Pseudo-scoping out of tensed clauses: the case of cumulation

Jonathan Palucci

NELS 54, January 26-27

1 Overview

1.1 Empirical puzzle

> **Goal of talk: to address whether tensed clauses impose a locality constraint and block non-local QR of universals, (1).**

(1)   [... [every] ... embedding predicate $_{\text{TP}}$[... t ...]].

- In the literature, variation of an indefinite is used as a way to detect where the universal takes scope, (2)—with mixed results.

(2)   [[every] [indefinite] embedding predicate $_{\text{TP}}$[... t ...]].

> **variation with *make sure*: ✓; variation with *claim*: ✗**
>
> (3)   A student made sure that every invited speaker had a ride.
>   ✓∀ > ∃   (Farkas and Giannakidou, 1996, p. 37)
>
> (4)   A student claimed that every professor was wrong. ✗∀ > ∃

- (3) licenses a weakened reading where the student varies by speaker—henceforth, a 'variation reading'.

- In contrast, (4) doesn't license a variation reading.

Empirical puzzle: variation readings are sensitive to the embedding predicate.

- One response to predicate sensitivity: tensed clauses do not block non-local QR per se, only for certain predicates (Barker, 2022; Hoeks et al., 2022).

  ○ *make sure* allows non-local QR; *claim* doesn't.

  ⤳ Non-local QR is possible and we just need to understand why certain embedding predicates block it.

1.2 Plan for today

- Use the proposal that variation readings underlyingly involve non-local QR as starting point.

Step 1: show that QR cannot be the right analysis by drawing parallel between universals and negative indefinites (w.r.t. variation).

  ○ No QR ⇒ case of pseudo-scope (Fox and Sauerland, 1996).

  ○ But if not QR, then what?

Step 2: argue variation readings are the indirect result of cumulative inference by drawing parallel between variation and cumulation.

Strategy: the key to understanding variation readings is to understand which predicates allow them.

  ○ Won't provide a complete explanation of predicate sensitivity but take steps towards a complete understanding.

2 QR is not viable

- First, w.r.t. variation, there is a parallel between sentences containing embedded universals and those with negative indefinites.

- Consider the context in (5a) with the target sentence in (5b).

(5) a. [*Ann, Bea and Carol were student volunteers for the open house. There were three tours so each student volunteer was responsible for overseeing one tour. Ann made sure that the first tour started on time, Bea made sure that the second tour started on time and Carol made sure that the third tour started on time.*]
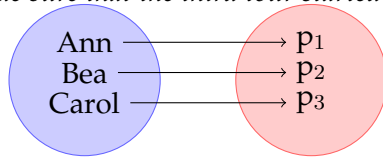

Figure 1: Diagram of scenario (p_i = tour i was on time).

  b. A student volunteer made sure that no tour of the department started late.

- In (5a), no particular student oversaw every tour.

Observation: In (5b), we get a similar weakened meaning when we replace the universal quantifier with a negative indefinite.

  ⤳ (5b) parallels (3) in involving variation of students by tours.

Emerging generalization: a broader pattern of variation.

  ○ Despite difference in quantificational force, variation is observed with universal and negative quantifiers alike.

- Sentences with negative indefinites parallel those with universals in licensing variation, but the parallel extends further.

- Consider the context in (6a) with the target sentence in (6b).

(6) a. [*Ann, Bea and Carol are teaching assistants. Before yesterday's class, the teacher wrote three problems and asked the three TAs to each look over one problem. Ann claimed that the first problem was error-free, Bea claimed that the second problem was error-free and Carol claimed that the third problem was error-free.*]

  b. #A teaching assistant claimed that no problem contained errors.

Observation: (6b) can only be about a particular student volunteer.

  ○ In contrast to (5b), (6b) does not license variation.

  ⤳ Variation with negative indefinites shows same predicate sensitivity.

Challenge for QR: QR can't capture variation with negative indefinites.

- Recall, QR approach analyzes variation reading as inverse scope.

  Prediction: variation shouldn't be available when embedded quantifier resists inverse scope (i.e., negative indefinite).

- If the negative indefinite QRs to a position above the subject indefinite, (7a), the resulting LF leads to an unattested reading, (7b).

(7) a. [no tour] λ_1 [a student made sure that $_{TP}[t_1$ started late]]
  b. $\neg\exists y$ [tour(y) $\wedge \exists x[$ student-vol.(x) $\wedge$ make-sure(x, p)]
     where p = $\lambda w.$ started-late(y)(w)
     'there is no tour y such that there is a student volunteer that made sure y started late'.

