

LING5702: Lecture Notes 11

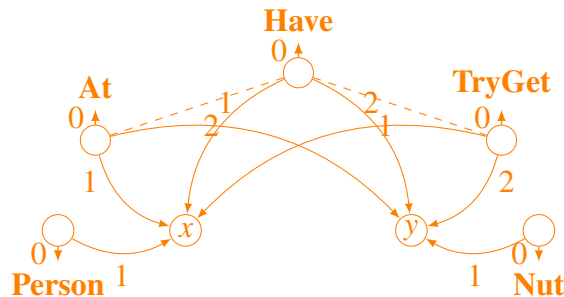
Sentence Processing

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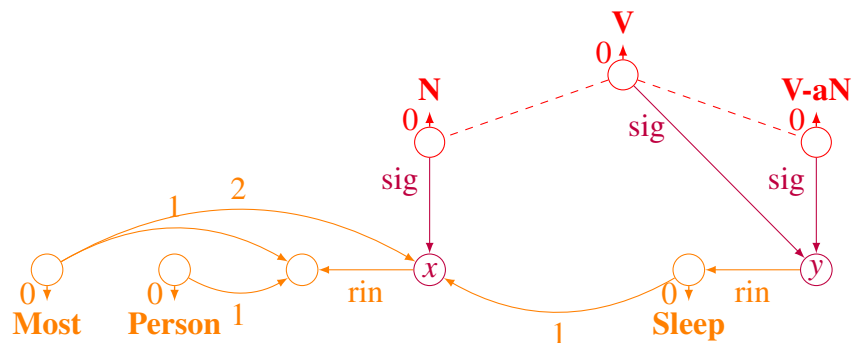
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11.1 Signs [de Saussure, 1916]

Previously we've seen hierarchies of events, which can be modeled using cued associations:



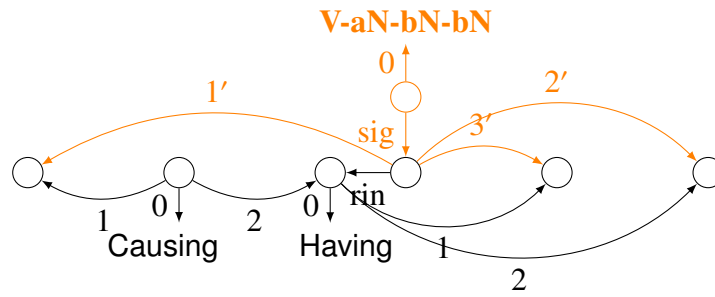
Language may extend this system by using hierarchies of **signs**, which **signify** events:



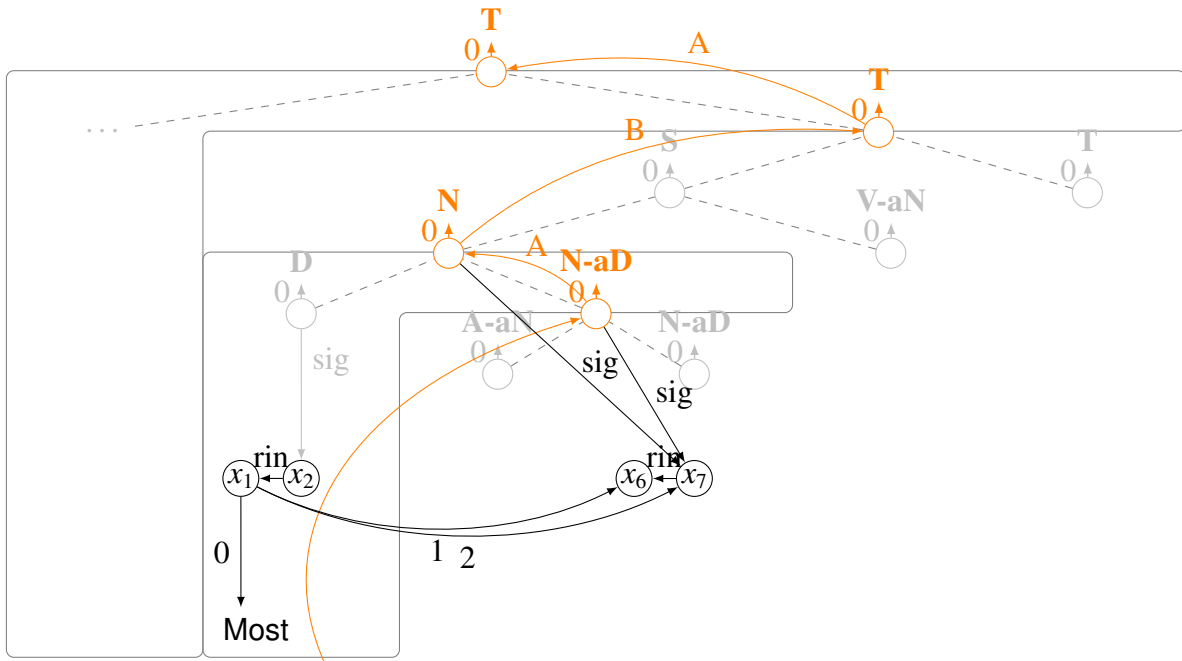
Signs have:

- **signified** structures (edges labeled **sig**) – these are our complex ideas;
- **syntactic categories** (edges labeled **0**) – we've seen these already (**V**, **V-aN**, etc.);
- **syntactic arguments** (labeled **1'**, **2'**, etc., from signified), connecting semantic participants;
- **inheritance** associations (labeled **rin**), to make restrictions accessible from nuclear scope.
- **apex/base** associations (labeled **A**, and **B**), connecting derivation fragments on the store;

For example, here's a lexical sign for the word *give*, defined to mean *cause to have*:



And here's a store of signs after the word *Most* in the sentence *Most large pumps work*:



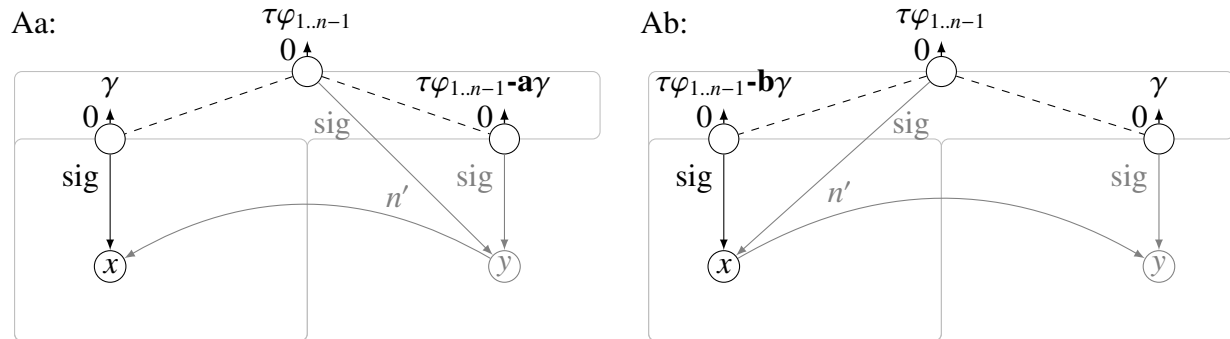
11.2 Processing [Lewis & Vasishth, 2005, Rasmussen & Schuler, 2018]

Comprehension proceeds as follows, using modified terminal and nonterminal decisions:

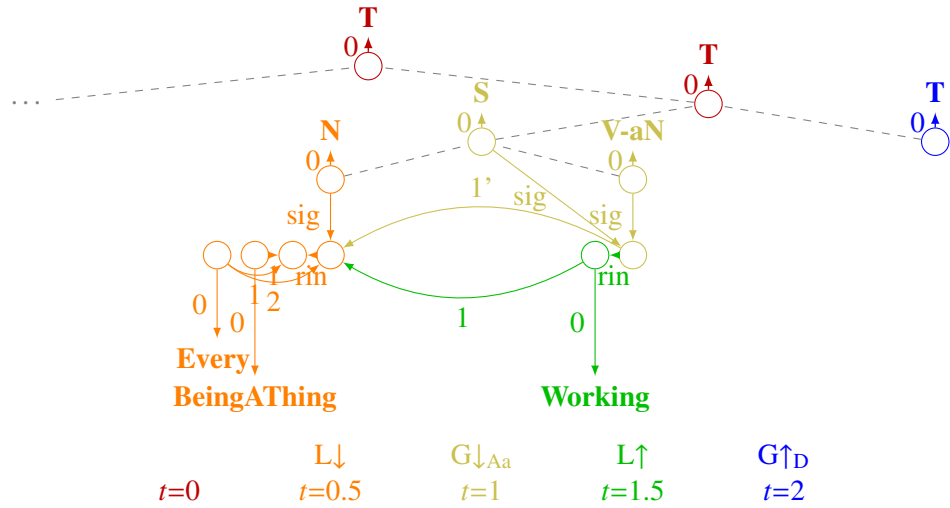
1. a **terminal** decision is made about whether to **match** store elements at the next word, and a **lexical inference rule** is applied (choose a meaning for the next word).

