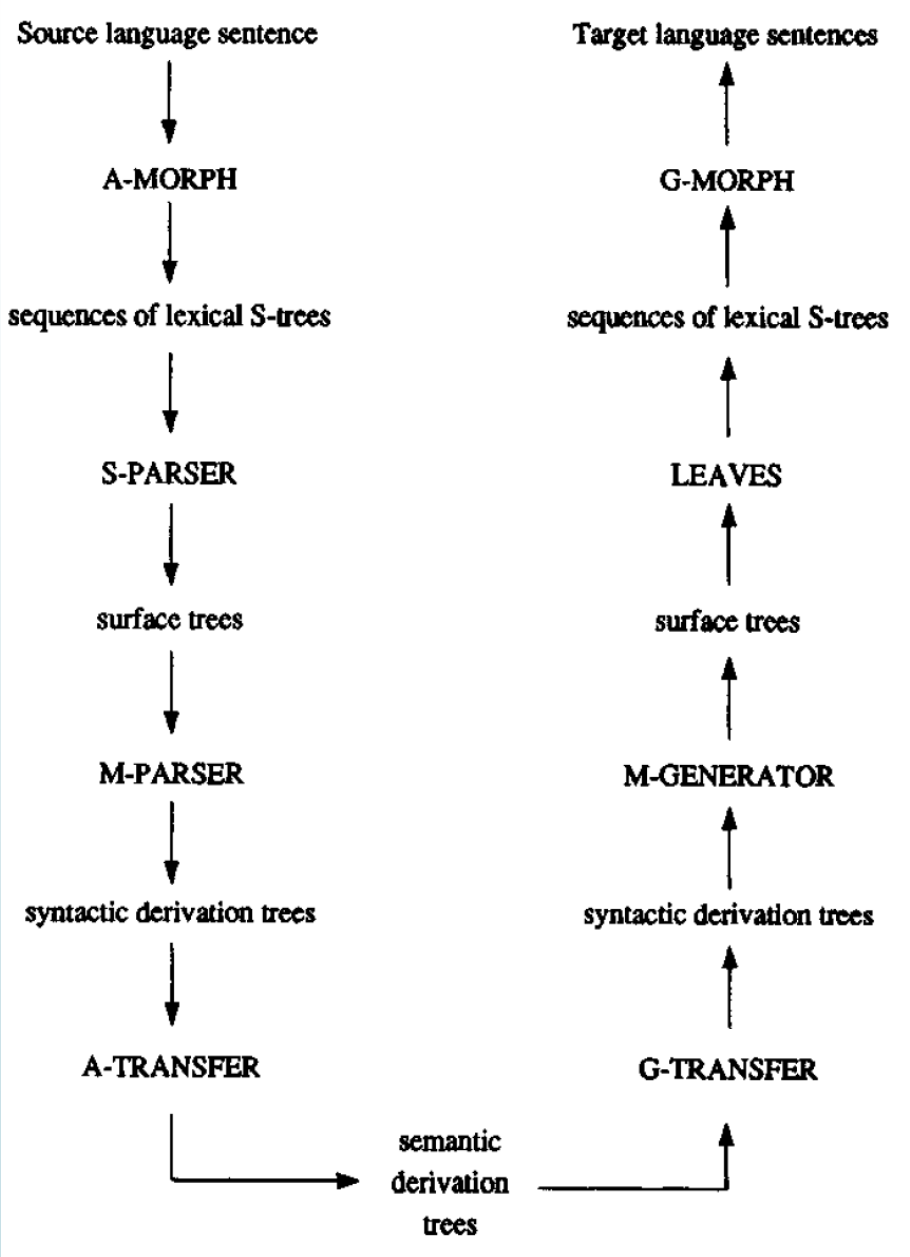
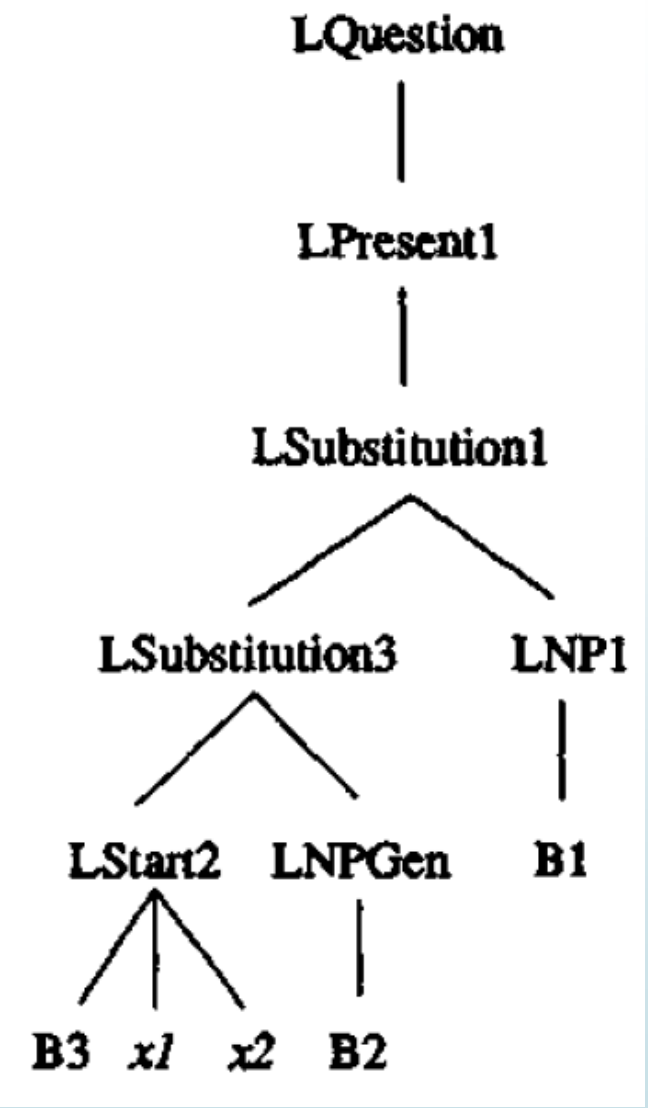