- (7b) doesn't derive truth conditions for a variation reading.

⤳ Right interpretation can't be derived by QRing the negative indefinite above the subject indefinite—in contrast to universal quantifier.

- We ran an acceptability rating experiment to verify the parallels between universal quantifiers and negative quantifiers.

- Rather than focusing solely on *make sure* and *claim*, we also tested:

make sure-like predicates: 4 predicates which license variation: *prove, confirm, verify* and *establish*

claim-like predicates: 4 predicates which don't license variation: *confess, believe, notice* and *heard*

- 20 participants were shown contexts where the indefinite varied, as in (5a), and were asked to rate the target sentence on a scale from 1 (completely unnatural) to 6 (completely natural).

  Condition 1: target sentence contained universal quantifier

  ○ *A student volunteer made sure that every tour started on time.*

  Condition 2: target sentence contained negative indefinite

  ○ *A student volunteer made sure that no tour started late.*

  ○ Controls involved non-varying indefinites ('non-varying context') that referred to a single individual; results in Figure 2.
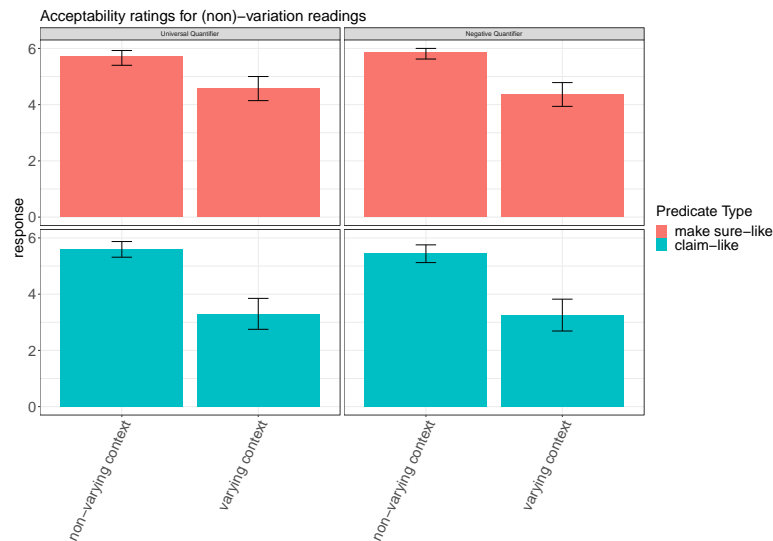

Figure 2: Left: Acceptability ratings in non-varying and varying indefinite contexts with universal quantifier. Right: Acceptability ratings in non-varying and varying indefinite contexts with negative quantifier.
Main observations in Figure 2:

1. **variation occurs with universal and negative quantifiers:** acceptability ratings across both conditions are the same.

2. **variation is predicate sensitive:** in varying context, observe higher acceptability of variation readings for *make sure*-like predicates (red bars) compared to *claim*-like predicates (blue bars).

⤳ Whatever is used to analyze variation with a universal quantifier should also extend to variation with a negative quantifier.

- If variation readings don't involve QR, what is the alternative?

- To understand what underlies these variation readings, we need a better understanding of *make sure*-like predicates.

  ○ What property of *make sure*-like predicates enables variation?

3 The cumulation-variation correspondence

- Now let's focus on the matrix subject position.

Manipulation: change the indefinite subject to a plural subject.

Observation: same predicate sensitivity as variation readings.

  ○ Illustrated in (8) and (9), with *claim* and *make sure*.

(8) a. [*Ann claimed that speaker 1 and speaker 2 were wrong; but not speaker 3 and speaker 4. Bea claimed that speaker 3 and speaker 4 were wrong; but not speaker 1 and speaker 2.*]
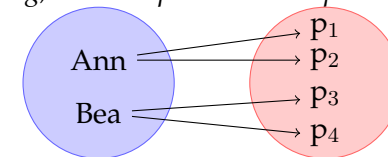

Figure 3: Diagram for (8) (p_i = speaker i was wrong).

  b. Ann and Bea claimed that every speaker was wrong. ✗

(9) a. [*Ann made sure that speaker 1 and speaker 2 had a ride; but not speaker 3 and speaker 4. Bea made sure that speaker 3 and speaker 4 had a ride; but not speaker 1 and speaker 2.*]
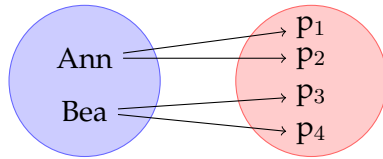
Figure 4: Diagram for (9) (p_i = speaker i had a ride).

b. Ann and Bea made sure that every speaker had a ride. ✓

Prediction: cumulation should show higher acceptability with *make sure*-like predicates than with *claim*-like predicates.