These form a scaffolding for the participants of predicates, quantifiers, etc.

First we need rules to attach arguments:

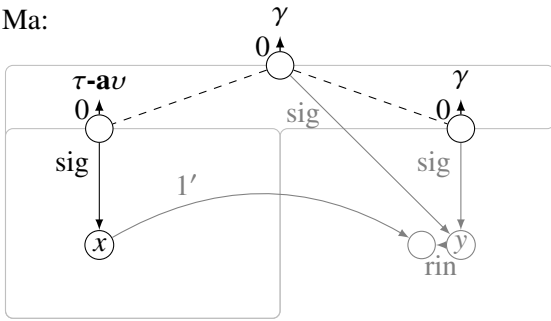


These rules attach constraints to the ‘nuclear scopes’ of the quantified noun phrase:

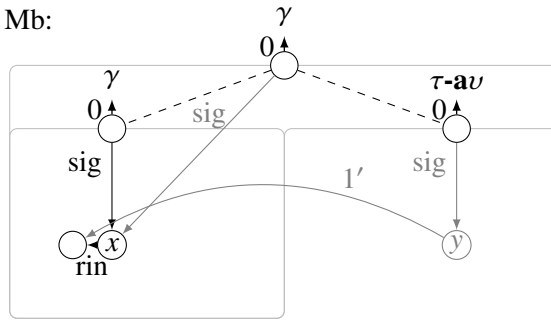


Then we need rules to attach modifiers:

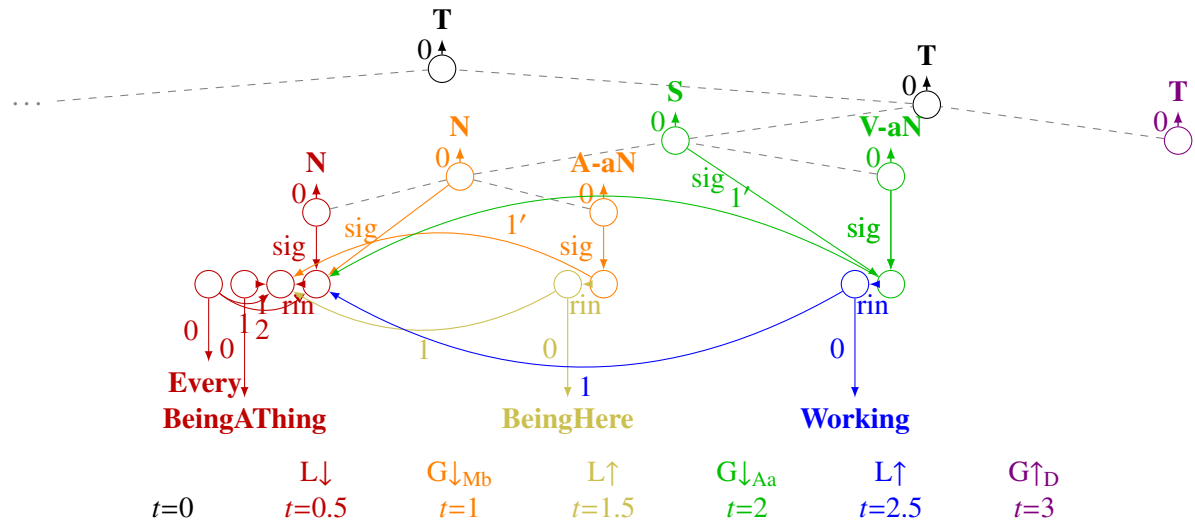
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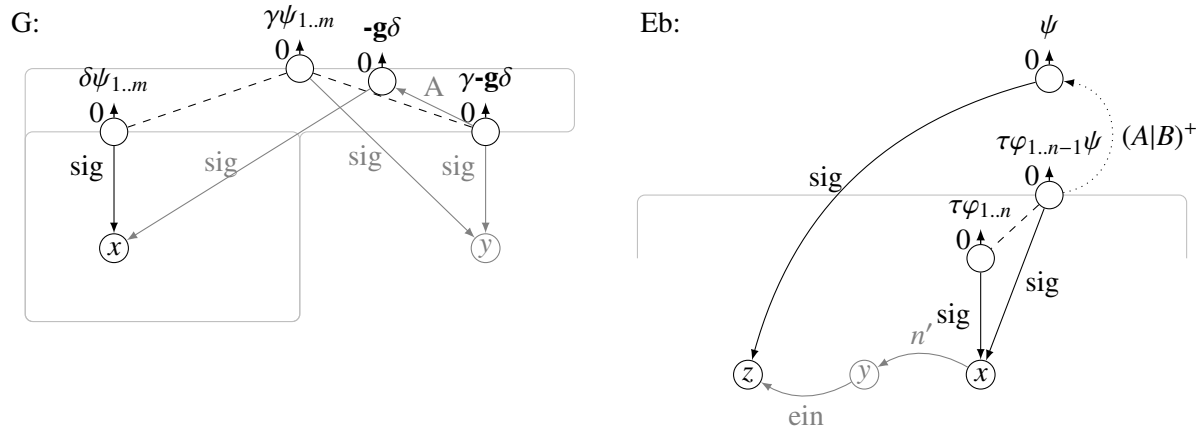
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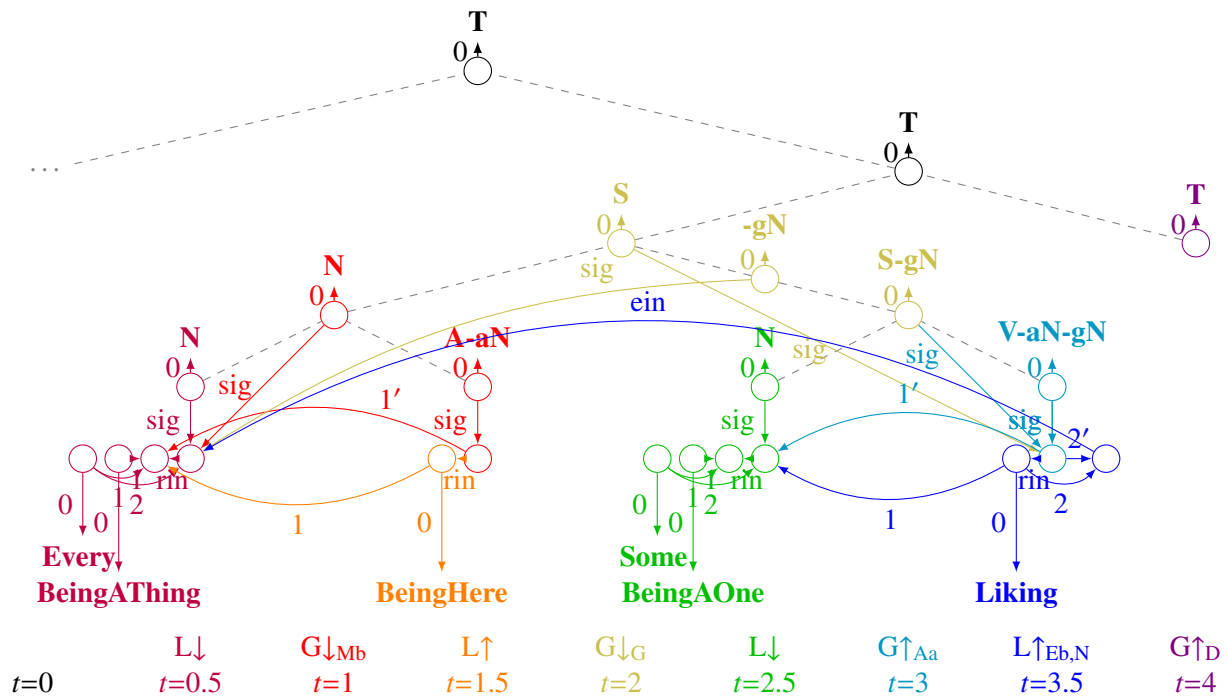
These rules attach constraints to the ‘restrictors’ of quantified noun phrases:



We also need rules to attach fillers to gaps ('G'ap and 'E'xtraction rules):



Here's an entire derivation of *Everyone here someone likes*:



There are several other rules as well, covered in more detail here:

https://linguistics.osu.edu/sites/linguistics.osu.edu/files/tech-rept-casp_0.pdf

References

[Lewis & Vasishth, 2005] Lewis, R. L. & Vasishth, S. (2005). An activation-based model of sentence processing as skilled memory retrieval. *Cognitive Science*, 29(3), 375–419.

[de Saussure, 1916] de Saussure, F. (1916). *Cours de Linguistique Générale*. Payot.

[Rasmussen & Schuler, 2018] Rasmussen, N. E. & Schuler, W. (2018). Left-corner parsing with distributed associative memory produces surprisal and locality effects. *Cognitive Science*, 42(S4), 1009–1042.