Pseudo-scoping out of tensed clauses: cumulation vs. buildups

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Abstract. Tensed complement clauses are often assumed to be scope islands for quantifier raising (QR) of universal quantifiers. However, as observed by Farkas & Giannakidou 1996, Barker 2022, Hoeks et al. 2022, a.o., there are apparent counterexamples to this assumption, where a universal DP appears to scope out of a tensed complement clause to take scope over a singular indefinite in the matrix clause, henceforth 'variation readings'. Hoeks et al. 2022 propose that QR out of tensed clauses is possible, but only in event structural configurations which involve buildup processes. In this paper, we report experimental results providing evidence that variation readings are not sensitive to buildups. We then offer an alternative analysis, capturing variation readings as a form of cumulation, and we present experimental results supporting this analysis. The empirical generalization suggests that tensed complement clauses are islands for QR after all, and apparent counterexamples are due to other mechanisms.

Keywords. Quantifier raising, universal quantification, scope islands, tensed complement clauses, cumulativity, event structure, pseudo-scope

1. Introducton. Tensed complement clauses are often assumed to be scope islands for quantifier raising (QR) of universal quantifiers, as illustrated in (1) (Chomsky 1975, May 1977).

(1) A student claimed that every speaker had a ride.
   a. *Available:* single student claimed that all the speakers had a ride.
   b. ***Unavailable:*** **for every speaker x, a student claimed x had a ride**

The only available interpretation for the example in (1) is the one paraphrased in (1-a), where the universal quantifier scopes within the tensed complement clause of *claim*. If the universal DP, *every speaker*, were able to undergo QR out of the tensed complement, we would expect a reading where the universal quantifier scopes above the singular indefinite, as paraphrased in (1-b).

However, as observed by Farkas & Giannakidou 1996, Barker 2022, Hoeks et al. 2022, a.o., there are counterexamples to this generalization. One such counterexample is provided in (2).

(2) A student made sure that every speaker had a ride.
   a. *Available:* single student made sure that all the speakers had a ride.
   b. ***Available:*** **for every speaker x, a student made sure x had a ride.**

Unlike (1), the example in (2) licenses a reading where the universal DP, *every speaker*, seemingly scopes above the singular indefinite, as paraphrased in (2-b)—henceforth, a 'variation reading'. The contrast between (1) and (2) raises the following empirical puzzle: variation readings appear to be predicate sensitive (Barker 2022). For example, the variation reading in (2-b) involves the LF in (3), where we posit an instance of 'non-local' QR out of the tensed complement clause.

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(3) LF: [[every speaker] λ_1 [[a student] make sure $_{TP}$[. . . t_1 . . .]]]

If one were to capture variation readings through QR, this raises the corresponding theoretical puzzle: why is an LF like (3) available for (2) but not (1)?

2. Buildup approach (Hoeks et al. 2022). One possible response to the empirical/theoretical puzzle introduced above is to posit a restriction on non-local QR, on a predicate-by-predicate basis (Barker 2022). The trouble is that this solution is rather stipulative. A more elegant response to this puzzle introduced above is presented in Hoeks et al. 2022. The idea is that non-local QR is a mechanism that is, in principle, available in the grammar (Anderson 2004, Syrett 2015, Wurmbrand 2018), but it is only possible in certain event structural configurations. In particular, they propose that the matrix event must involve a buildup process in order for non-local QR to be licensed. Intuitively, a buildup process can be thought of as an eventuality where the quantification is 'built up to' over time by individual cases of the quantification. This proposal explains the contrast between (2) and (1) as follows. The lexical semantics of the predicate *make sure* involves such a buildup process, which is why non-local QR is possible in (2). In contrast, the lexical semantics of *claim* doesn't involve such a buildup process, meaning that non-local QR is not available in (1).

