The time course of quantifier-quantifier interaction
Oliver Bott, Fabian Schlotterbeck
Collaborative Research Center 833, Constitution of Meaning, University of Tübingen

Scope ambiguity
- has no surface syntactic correspondence
- its resolution may depend on conscious decision [1]
- early or late process?

ISA: Immediate Scope Assignment – whenever a quantifier is encountered
GI: Global Interpretation – Scope depends on a complete sentence

Previous Online Studies
- used anaphora for disambiguation (eg [2],[3],[4],[5]):
  (1) Every kid climbed a tree. This tree/these trees...
  ▶ processing difficulty measured at the pronoun in subsequent the sentence
  ▶ a different design is needed in order to address ISA

References
[36x27]http://www.sfb833.uni-tuebingen.de/b

Scope is computed globally – after the sentence is complete
- Scope inversion leads to considerable processing difficulty
  1) We interpret the first-pass effect at the second quantifier as a failed search for a binder
  2) Regressive eye-movements originated mainly from the last region indicating that the computation of inverse scope was delayed until the end of the sentence

Discussion of the Offline Results
- The design fulfills all requirements for testing ISA
- verb position doesn’t influence the readings
- without a variable, surface scope is strongly preferred
- a variable in the first quantifier leads to scope inversion
- the bound inverse interpretation is a natural option we expect to be considered during online comprehension

Eyetracking Experiment (N=48)
- materials: 40 items, 118 fillers, latin square design
- sensicality judgment in each trial: all conditions equally acceptable [ab] (7-8)
- verb position didn’t affect eye-movements (four factor mixed model: all x , except for verb/par ROI)

First-Pass Times
- when encountering second quantifier: QQ+his slower than QQ—his
  (4) [AB] result: pronoun × DP [first = 2.6 p < .05]
- early scope inversion effect?
- If so, regressions out of 2nd DP in QQ+his condition expected

First-Pass Regression Ratios
- 2nd DP: no differences (logit mixed model: all × q)
- sentence final ROI:
  1) QQ conditions led to more regressions than controls (z = 4.6, p < .05)
  2) more regressions out of QQ+his than QQ—his (z = 2.4, p < .05)
- scope interpretation delayed until the end of the sentence

Go-Past Times
- same pattern of effects
  1) QQ conditions took longer than controls (z = 4.6, p < .05)
  2) scope inversion effect (z = 4.3, p < .05)
- scope computation during rereading of the doubly quantified sentences

Praphrase Selection I (N=48)
- does inclusion of his shift scope preferences?
- problem: his in QQ+his could refer to a sentence external referent
- task: choose among a set of 3 paraphrases for the potential readings (+ none fits)
- pronoun × verb position: 36 items, 48 fillers,latin square

Praphrase Selection II
- QQ+his could trigger a wait-and-see strategy for a referent yet to come
- we therefore explicitly provided a referent (QQ+his, said Peter)
- gender mismatch × verb position
- no effect of verb position (higher analysis: all p > .05)
- bound variable interpretation even in the presence of a potential referent (z = 3.3, p < .05)
- same pattern across verb positions (higher analysis: all p > .05)

Go-Past Times
- same pattern of effects
  1) QQ conditions took longer than controls (z = 4.6, p < .05)
  2) scope inversion effect (z = 4.3, p < .05)
- scope computation during rereading of the doubly quantified sentences