On numeral quantification in Juruna: 'exactly' and 'at least' readings

Suzi Lima (University of Massachusetts, Amherst/ slima@linguist.umass.edu)

The literature about numeral quantification can be divided in two main proposals. On the one hand, the Neo-Gricean approach claims that the lexical meaning of numerals (like 'three') is an 'at least' meaning ('at least three') which, depending on the context, may be strengthened by way of a scalar implicature to generate an 'exactly' reading (Horn 1972, 1989, Levinson 2000). On the other hand, critics of the Neo-Gricean approach argue that numerals have a default 'exactly' reading (e.g. Horn 1992, Geurts 1998, Breheny 2005, 2008).

In Juruna (Juruna family, Tupi stock) the composition of [Numeral + NP] necessarily yields 'exactly' readings (1) and the composition of [[Numeral NP] pl] necessarily yields 'at least' readings (2):

(1.i) The numeral three: *txabïu*

(1.a.) Txabï-a senahï tahu
Three-nom. man run.cumulative form
"Exactly three men ran (single or multiple events)"
* "Three (or more) men ran (single or multiple events) "

(1.b.) Txabï-a senahï wanã
Three-nom. man run.suppletive plural form
"Exactly three men ran (multiple events)"
* "Three (or more) men ran (multiple events) "

(2.a.) Txabï-a senahï-i tahu
Three-nom. man-pl run.cumulative form
"Three (or more) men ran (single or multiple events) "
* "Exactly three men ran (single or multiple events)"

(2.b.) Txabï-a senahï-i wanã
Three-nom. man-pl run.suppletive plural form
"Three (or more) men ran (multiple events) "
* "Exactly three men ran (multiple events)"

Our analysis of these facts is that numerals are lexically exact and 'exactly' readings are default for numeral quantification. Approximative readings are generated by an 'at least' operator. Geurts (2006) and Breheny (2008) argue that numeral quantification encodes a bilateral ('exactly') semantics, others readings being derived from that one through the use of semantic operations, like pluralization. In that sense, we are claiming that Juruna is evidence that these readings can be derived by semantic compositional processes and are not entirely dependent on Pragmatics (Chierchia, Fox and Spector 2008).

Following Partee (1986) and Geurts (2006), we render the 'exactly' reading of numerals as in (3), making use of the operator '$\exists!x$' in their denotation, where '$\exists!x$' means 'there is a unique x such that.' 'At least' readings are derived from an adjectival reading of numerals through type-shifting operations (existential closure), as in (4) (where '$A \rightarrow_S B$' means that A is type-shifted to B):

(3) $\lambda P\ \exists!x[\#x = 3 \wedge \text{man}(x) \wedge P(x)]$

(4) $\lambda x[\#x \geq 3 \wedge \text{man}(x)] \rightarrow_S \lambda P\ \exists x[\#x \geq 3 \wedge \text{man}(x) \wedge P(x)]$

'At least' readings of numerals are argued to be modalized: in contexts like (2) the speaker knows that three people ran, but that it is possible that more than three people had run (Geurts & Rick Nouwen 2007))

In conclusion, Juruna is a language where exactly readings are defaults and an 'At least' operator generates approximative readings. This operator can be type-shifting, such as the existential closure. As a consequence, these readings can be derived by compositional semantic instead of depending exclusively in post-compositional operations.

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