Building on the contrast between (1) and (2), Hoeks et al. 2022 make two main claims. The first claim concerns licensing variation readings with the embedding predicate *claim*: two manipulations to a sentence like (1) should make the variation reading available (henceforth, 'external buildup cues'). The first manipulation involves adding an adverbial, like *by 8pm*, which signals that the matrix event is construed as a buildup process. The second manipulation involves changing the aspect of the embedding predicate to perfect aspect. The intuition behind this manipulation is that perfect aspect signals that the buildup process has lead to a result state. The second claim concerns the embedding predicates which can license variation readings. More specifically, external buildup cues only work for a subset of embedding predicates—predicates which they identify as 'buildupicle' predicates. Examples of buildupicle predicates provided in Hoeks et al. 2022 include: *claim, heard, found, become aware, believe/come to believe*. In contrast, they also provide examples of 'non-buildupicle predicates': *is confident, is sure, is aware, is convinced, realize, remember*.

3. Experiment 1: testing the Buildup approach. Hoeks et al. 2022 make the following empirical claim: external buildup cues license a variation reading for (4), in contrast to (1).

(4) By 8pm, a student had claimed that every professor had a ride. (Hoeks et al. 2022; p.444)

The sentence in (4) serves as a crucial data point as it provides the basis for our first experiment. In particular, we had two goals in our first experiment: i) to test whether the claim concerning (4) is borne out and ii) to test whether the availability of variation readings differed between buildupicle and non-buildupicle predicates. The Buildup approach predicts that: i) a variation reading should be more readily available with (4), in contrast to (1); ii) in general, variation readings should be more readily available with buildupicle predicates, in contrast to non-buildupicle predicates.

3.1. EXPERIMENTAL DESIGN. To test these claims, we conducted a sentence rating experiment with 20 participants. Participants were recruited on Prolific., and we restricted participation to those who self-report to be native speakers of North American English, having grown up and currently live in the United States or Canada. We also restricted the experiment to participants

with at least a 97% approval rating on Prolific. Participants were shown context-sentence pairs and asked to rate how natural the sentence sounded (given the context) on a 6-point Likert scale, where 1 corresponded to 'completely unacceptable' and 6 corresponded to 'completely acceptable'.

For the experimental design, we manipulated predicate type (buildupicle predicate vs. non-buildupicle predicate) and context type (buildup context vs non-buildup context). There were a total of 12 item sets, where each item set involved a different embedding predicate. Every participant saw every condition in each item set for a total of 48 trials. To minimize spill-over effects between sentences from the same item set, their distance was maximized by creating 4 blocks of stimuli, each with a Latin square design so that a participant saw only one condition from each item set in that block and the same number of trials from each condition. In addition, order within each block was randomized, and the order between blocks was also randomized between participants. The list of of predicates is provided in (5). Six of the predicates were buildupicle predicates, so the Buildup approach predicts them to pattern like *claim* in terms of licensing variation readings with singular indefinite subjects in the presence of external buildup cues. The other six predicates were non-buildupicle predicates, so the Buildup approach predicts them to not license variation readings with singular indefinite subjects, even in the presence of external buildup cues.

(5) a. **Buildupicle predicates:** *claim, heard, found, become aware, believe/come to believe*
b. **Non-buildupicle predicates:** *is confident, is sure, is aware, is convinced, realize, remember*

In the experiment, each item set comprised of four conditions and the context varied in each condition. There were two variations of the target sentence: one involving no buildup cues and one involving buildup cues. Two of the conditions involved the no buildup cue variant while the other two conditions involved the buildup cue variant. As a reminder, the buildup cue variant made use of two manipulations: i) the target sentence contained a buildup adverbial (like *by the end of the talk*) and ii) the embedding predicate contained perfect aspect (i.e., *had claimed*)