A-TRANSFER

- semantic derivation tree
- Syntactic derivation trees are language specific and we will use semantic derivation trees as interlingua



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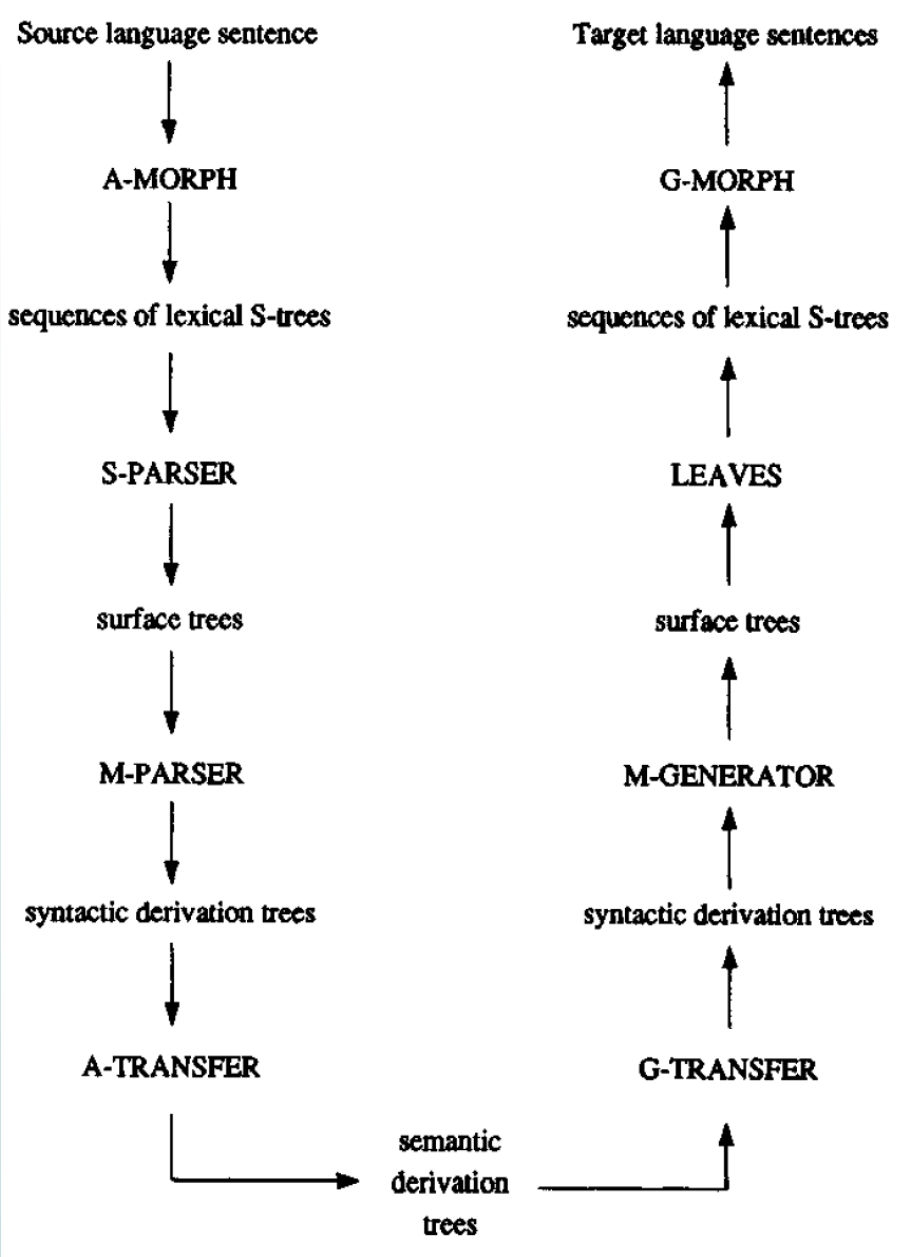
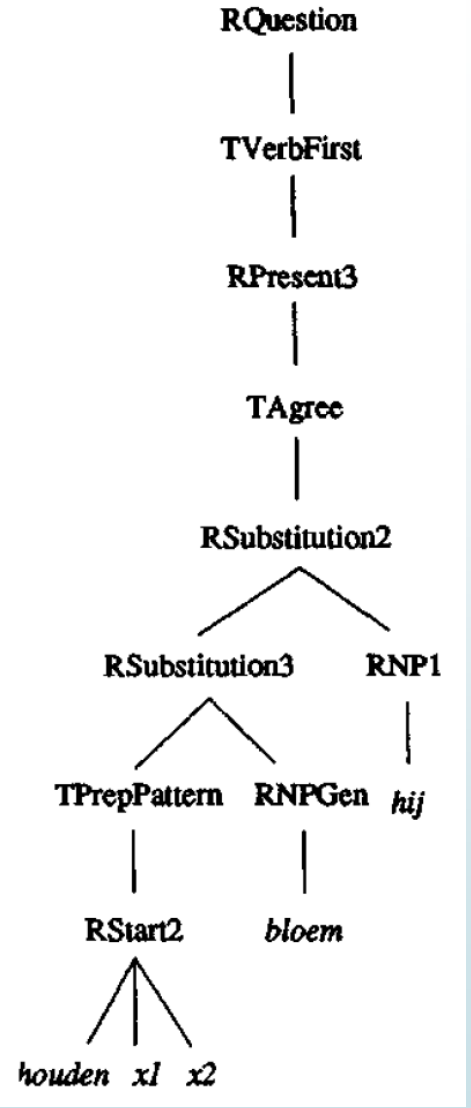


