Experiment 2: DP-Aux-DP-V

• Task: Choose a paraphrase
• Scope judgments for [qq, amb]- and [qq, disamb]-sentences in both orders
• What interpretation do readers have for sentences like (1) and (2)? Does the computation of inverse scope cause processing difficulty?

(1) Jeden dieser Schüler hat genau ein Lehrer gelobt.

(2) Jeden seiner Schüler hat genau ein Lehrer gelobt.

∀ • Scope ambiguity: ∀x [student(x) → ∃y [teacher(y) ∧ praise(y,x)]] (linear)
∀ [teacher(y) ∧ ∃x [student(x) → praise(y,x)]] (inverse)

• Intuitively, linear scope is preferred in (1) (e.g. Pafel, 2005)
• Online perspective on computing quantifier scope (inspired by Barker, 2002):
  - We can derive scope incrementally but have to postulate an abstract predicate
  - Representation of the incomplete sentence with the predicate yet to come
  \[ \lambda q. \forall x [student(x) → \exists y [teacher(y) ∧ q]] \]

(3) Genau ein Lehrer lobte jeden dieser Schüler.

(4) Genau ein Lehrer lobte jeden seiner Schüler.

• Is there an effect of computing inverse scope at the second quantifier?
• Comparing difficulty in integrating exactly one teacher of (2) vs. (1) can be used to study incremental interpretation of scope
• In (2), scope can be determined without looking at the verbal information
• Will there be difficulty even before the predicate has been processed?
• We compared two word orders: DP-V-DP vs. DP-Aux-DP-V

Design of the Study

Experiment 1 (DP-V-DP)

- Does the computation of inverse scope cause processing difficulty?
  - Self paced reading, 32 participants, 32 items + 96 fillers, latin square design
  - Difficulty at the second quantifier when inverse scope is required
  - No difference w.r.t. deines Interaction DP-Type (Q vs. Def) × Binding (of Amb vs. of Def): F(1,31)=11.16, p<.01
  - Last segment: QQ conditions more difficult than QDef
    - Main effect: F(1,31)=26.17, p<.01
    - Interaction: F(1,31)=8.83, p<.01

- Binding visibly affects scope assignment at second quantifier
  1) Compute linear scope, check variable binding and reanalyze or
  2) Move second quantifier to a scope position very high up in LF?
  - Late effect at the end of the sentence: could be computing a model?

Experiment 2 (DP-Aux-DP-V)

- Can the processor determine the scopal configuration of an incomplete sentence with a yet abstract predicate?
  - Both QQ conditions were read equally fast
    - VDef model: A (contextually salient) teacher praised each kid.
    - VAmb model: One teacher praised each kid vs. and all the others did not.
    - VDef model: A (contextually salient) teacher praised each kid.
  - Surprisingly, no difference between the QQ conditions
    - VDef model: F(1,31)=46.56, p<.01
    - VAmb model: F(1,31)=23.35, p<.01
  - Computing scope requires a concrete scenario including verbal information
  - Late effect like in Experiment 1. compare complexity of these models:
    - QQ models: One teacher praised each kid and all the others did not.
    - QDef model: A (contextually salient) teacher praised each kid.

Controlling the Scope Readings and the Complexity of Bound Variable Interpretations

- What interpretation do readers have for sentences like (1) and (2)? Does variable binding of "his" really disambiguate the scope?
  - Scope judgments for [qq, amb]- and [qq, disamb]-sentences in both orders
  - Task: Choose a paraphrase (All students were praised by the same teacher vs. Each student was praised by a different teacher), if both don’t fit provide your own.
  - 20 participants, 32 items, 26 fillers

  Results:
  - Both readings available in amb. conditions
  - Only∃V-reading in disamb. conditions
  - No difference between qvq- and qvq-order

- Using variable binding to disambiguate an otherwise scope ambiguous sentence towards the inverse reading causes processing difficulty.
- Scope is computed online while interpreting a multiply quantified sentence; variable binding works as a filter that can lead to revising the initial scope reading.
- Scope is computed only when the quantifiers and the predicate have all been encountered – it hinges on a concrete scenario (see Sanford & Garrod, 1998)

Discussion

- Latin square design testing the 32 items + 96 Fillers