

Against class A treatment of *no more*: experimental evidence from Czech

Mojmír Dočekal (docekal@phil.muni.cz), Masaryk university

Background. Previous research on modified numerals established some widely accepted contrasts between comparative modifiers (CM) and superlative modifiers (SM) (see Büring 2008; Geurts and Nouwen 2007; Nouwen 2015; Mayr 2013; Schwarz 2016 a.o.), such as: (i) CM don't but SM do give raise to obligatory ignorance implicatures; (ii) CM can scope over or under existential modals (EM) but SM have to outscope them. A *no more than Num* construction (NMC), where negation and comparison are combined in a way exemplified by an English sentence (1) from Nouwen (2008), to this day the most developed formal treatment of NMC, is then claimed to allow both scopes w.r.t. EM (Nouwen 2008) and to have scalar bounding inference, signalling speaker's well-informedness (ibid), since English *no more* construction (unlike class B modifiers) give raise to equality readings like (=50) for (1). Such claims seem to be supported by the comparative morphology of NMC. I bring new experimental and corpus evidence against both claims, showing that (cross-linguistically) (i) NMC can be interpreted only with wider scope than EM; (ii) NMC is compatible (mostly) only with speaker's insecurity (or so-called variation) readings as SM. The experimental and corpus evidence comes from Czech as it was observed before that Slavic languages (unlike English) generally don't support speaker's well-informedness NMC interpretation (Dočekal 2017).

(1) No fewer than fifty people showed up.

Experiment. The experiment followed an observation (Geurts and Nouwen 2007; Blok 2019 a.o.) that class A modifiers allow both wide and narrow scope w.r.t. an existential modal readings but class B modifiers have to out-scope the existential modals (split-scope). The research question of the experiment then was whether Czech *no more* would behave more like class A or as class B modifier in this environment. The experiment was a truth-value judgment task where the context described a situation strongly preferring the wide scope of the existential modal over the degree quantifiers. There were three conditions (CM: FEWER, SM: AT-MOST and *no more* modifier: NO-MORE). An example item from the experiment with the translation of the context and glossed conditions is in (2). The subjects had to judge (on Likert scale 1-5, 1: worst, 5: best) the appropriateness of one of the conditions (for each item) in the context. There were nine items and nine fillers, 33 subjects participated in the experiment (implemented on IBEX farm), and all of them passed fillers (uncontroversial TVJT).

(2) Context: Alex is reading an info at a gas station which states that:

- a. Jeden litr benzínu Ropák může obsahovat {a. nanejvýš/b. méně než/ c.
one liter fuel.GEN.SG Ropák.NOM.SG can contain at-most/ fewer than
ne víc než} 0.5 gramu olova.
no more than 0.5 gram.GEN.SG lead.GEN.SG
'One liter of the Ropák fuel can contain {a. at most/b. fewer than/c. no more than}
0.5 g of lead.'

Alex comments on the info: 'So, there can be sometimes even 0.6 g of lead in Ropák.'

Results. The mean/median acceptability of the three conditions are the following: AT-MOST 1.15/1, FEWER: 3.6/4, NO-MORE: 1.4/1. The boxplot representing the variation, means and medians is in the Figure 1. The mixed-effects model (R package LME4, subjects and items were random effects, answers were modelled as depending on the fixed-effect, condition) supports the descriptive statistics: there is a non-significant difference between AT-MOST and NO-MORE (t-value: 1.3, $p = 0.19$), statistically significant difference between AT-MOST and FEWER (t-value: 15.12, $p < 2e - 16$) and statistically significant difference between NO-MORE and FEWER (t-value: 13.99, $p < 2e - 16$). The experiment thus confirms that the scope behaviour of *no more* construction follows the pattern

of class B modifiers, not the class A modifiers.