Why? These phenomena are correlated, so an embedding predicate should license both variation and cumulation, or neither.

- We tested this through another acceptability rating task where participants were shown cumulative scenarios with target sentences containing plural subjects (e.g., conjoined proper nouns).
  - Controls involved non-conjoined subjects that simply referred to a single individual ('non-conjoined subject' in Figure 5).
  - Sample context and target sentence is provided in (10) (others are provided in the Appendix); the results are shown in Figure 5.

(10) CONJOINED SUBJECT CONTEXT
  a. [*Before yesterday's class, there were four problems to look over. Ann made sure that the first and second problems were error-free, but didn't take a look at the third and fourth problems. Bea made sure that the third and fourth problems were error-free, but didn't look at the first and second problems.*]
  b. Ann and Bea made sure that every problem was error-free.

The main observation in Figure 5: cumulation with conjoined subjects is rated significantly higher with *make sure*-like predicates (red bars) compared to *claim*-like predicates (blue bars).

⤳ Cumulation/variation show the same pattern w.r.t. *make sure*-like and *claim*-like predicates, suggesting the generalization in (11):
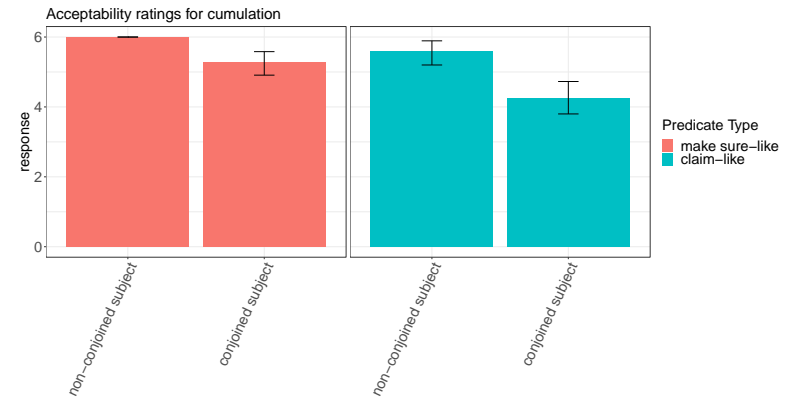

Figure 5: Acceptability ratings for cumulation.

(11) THE CUMULATION-VARIATION CORRESPONDENCE
A clause embedding predicate will license variation readings (i.e. apparent wide scope of a universal) whenever the predicate licenses cumulation.

Takeaway from experiments: tensed clauses are scope islands for QR after all; apparent wide scope is an illusion, derived via cumulation.

⤳ predicate-dependence of variation readings is a consequence of the fact that cumulation is predicate-dependent.

Taking stock: cumulation and variation involve the same mechanism.

  - We have a way of analyzing the examples involving conjoined subjects: cumulative inferences (Harada, 2022).
  - We can then apply these cumulative inferences to the case of variation readings.

4 Cumulative inferences

- Drawing on inferential source analyses of cumulativity (Kratzer, 2002; Pasternak, 2018), Harada (2022) analyzes cumulativity across a tensed clause boundary using cumulative inferences.

○ Certain predicates, like *make sure*, license an inference which combines the contributions of each member of the matrix subject

⇒ as a result, embedded proposition is true.

Illustration: Consider the above example, repeated in (12), to outline the truth conditions arising from cumulative inferences, as in (12c).

(12)   a.   [*Ann made sure that speaker 1 and speaker 2 had a ride; but not speaker 3 and speaker 4. Bea made sure that speaker 3 and speaker 4 had a ride; but not speaker 1 and speaker 2.*]
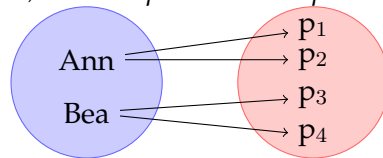

Figure 6: Diagram of scenario (p_i = speaker i had a ride).

   b.   Ann and Bea made sure that every speaker had a ride.

   c.   make-sure(ann, $\{p_1, p_2\}$) ∧ make-sure(bea, $\{p_3, p_4\}$) → make-sure($\{$ann, bea$\}$, $p_\forall$) ($p_\forall = p_1 \land p_2 \land p_3 \land p_4$)

• In (12), the contributions of Ann and Bea are cumulated together so that a conjunction of propositions holds: $p_1 \land p_2 \land p_3 \land p_4$.