In one condition ('non-buildup context, non-varying'; i.e., the control condition), the context involved a single individual, so that the singular indefinite in the target sentence referred to a single individual (corresponding to a 'surface scope' reading). In this condition, neither the target sentence nor the context involved any external buildup cues, (6). In another condition ('non-buildup context, varying'), the context involved several individuals, so that the singular indefinite in the target sentence varied between individuals (corresponding to an 'inverse scope' reading). In this condition, neither the target sentence nor the context involved any external buildup cues, (7). In the third condition ('buildup context, non-varying'), the context again involved a single individual, so that the singular indefinite in the target sentence referred to a single individual (corresponding to a 'surface scope' reading). However, in this condition, both the context and the target sentence involved external buildup cues, (8). In the fourth and final condition ('buildup context, varying'), the context involved several individuals, so that the singular indefinite in the target sentence varied between individuals (corresponding to an 'inverse scope' reading). Again, in this condition, both the context and the target sentence involved external buildup cues, (9). Participants were given the chance to report any issues that arose throughout the experiment and none of the participants reported any issues. At the end of the experiment, participants were also given the opportunity to guess what they believed the experiment was about and none of the participants ascertained the

goal of the experiment (this is important since participants were exposed to many similar stimuli).

(6) NO BUILDUP, NON-VARYING INDEFINITE CONTEXT: *[Bea is a student. At last week's talk, the speaker presented three theories in total. In the final discussion, Bea raised issues with each theory and said they were all wrong.]* **A student claimed that every theory was wrong.**

(7) NO BUILDUP, VARYING INDEFINITE CONTEXT: *[Ann, Bea and Carol are students. At yesterday's talk, the speaker presented three theories. During the final discussion, Ann claimed the first theory was wrong, Bea claimed the second theory was wrong and Carol claimed the third theory was wrong.]* **A student claimed that every theory was wrong.**

(8) BUILDUP, NON-VARYING INDEFINITE CONTEXT: *[Ann is a student. During last week's invited talk, the speaker presented three different theories in total. When the speaker presented the first theory, Ann raised her hand and claimed the theory was wrong. Then, when the speaker presented the second theory, Ann raised her hand and claimed the theory was wrong. Finally, when the speaker presented the third and final theory, Ann again raised her hand and claimed the theory was wrong.]*
By the end of the talk, a student had claimed that every theory was wrong.

(9) BUILDUP, VARYING INDEFINITE CONTEXT: *[Ann, Bea and Carol are students. During yesterday's talk, the speaker presented three theories in total. When the speaker presented the first theory, Ann claimed it was wrong. When the speaker presented the second theory, Bea claimed it was wrong. Finally, when the speaker presented the third theory, Carol claimed it was wrong.]* **By the end of the talk, a student had claimed that every theory was wrong.**

3.2. RESULTS. The results for experiment 1 are in Figure 1. The main takeaway is that the varying condition with buildup cues is rated significantly worse than the non-varying condition; and more importantly, the varying condition with buildup cues is rated just as bad as the varying condition without buildup cues. This suggests that the external buildup cues suggested by Hoeks et al. 2022 didn't facilitate the availability of variation readings. In addition, there doesn't appear to be any difference between buildupicle and non-buildupicle predicates (in terms of licensing variation readings). The results were analyzed using linear mixed effects models (using the lme4 package in R) with predicate type and context as fixed effects—including interactions—and random intercept and slopes by item and participant (including interactions).[1] The statistical model indicated a clear contrast between the varying and non-varying conditions overall, indicating that variation readings are either not present or at least much harder to get compared to the non-varying baseline. The factors predicted to facilitate variation readings by the Buildup approach had no effect though: the statistical model indicates no significant difference between buildupipcle and non-buildupicle predicates (β = -0.0521, p = 0.68) and no significant interaction between predicate type and context (β = 0.1208, p = 0.62). These null results suggest that, if the distinction between buildupicle and non-buildupicale predicates and the presence of buildup cues have any effect at all, they are not

[1] Model specification to analyze results:

(i) `lmer(response ~ buildupicle.vs.not*varying.vs.not + (1+varying.vs.not || item) + (1+buildupicle.vs.not*varying.vs.not || participant)`

large enough to be detectable with an experiment this size, suggesting that they do not play a major role in explaining when variation readings are available.

