Nonlogical Rules

Carl Pollard

Department of Linguistics
Ohio State University

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Introducing Nonlogical Rules (1/3)

- The last problem on Problem Set One showed that it is harder to analyze relative clauses (RCs) without relative pronouns or relativizers than RCs with them.
- Why? Because there is no overt expression responsible for converting a gappy sentence into a postnominal modifier.
- The usual solution is to posit an inaudible relative pronoun or relativizer along the following lines:

$$\vdash \lambda_{fs}.s \cdot (f\ \mathbf{e}); (\mathrm{Acc} \multimap \mathrm{S}) \multimap \mathrm{N} \multimap \mathrm{N}; \mathsf{that}$$

Note: This isn't quite right, since it disallows the relativization of embedded subjects within the RC.

- Such lexical entries are reminiscent of the 'null functional heads' of mainstream generative grammar.

Introducing Nonlogical Rules (2/3)

- Equivalently, we can posit a special-purpose nonschematic inference rule:

$$\frac{\Gamma \vdash f; \mathrm{Acc} \multimap \mathrm{S}; P}{\Gamma \vdash \lambda_s.s \cdot (f\ \mathbf{e}); \mathrm{N} \multimap \mathrm{N}; \lambda_Q.P\ \mathsf{that}\ Q}$$

- Such rules are called **nonlogical** because they are not included in the linear logic-based rule schemas already introduced.
- It turns out that the need for such rules arises often.
- The difference between logical and nonlogical rules seems to correspond closely to the distinction in mainstream generative grammar between 'core grammar' and the 'marked periphery'.

Introducing Nonlogical Rules (3/3)

- Notice that even though the null relativizer rule is nonlogical, its semantics is logical in a certain sense: its reference at any world w is definable without any nonlogical constants except @ itself:

$$\vdash \forall_w.\mathsf{that}@e = \lambda_{PQx}.(P\ x)@w \wedge (Q\ x)@w$$

- As we'll see, nonlogical rules that arise in practice often (but not always) have this property. Why is this?

Where Do Predicative NPs Come From? (1/2)

- In order for sentences like *Chiquita is lazy* to get the right semantics, the predicational copula

$$\vdash \lambda_{st}.s \cdot \text{is} \cdot t; A \multimap (A \multimap \text{Prd}) \multimap \text{S}; \mathsf{prd}\ (A \leq \text{NOM})$$

  must predicate its complement's meaning of its subject's meaning.
- And so its own meaning must be the **predication** combinator $\mathsf{prd} =_{\text{def}} \lambda_{xP}.P\ x$.
- But this won't work if the complement is an ordinary NP such as *Burrita*; we need a 'version' of *Burrita* (or any other NP that could occur postcopularly) that has tecto PrdN and a property meaning, in the present case $\lambda_x.x\ \mathsf{exteq}\ \mathsf{b}$, where $\mathsf{exteq} : \text{e} \to \text{e} \to \text{p}$ is subject to the meaning postulate:

$$\vdash \forall_{xyw}.(x\ \mathsf{exteq}\ y)@w \leftrightarrow (x@w = y@w)$$

Where Do Predicative NPs Come From? (2/2)

- It will come as no surprise that there are two logically equivalent ways to manage this:
  1. a nonlogical rule:

$$\frac{\Gamma \vdash a; \mathrm{Acc}; b}{\Gamma \vdash a; \mathrm{PRO} \multimap \mathrm{PrdN}; \lambda_x.x \ \mathsf{exteq} \ b}$$

  2. a lexical entry:

$$\vdash \lambda_s.s; \mathrm{Acc} \multimap \mathrm{PRO} \multimap \mathrm{PrdN}; \mathsf{exteq}$$

- Either way we can derive:

$$\vdash \mathrm{chiquita} \cdot \mathrm{is} \cdot \mathrm{burrita}; \mathrm{S}; \mathsf{c\ equals\ b}$$

Three Kinds of Prepositional Phrases

The term 'prepositional phrase' is used for (at least) three different kinds of expressions in English:

1. Pedro depends **on Chiquita**. (semantically vacuous)
2. **On Chiquita** is Pepito's favorite place to be. (refers to a location (spatiotemporal region))
3. Pepito is **on Chiquita**. (predicates being at a location)

Semantically Vacuous Prepositions

- PPs with specific semantically vacuous prepositions can be subcategorized for by verbs, e.g.