• Conjunction of propositions is contextually equivalent to the proposition *every speaker had a ride* ($p_\forall$); we get the inference in (12c).

⤳ Ann and Bea, between them, made sure that every speaker had a ride.

• Cumulative inferences are different than prototypical cumulativity involving relational plurals (Kroch, 1974; Langendoen, 1978; Scha, 1984; Beck and Sauerland, 2000):

○ Prototypical cumulativity involves two plurals, X and Y, and a relation, R, that holds between the members of these plurals.

• Crucially, cumulative inferences don't require two plurals. Instead they make reference to the embedded proposition as a whole.[1]

┌─ **Cumulative inferences** ─
⇒ we have *X made sure that p*, where p is an unanalyzed proposition that is brought about by members of the plurality, X.
└

Accounting for the broader pattern of variation: The fact that variation readings are possible with negative quantifiers is expected under the cumulative inference story.

○ This is because the embedded quantifier is, in a sense, inert.

○ Doesn't matter if the embedded proposition contains a universal or negative quantifier, as long as the proposition is true.

○ Using cumulative inferences, we can now analyze variation readings with singular indefinite subjects.

5   Locating the plurality

• As we've seen, cumulative inferences crucially involve a plurality in the subject position to cumulate over.

• If variation readings are cumulative inferences in disguise, then:

---

[1]This can be illustrated by replacing the universal quantifier with a singular definite, as in (1) (Harada, 2022, Ch.2).

(1)   a.   [*The ramen recipe is comprised of two parts: the noodle recipe and the broth recipe. Boy 1 proved that the noodle recipe is flawless. Boy 2 proved that the broth recipe is flawless.*]

   b.   The two boys proved that the ramen recipe is flawless.

> **Question:** Where does the subject plurality come from with the singular indefinite?
>
> **Proposed answer:** Contrary to appearances, variation readings actually involve a hidden plurality in the subject position.

- In this section, I outline one way to make sense of this.

- I propose that the singular indefinite is interpreted as a free variable ranging over (partial) functions from events to individuals.

  ○ Variation is contextually available insofar as the context introduces a set of events relating students to speakers, as in (13a).

  ○ A plurality is then retrieved by collecting together the students from each event, as in (13c).

(13)　a. [*There are three invited speakers. Student 1 made sure speaker 1 had a ride; student 2 made sure speaker 2 had a ride; student 3 made sure speaker 3 had ride.*]

$$f(E)=\{s_1,s_2,s_3\} \quad p_\forall=p_1 \wedge p_2 \wedge p_3$$

$$f(e_1)=s_1 \rightarrow p_1$$
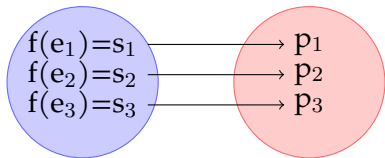$$f(e_2)=s_2 \rightarrow p_2$$
$$f(e_3)=s_3 \rightarrow p_3$$

Figure 7: Diagram of scenario (p_i = speaker i had a ride).

　　b. A student made sure that every invited speaker had a ride.

　　c. $[\exists e_1[f(e_1) = s_1 \wedge \text{make-sure}(f(e_1), p_1)] \wedge$
$\exists e_2[f(e_2) = s_2 \wedge \text{make-sure}(f(e_2), p_2)] \wedge$
$\exists e_3[f(e_3) = s_3 \wedge \text{make-sure}(f(e_3), p_3)]] \rightarrow$
$\exists E \, [\text{make-sure}(f(E), p_\forall)]$
(where $E = \{e_1, e_2, e_3\}$)

- In (13c), there are three different events (e_1, e_2 and e_3) which comprise the set E.

　　○ For each event, the function f maps it to a different student.

　　○ The students are then collected together into a plurality and we get a plural subject, f(E).

- The cumulative inference goes through because the predicate *make sure* allows us to cumulate different events together.

⇒ The cumulative inference effectively combines the contribution of each witness of the indefinite.

- No cumulative inference with *claim*-like predicate because it doesn't allow collecting the individual from each event into a plurality.

  Recall: claims are not things that can be cumulated together.

6　Concluding Remarks

Takehome message: Apparent inverse scope out of a tensed clause is not due to an exceptional scope shifting mechanism, like QR, but the indirect result of a cumulative inference.