G-TRANSFER

- converts the semantic derivation trees to syntactic derivation trees



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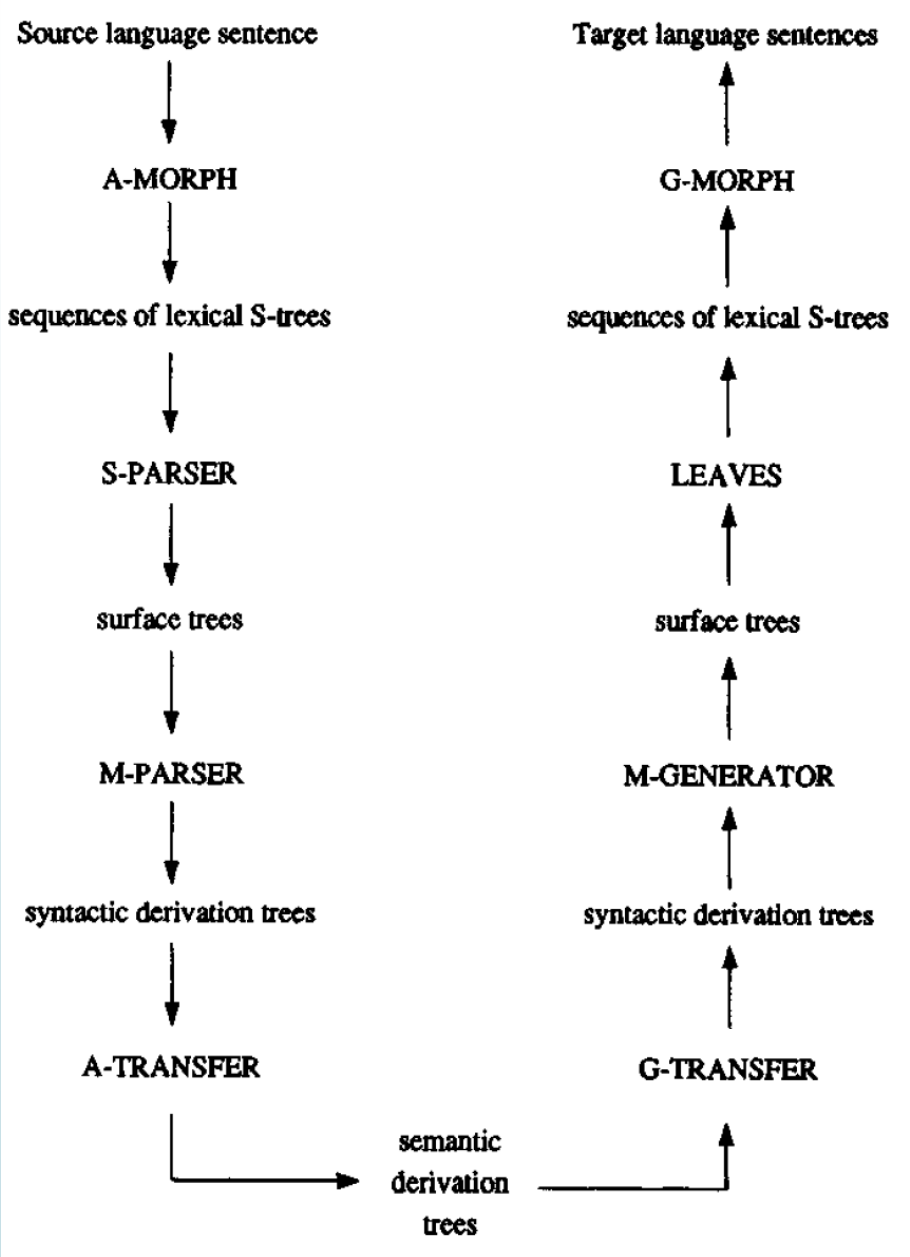
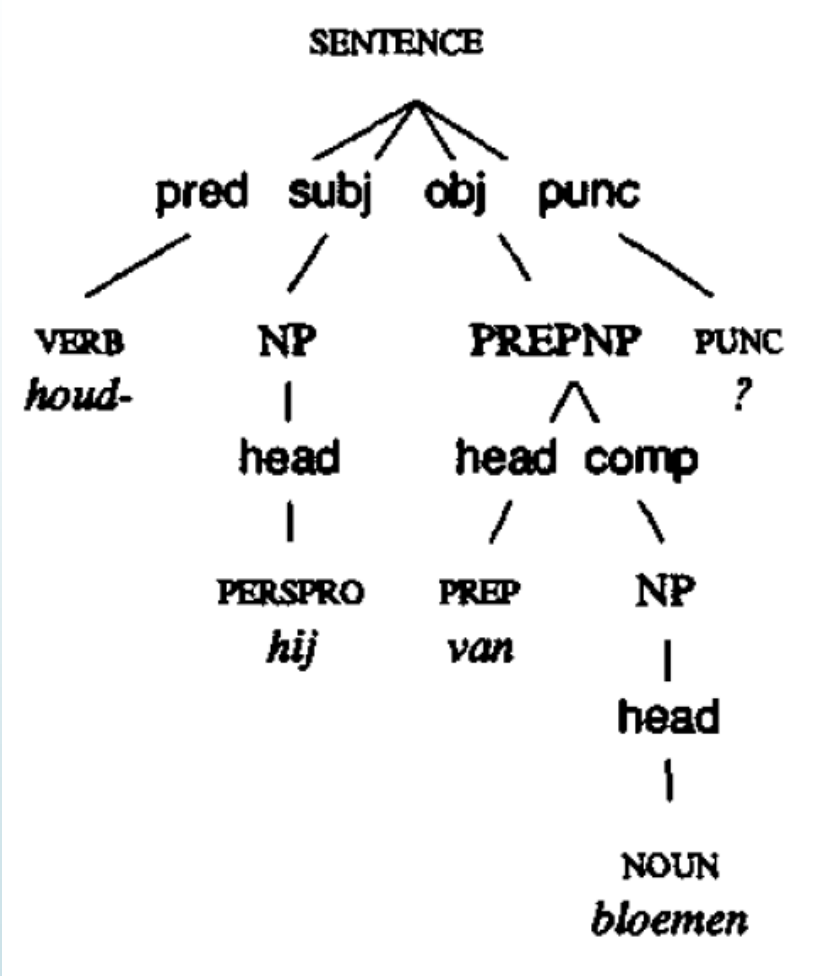