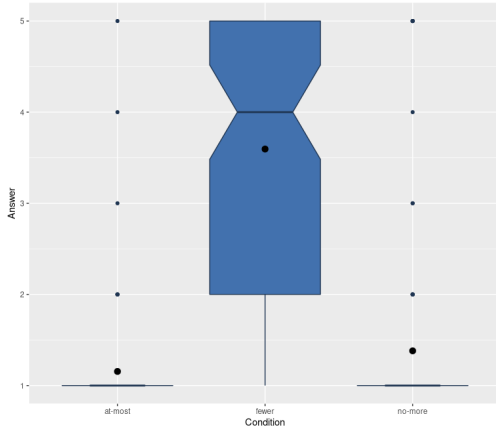


Fig. 1: Boxplot of responses

Analysis. The scope behaviour of Czech NMC is a class B profile. Thus I follow original Nouwen’s 2008 suggestion to analyze German/Dutch *nicht mehr/niet meer* as negative differential expression, thus expressing that there is no positive difference in degree between the arguments of the comparative *more*, formally: $\llbracket \text{nicht mehr } \alpha \rrbracket = \lambda P. \neg \exists d' [max_d(P(d)) = \alpha + d']$. And since the negative differential analysis is equivalent to the class B at-issue semantics of *at most*: $\lambda P. max_d(P(d)) \leq \alpha$ (after Kennedy 2015), such approach applied to Czech experimental data correctly derives the similar scope behavior of NMC and class B modifiers. The wide scope of the NMC/class B modifiers in (2a,c) then is $max_d(\diamond \text{contain}(1LRopak, d)) \leq 0.5g$, which is incompatible with Alex’s continuation and predicts low acceptability of NO-MORE and AT-LEAST in the experiment. The weak

surface scope ($\diamond [max_d(\text{contain}(1LRopak, d)) \leq 0.5g]$) which allows ‘more than’ reading is allowed only for class A modifiers and explains the high acceptability of FEWER (whatever the reasons for obligatory wide scope of class B modifiers over existential modals are, see Blok 2019). The scope behavior of Czech NMC then shows that semantically NMC behaves as class B modifier, despite its comparative morphology. Next, pragmatic properties of Czech NMC seem to show that even alternatives for implicatures of Czech NMC are similar as class B modifiers (contra Nouwen 2008). Since all the corpus occurrences of Czech NMC (Czech national corpus, ČNK) seem to appear either in (i) anti-specific contexts (in the sense of Nouwen 2015: the speaker cannot mean some specific number) like (3a); or in (ii) in non-epistemic, generic variation readings like (3b). Such pragmatic behavior is more compatible with ignorance implicatures usually attributed to class B modifiers (with stronger alternatives like $\{\text{exactly } n, \text{ at most } n-1\}$ accounting for speaker’s insecurity/variation). Class B type of implicature alternatives would account for the unacceptability of sentences like (3c) (and absence of their type in ČNK). In sum, it seems that English NMC is more exceptional type of NMC (see Blok et al. 2017 for a similar observation concerning English *no*).

- (3) a. Nevím, kolik má metrů čtverečních, určitě ne víc než padesát.
neg-know how-much has meter square certainly no more than 50
‘I don’t know how many square meters it has, certainly no more than fifty.’
- b. průměrnou délku denních přesunů, zpravidla ne víc než pět až šest km
average length day transports normally no more than 5 to 6 km
‘average length of daily transports, regularly no more than 5 to 6 km.’
- c. #Země má ne víc než dva měsíce.
earth has no more than two moons
‘Earth has no more than two moons.’

References: Blok, D. (2019). *Scope Oddity*. PhD Thesis, LOT • Büring, D. (2008). The least at least can do. In *Proc. of WCCFL*, Vol 26, pp. 114–120 • Dočekal, M. (2017). Upper bounded and un-bounded ‘no more’. *ALA* 64(2), 213–231 • Geurts, B. and R. Nouwen (2007). ‘At least’ et al. *Language*, 533–559 • Kennedy, C. (2015). A ‘de-Fregean’ semantics (and neo-Gricean pragmatics) for modified and unmodified numerals. *SemPrag* 8, 10–1 • Mayr, C. (2013). Implicatures of modified numerals. *From grammar to meaning*, 139–171 • Nouwen, R. (2008). Upper-bounded no more *NLS* 16(4), 271–295 • Nouwen, R. (2015). Modified numerals *Epistemic Indefinites*, 244–266 • Schwarz, B. (2016). Consistency preservation in quantity implicature. *SemPrag* 9, 1–1.