- One final observation which supports the conclusion that tensed clauses are scope islands for QR.

- We have been using variation of the indefinite as a means of detecting where the universal takes scope.

Alternative diagnostic for non-local QR: assessing the relative scope of the universal and the embedding predicate directly, (14).

(14)　[... [every] ... embedding predicate $_{TP}$[... t ...]].

- To sharpen intuitions, use an embedding predicate with existential quantificational force.

- First, consider (15).

(15)　[*Scenario: there can only be one winner.*]
　　For every runner, I consider it possible that they will win.

- (15) licenses a reading which is compatible with the scenario and conveys that each runner has a chance of winning.

- Now consider (16).

(16) [*Scenario: there can only be one winner.*]
#I consider it possible that every runner will win.

- Two possible readings of (16):

Surface: 'I consider it possible that all the runners will win'

⤳ incompatible with the scenario.

Inverse: 'For each runner x, I consider it possible that x will win'

⤳ compatible with the scenario and corresponds to (15)

- If non-local QR is available, the inverse scope reading should be available for (16).

- The sentence is infelicitous, so inverse scope reading is not available.

⤳ Explained by the conclusion that tensed clauses are scope islands for QR after all.

- By connecting variation and cumulation, we have a path towards a more complete understanding of the initial empirical puzzle concerning predicate sensitivity.

Next steps
1. What is it about *make sure*-like predicates that licenses cumulative inferences?

2. Is this a truly lexical phenomenon or can contextual factors also license cumulation/variation with *claim*-like predicates?

Acknowledgments

Appendix: sample stimuli

Variation readings stimuli: Figure 2

Universal quantifier stimuli

- 'non-varying context' condition for *make sure*-like predicates corresponds to (17).

- 'non-varying context' condition for *claim*-like predicates corresponds to (18).

- 'varying context' condition for *make sure*-like predicates corresponds to (19).

- 'varying context' condition for *claim*-like predicates corresponds to (20).

(17) NON-VARYING INDEFINITE CONTEXT

a. [*Ann is a teaching assistant. During last week's class, the teacher assigned three problems. Before assigning the problems, the teacher asked Ann to look them over. Ann made sure that all the problems contained no errors.*]

b. A teaching assistant made sure that every problem was error-free.

(18) NON-VARYING INDEFINITE CONTEXT

a. [*Bea is a teaching assistant. During last week's class, the teacher assigned three problems. Before assigning the problems, the teacher asked Bea to look them over. After reviewing the problems, Bea claimed that all the problems contained errors.*]

b. A teaching assistant claimed that every problem contained errors.

(19) VARYING INDEFINITE CONTEXT

a. [*Ann, Bea and Carol are teaching assistants. During last week's class, the teacher assigned three problems. Before assigning the problems, the teacher wanted the teaching assistants to review the problems. So she asked the three teaching assistants to each look over one problem. Ann made sure that the first problem was error-free, Bea made sure that the second problem was error-free and Carol made sure that the third problem was error-free.*]

b. A teaching assistant made sure that every problem was error-free.

(20) VARYING INDEFINITE CONTEXT

a. [*Ann, Bea and Carol are teaching assistants. During last week's class, the teacher assigned three problems. Before assigning the problems, the teacher wanted the teaching assistants to look over the problems. So she asked the three teaching assistants to each look over one problem. After doing so, Ann claimed that the first problem contained errors, Bea claimed that the second problem contained errors and Carol claimed that the third problem contained errors.*]

b. A teaching assistant claimed that every problem contained errors.

Negative indefinite stimuli

- 'non-varying context' condition for *make sure*-like predicates corresponds to (21).

- 'non-varying context' condition for *claim*-like predicates corresponds to (22).

- 'varying context' condition for *make sure*-like predicates corresponds to (23).

- 'varying context' condition for *claim*-like predicates corresponds to (24).

(21) NON-VARYING INDEFINITE CONTEXT

a. [*Ann is a teaching assistant. During last week's class, the teacher assigned three problems. Before assigning the problems, the teacher asked Ann to look them over. Ann made sure that all the problems contained no errors.*]

b. A teaching assistant made sure that no problem contained errors.

(22) NON-VARYING INDEFINITE CONTEXT

a. [*Bea is a teaching assistant. During last week's class, the teacher assigned three problems. Before assigning the problems, the teacher asked Bea to look them over. After reviewing the problems, Bea claimed that all the problems were error-free.*]

b. A teaching assistant claimed that no problem contained errors.