M-GENERATOR

- converts syntactic derivation trees to surface trees.
- two functions
  - validating syntactic derivation trees and selecting the correct trees
  - converting these trees to surface trees



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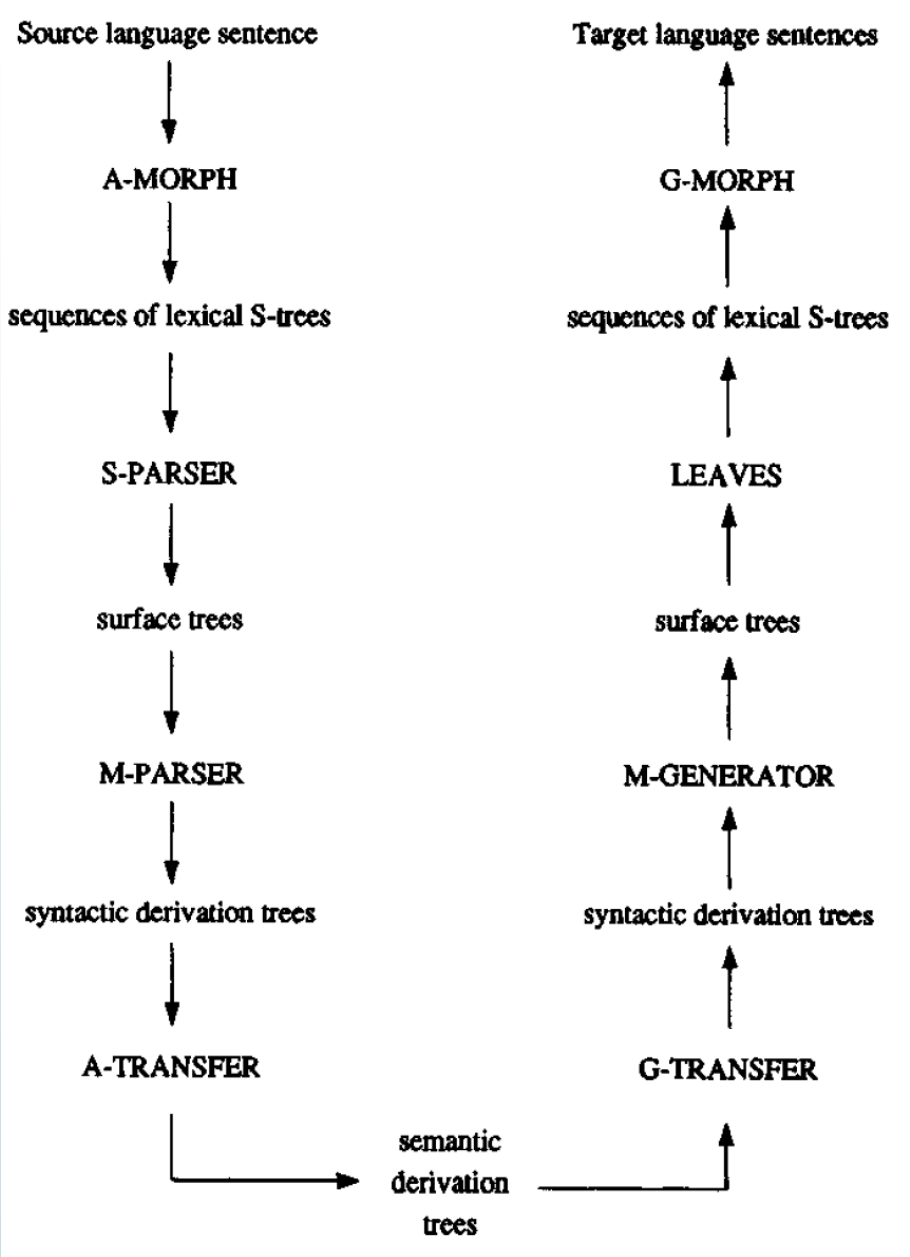

Dictionaries

- Dutch and English
  - Van Dale dictionaries having nearly 90000 entries

References

- [1]Appelo, L., and J. Landsbergen. "The machine translation project Rosetta." *I. International Conference on the State of the Art in Machine Translation in America, Asia and Europe: Proceedings of IAI-MT86, IAI/EUROTRA-D*. 1986.
- [2] Dowty, D. R., R. E. Wall, and S. Peters. "Introduction to Montague Semantics (Reidel, Dordrecht)." *DowtyIntroduction to Montague Semantics1981* (1981).
- [3] Hutchins, William John, and Harold L. Somers. *An introduction to machine translation*. Vol. 362. London: Academic Press, 1992.