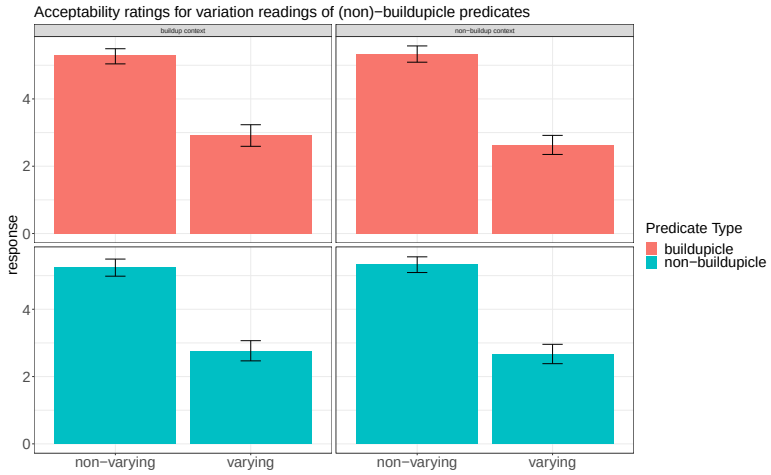

Figure 1: Left: non-varying and varying indefinite contexts involving buildups, (8)–(9). Right: non-varying and varying indefinite contexts involving no buildup, (6)–(7).

4. When are variation readings available?. In this section, we propose an alternative analysis of variation readings. We argue that variation readings don't involve non-local QR but arise from certain inferential properties of the embedding predicate (drawing on Harada 2022). More specifically, we observe that embedding predicates which license variation readings with singular indefinites also license a form of predicate sensitive cumulation with plural subjects, suggesting a connection between the two phenomena. We refer to this as 'the cumulating approach' (Palucci 2024). More generally, a goal in the remainder of the paper is to argue that mechanisms other than QR are needed to analyze variation readings; the cumulating approach is one possible analysis.

To understand what we mean by 'cumulation', consider (10). The target sentence is true in the provided context under a reading that is weaker than the distributive reading one might expect. The cumulation we are concerned with reflects the fact that the source of distributivity, whatever it is, can be absent and the resulting truth conditions reflect certain inferential properties of the embedding predicate which allow us to combine Ann and Bea's contributions together. Thus, in (10), the two separate instances of 'making sure' from Ann and Bea can be cumulated together (due to the cumulating properties of *make sure*) so that Ann and Bea, between them, made sure that every problem was error-free. For this reason, the target sentence is felicitous in this context. We refer to these inferential properties, whatever they may be, as 'cumulation'.

(10) PLURAL SUBJECT CONTEXT: *[Ann and Bea are teaching assistants. They were asked to review four homework problems. Ann made sure the first and second problems were error-free, but didn't look at the third and fourth problems. Bea made sure the third and fourth problems were error-free, but didn't look at the first and second problems.]*
Ann and Bea made sure that every problem was error-free.

The difference between *make sure* and *claim* then boils down to whether each predicate has the

necessary inferential properties. For example, consider (11). In this case, Ann and Bea's claims can't be combined into a single claim since claims from different individuals aren't the kind of thing that can be cumulated. For this reason, the target sentence is not felicitous in this context.

(11) PLURAL SUBJECT CONTEXT: *[Ann and Bea are teaching assistants. They were asked to review four homework problems. Ann claimed that the first and second problems contained errors, but had no issues with the other problems. Bea claimed that the third and fourth problems contained errors, but had no issues with the other problems.]*
#Ann and Bea claimed that every problem contained errors.

Furthermore, we propose that the contrast between *make sure* and *claim* represents a more general divide between two classes of embedding predicates. On the one hand, we propose that there are predicates that pattern like *make sure*—henceforth, 'cumulating predicates'. On the other hand, we propose that there are predicates that pattern like *claim*—henceforth, 'non-cumulating predicates'. The hypothesis underlying the cumulating approach is that the availability of variation readings correlates with this kind of predicate sensitive cumulation; in other words, variation readings are more readily available with cumulating predicates, in contrast to non-cumulating predicates.

Also note that the cumulating approach makes a different prediction regarding the data point in (4). The crucial prediction by the Buildup approach was that external buildup cues will make non-local QR available even when the universal DP is embedded in the tensed complement clause of *claim*. In contrast, the cumulating approach predicts (4) to be bad—regardless of external buildup cues (since *claim* doesn't have the necessary inferential/cumulating properties).