(23) VARYING INDEFINITE CONTEXT

a. [*Ann, Bea and Carol are teaching assistants. During last week's class, the teacher assigned three problems. Before assigning the problems, the teacher wanted the teaching assistants to review the problems. So she asked the three teaching assistants to each look over one problem. Ann made sure that the first problem was error-free, Bea made sure that the second problem was error-free and Carol made sure that the third problem was error-free.*]

b. A teaching assistant made sure that no problem contained errors.

(24) VARYING INDEFINITE CONTEXT

a. [*Ann, Bea and Carol are teaching assistants. During last week's class, the teacher assigned three problems. Before assigning the problems, the teacher wanted the teaching assistants to review the problems. So she asked the three teaching assistants to each look over one problem. After doing so, Ann claimed that the first problem was error-free, Bea claimed that the second problem was error-free and Carol claimed that the third problem was error-free.*]

b. A teaching assistant claimed that no problem contained errors.

Cumulation stimuli: Figure 5

- 'non-conjoined subject' condition for *make sure*-like predicates corresponds to (25).

- 'non-conjoined subject' condition for *claim*-like predicates corresponds to (26).

- 'conjoined subject' condition for *make sure*-like predicates corresponds to (27).

- 'conjoined subject' condition for *claim*-like predicates corresponds to (28).

(25) NON-CONJOINED SUBJECT CONTEXT

　　a. [*During last week's class, the teacher assigned four problems. Before assigning the problems, the teacher asked Ann to look them over. Ann made sure that all the problems contained no errors.*]

　　b. Ann made sure that every problem was error-free.

(26) NON-CONJOINED SUBJECT CONTEXT

　　a. [*During last week's class, the teacher assigned four problems. Before assigning the problems, the teacher asked Bea to look them over. After reviewing the problems, Bea claimed that all the problems contained errors.*]

　　b. Bea claimed that every problem contained errors.

(27) CONJOINED SUBJECT CONTEXT

　　a. [*During last week's class, the teacher assigned four problems. Before assigning the problems, the teacher asked Ann and Bea to look the problems over. Ann made sure that the first and second problems were error-free, but didn't take a look at the third and fourth problems. Bea made sure that the third and fourth problems were error-free, but didn't look at the first and second problems.*]

　　b. Ann and Bea made sure that every problem was error-free.

(28) CONJOINED SUBJECT CONTEXT

　　a. [*During last week's class, the teacher assigned four problems. Before assigning the problems, the teacher asked Ann and Bea to look the problems over. After reviewing the problems, Ann claimed that the first and second problems contained errors, but didn't notice any issues with the third and fourth problems. Bea claimed that the third and fourth problems contained errors, but didn't notice any issues with the first and second problems.*]

　　b. Ann and Bea claimed that every problem contained errors.

Selected References

Barker, Chris (2022). "Rethinking scope islands". In: *Linguistic Inquiry* 53.4, pp. 633–661.

Beck, Sigrid and Uli Sauerland (2000). "Cumulation is needed: A reply to Winter (2000)". In: *Natural language semantics* 8.4, pp. 349–371.

Farkas, Donka F and Anastasia Giannakidou (1996). "How clause-bounded is the scope of universals?" In: *Semantics and Linguistic Theory*. Vol. 6, pp. 35–52.

Fox, Danny and Uli Sauerland (1996). "Illusive scope of universal quantifiers". In: *North East Linguistics Society*. Vol. 26. 1, p. 7.

Harada, Masashi (2022). "Locality effects in composition with plurals and conjunctions". PhD thesis. McGill University.

Hoeks, Morwenna, Deniz Özyıldız, Jonathan Pesetsky, and Tom Roberts (2022). "Event plurality & quantifier scope across clause boundaries". In: *Semantics and Linguistic Theory*. Vol. 1, pp. 443–462.

Kratzer, Angelika (2002). *The Event Argument and the Semantics of Verbs*. University of Massachusetts at Amherst.

Kroch, Anthony S (1974). "The semantics of scope in English". PhD thesis. Massachusetts Institute of Technology.

Langendoen, D Terence (1978). "The logic of reciprocity". In: *Linguistic inquiry* 9.2, pp. 177–197.

Pasternak, Robert (2018). "Thinking alone and thinking together". In: *Semantics and Linguistic Theory*. Vol. 28, pp. 546–565.

Scha, Remko JH (1984). "Distributive, collective and cumulative quantification". In: *Truth, interpretation and information: Selected papers from the third Amsterdam colloquium*. Vol. 2, pp. 131–158.