  $\vdash \lambda_s.\text{depend} \cdot s; \text{On} \multimap \text{PRO} \multimap \text{Bse}; \lambda_{yx}.\mathsf{depend}\ x\ y$

- We analyze them as having different tectotypes, e.g. On, By, For, With, etc., with the meaning of the PP determined by the prepositional object:

$$\frac{\vdash \lambda_s.\text{on} \cdot s; \text{Acc} \multimap \text{On}; \lambda_x.x \qquad \vdash \text{chiquita}; \text{Acc}; \mathsf{c}}{\vdash \text{on} \cdot \text{chiquita}; \text{On}; \mathsf{c}}$$

- Is there any reason to consider different semantically vacuous prepositions as subtypes of a common tecto?

Nonpredicative Locative Prepositions

- Some prepositions combine with an Acc to form an expression which refers to, or perhaps existentially quantifies over, (a) certain location(s) associated with the entity denoted by that Acc.
- Let us call such expressions **locatives** (Loc) and such prepositions **nonpredicative locative** prepositions.
- Something to think about: how should Loc fit into our ordering of basic tectos?
- Assuming locations are certain kinds of entities, the meaning of a locative preposition is a function that maps entities to an associated (quantifer over) location(s), so that e.g. (on c) denotes the 'on Chiquita' location.
- So we have lexical entries like:

$$\vdash \lambda_s.\mathrm{on} \cdot s; \mathrm{Acc} \multimap \mathrm{Loc}; \mathsf{on}$$

Prepositions that Predicate Location (1/2)

- Many prepositions, here analyzed with tecto Acc $\multimap$ PrdP, predicate:

  1. This present is **for** you.
  2. This book is **about** bats.
  3. Your argument is **without** merit.

- Among these are ones that predicate location of the subject denotation at a location associated with the denotation of the prepositional object:

  1. Pepito is on Chiquita.
  2. Chiquita is behind Pedro.
  3. Pedro is beside Maria.

- Let's call these **predicative locative prepositions**.

Prepositions that Predicate Location (2/2)

- Clearly the location at which a predicative locative PP locates the subject is the **same** as the one denoted by the corresponding nonpredicative locative PP. E.g.:
- *Pepito is on Chiquita* predicates of Pepito *being at* the location denoted by the nonpredicative PP *on Chiquita*
- We can analyze this correspondence with a nonlogical rule

$$\frac{\Gamma \vdash s; \mathrm{Loc}; l}{\Gamma \vdash s; \mathrm{PRO} \rightarrow \mathrm{PrdP}; \lambda_x.x \text{ at } l}$$

  or the equivalent lexical entry:

  $\vdash \lambda_s.s; \mathrm{Loc} \multimap \mathrm{PRO} \multimap \mathrm{PrdP}; \lambda_{lx}.x \text{ at } l$
- Be careful not to confuse the locative at with the constant @ denoting the being-true-at relation!
- Note that this rule is nonlogical in a strong, semantic sense, because its meaning contribution involves the nonlogical constant at.

More about Nonlogical Rules

- More examples: rules that turn
  - plural and mass N's into Neu's
  - predicatives into 'absolutive' sentence modifiers
  - nonnominal predicatives into postnominal modifiers (so-called 'reduced relatives')
- Do languages have lots of nonlogical rules, or just a few?
- Are nonlogical rules which are semantically logical the norm or are they exceptional?
- What is the range of possible non-logical meanings for nonlogical rules?