4.1. EXPERIMENTAL DESIGN. To test the above claims, we conducted 2 sentence rating experiments, each with 32 participants. Participants were recruited on Prolific., with the same restrictions as the first experiment. Participants were shown context-sentence pairs and asked to rate how natural the sentence sounded (given the context) on a 6-point Likert scale, where 1 corresponded to 'completely unacceptable' and 6 corresponded to 'completely acceptable'. One experiment looked at variation readings with singular indefinite subjects, while the other experiment looked at cumulation with plural subjects. These experiments aimed to replicate the experiments in Palucci 2024 but with an improved experimental design, better stimuli, more predicates and more participants.

For the design of the experimental stimuli, we manipulated predicate type (cumulating predicate vs. non-cumulating predicate) and context type (varying context vs. non-varying context). For both experiments, there were a total of 20 item sets, where each item set involved a different embedding predicate. The list of predicates is provided in (12). Ten of the predicates (cumulating predicates) were hypothesized to pattern like *make sure* in terms of licensing cumulation with plural subjects and variation readings with singular indefinite subjects. The other ten predicates (non-cumulating predicates) were hypothesized to pattern like *claim* in terms of not licensing cumulation with plural subjects and variation readings with singular indefinite subjects.

(12) a. **Cumulating predicates:** *make sure, confirm, establish, prove, verify, determine, guarantee, corroborate, double-check, note down*
b. **Non-cumulating predicates:** *claim, notice, confess, heard, believe, hope, fear, know, say, realize*

For the experiment on variation readings, each item set comprised of four conditions. The target sentence was the same in each condition (i.e., a singular indefinite subject, an embedding predicate and a tensed complement clause containing a universal quantifier) but the context varied. In one condition (i.e., the control condition), the context involved a single individual, so that the singular indefinite in the target sentence referred to a single individual (corresponding to a 'surface scope' reading), (13). In another condition, the context involved several individuals, so that the singular indefinite in the target sentence varied between individuals (corresponding to an 'inverse scope' reading), (14). The other two conditions were unacceptable baselines. In one baseline, the context again involved a single individual but the embedded clause was not rendered true in the context, (15). In the other baseline, the context again involved several individuals but the embedded clause was not rendered true in the context, (16). The experiment involved a Latin Square design so that each participant saw one condition from each item set for a total of 20 trials.

(13) NON-VARYING INDEFINITE CONTEXT—NON-VARYING: *[There were three homework problems to review. As a teaching assistant, Ann was asked to review the homework problems. Indeed, Ann made sure all of the homework problems were error-free.]*
A teaching assistant made sure that every problem was error-free.

(14) VARYING INDEFINITE CONTEXT—VARYING: *[There were three homework problems to review. As teaching assistants, Ann, Bea and Carol were asked to review the homework problems. Ann made sure that the first problem was error-free. Bea made sure that the second problem was error-free. Carol made sure that the third problem was error-free.]*
A teaching assistant made sure that every problem was error-free.

(15) NON-VARYING INDEFINITE CONTEXT—NON-VARYING BASELINE: *[There were five homework problems to review. As a teaching assistant, Ann was asked to review the homework problems. Ann made sure that three of the five homework problems were error-free. However, she didn't make sure that the fourth and fifth homework problems were error-free.]*
A teaching assistant made sure that every problem was error-free.

(16) VARYING INDEFINITE CONTEXT—VARYING BASELINE: *[There were five homework problems to review. As teaching assistants, Ann, Bea and Carol were asked to review the homework problems. Ann made sure that the first problem was error-free. Bea made sure that the second problem was error-free. Carol made sure that the third problem was error-free. None of them made sure that the fourth and fifth problems were error-free.]*
A teaching assistant made sure that every problem was error-free.

For the experiment on cumulation with plural subjects, each item set also comprised of four conditions. The target sentence in each condition involved either a singular/plural subject, an embedding predicate and a tensed complement clause containing a universal quantifier, and the context always varied. In one condition (i.e., the control), the context involved a single individual that rendered the embedded clause true, (17). In another condition, the context involved two individuals, so that the embedded clause was only rendered true under a cumulative construal (by combining the contributions of each individual), (18). The other two conditions were unacceptable baselines. In one baseline, the context again involved a single individual but the target sentence involved a con-

joined subject so that there was a mismatch between the number of individuals in the context and the number of individuals in the target sentence, (19).[2] In the other baseline, the context involved several individuals but the target sentence now involved a singular subject so that there was a mismatch between the number of individuals in the context and the number of individuals in the target sentence, (20). The experiment involved a Latin Square design so that each participant saw one condition from each item set for a total of 20 trials. At the end of both experiments, participants filled out the same post experiment questionnaire as in the first experiment on buildup cues.

(17) SINGULAR SUBJECT, SINGULAR CONTEXT—SINGULAR: *[There were four homework problems to review. Ann made sure that all the homework problems were error-free.]*
Ann made sure that every problem was error-free.

(18) PLURAL SUBJECT, PLURAL CONTEXT—PLURAL: *[There were four homework problems to review. Ann and Bea, who don't know each other, worked separately to make sure they were error-free. Ann made sure that the first and second problems were error-free, but she didn't look at the third and fourth problems. Bea made sure that the third and fourth problems were error-free, but she didn't look at the first and second problems.]*
Ann and Bea made sure that every problem was error-free.

(19) PLURAL SUBJECT, SINGULAR CONTEXT—PLURAL BASELINE: *[There were four homework problems to review. Ann made sure that all the homework problems were error-free.]*
Ann and Bea made sure that every problem was error-free.

(20) SINGULAR SUBJECT, PLURAL CONTEXT—SINGULAR BASELINE: *[There were four homework problems to review. Ann and Bea, who don't know each other, worked separately to make sure they were error-free. Ann made sure that the first and second problems were error-free, but she didn't look at the third and fourth problems. Bea made sure that the third and fourth problems were error-free, but she didn't look at the first and second problems.]*
Ann made sure that every problem was error-free.

4.2. RESULTS. The results for experiment 2 are provided in Figure 2. The main observation is that, in the plot on the left, the plural condition is rated better with cumulating predicates than with non-cumulating predicates. Similarly, in the plot on the right, the varying condition is also rated better with cumulating predicates than with non-cumulating predicates. These results suggest that cumulation with plural subjects and variation readings with singular indefinites show the same predicate sensitivity. The results were analyzed using linear mixed effects models (using the lme4 package in R) with predicate type and context as fixed effects—including interactions—and random intercepts and slopes by participant (including interactions) and random intercepts and slopes for context by item (since predicate type did not vary by item).[3] The statistical models indicate

[2] It is worth pointing out that while this was meant to serve as an unacceptable baseline, some participants rated these sentences fairly high. We speculate that the reason is that, even though a single individual rendered the embedded clause true in the context, participants were able to interpret the target sentence collectively, as if the conjoined subject in the target sentence formed a group of some kind. While this was not expected, we believe this is an interesting result in its own right and worth exploring more in future research.

[3] Model specification to analyze results:

(i) `lmer(response ~ noncumulating.vs.cumulating*varying.vs.not +`

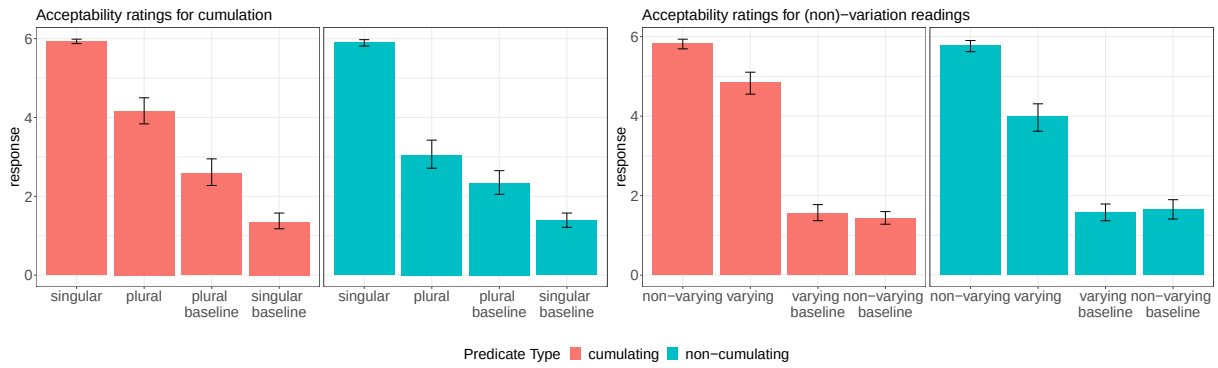

Figure 2: Cumulation/Variation readings with embedded universal quantifiers.
Left: cumulation with singular/plural subjects. Right: variation readings with singular indefinites.

that there was a significant interaction between predicate type and context for both cumulation with plural subjects (β = -0.916, p <0.001) and variation readings with singular indefinites (β = -0.649, p <0.05). We note that that the varying condition with non-cumulating predicates was not rated as low as the unacceptable baselines. This could be i) because the infelicity of the available reading and the actual context is more subtle than in our baseline condition, or ii) it could mean that a variation reading is harder with non-cumulating predicates but still possible (through cumulation or some other route). That being said, there is still a relative contrast between the varying conditions with cumulating and non-cumulating predicates. The positive results obtained in these experiments also provide support for the methodology that we used, namely, acceptability rating tasks. Our results illustrate that, even for an experiment this size, this methodology is in fact sensitive enough to detect relative contrasts in acceptability for subtle judgments, like variation readings.

In the above model, we divided the predicates into cumulating and non-cumulating ones based on intuitions concerning which predicates allow cumulation. To compare both kinds of predicates, we averaged over all non-cumulating predicates—even though there was variability in the degree to which each predicate licensed variation readings. This variability suggests that cumulation and variation readings may be gradient phenomena. However, the results from the experiment concerning cumulation validate this intuition by giving us a way to quantify the degree to which an embedding predicate allows cumulation (henceforth, 'cumulation score'). This means we can test our research hypothesis without relying on untested intuitions by testing whether cumulation score predicts to what extent a variation reading is allowed (the prediction: a higher cumulation score leads to a better variation reading). To this end, we ran a second model, where the model specification was the same, but we modified how we coded the fixed effect of predicate type. Using the results from the experiment on cumulation with plural subjects, we assigned each predicate a cumulation score by, first, looking at the 'plural subject, plural context' condition and calculating the average acceptability rating for each predicate in this condition. We then did the same for

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(1+varying.vs.not || item) + (1+noncumulating.vs.cumulating*varying.vs.not
|| participant)
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the 'singular subject, singular context' condition. We then took our cumulation score to be the difference between these two values. By doing this, we were able to model the degree to which a predicate allows cumulation (as a continuous predictor), instead of assuming it is a binary predictor in our model (cumulating vs. non-cumulating). The statistical model again indicates a significant interaction between predicate type and context (β = -0.763, p <0.05). Furthermore, cumulation score does a fairly good job of dividing the predicates into those that we referred to as cumulating and those which we referred to as non-cumulating, by assigning the former a higher cumulation score. The division wasn't perfect but, in general, reflected our initial intuitions.[4]

5. Discussion. The results from the experiment on buildup cues provide evidence that variation readings are not easily available for both non-buildupicle predicates and (crucially) buildupicle predicates, even when external buildup cues were used. More specifically, according to the results from that experiment, a variation reading was not available for the crucial data point in (4) (compared to other non-buildupicle predicates). These null results provide evidence that, contra Hoeks et al. 2022, the availability of variation readings is not mediated by the event structure of the matrix event, and furthermore that non-local QR may not be the mechanism underlying variation readings. In contrast, the results from the two experiments on cumulation with plural subjects and variation readings with singular indefinite subjects (from section 4.2) show a correlation between the degree to which a predicate allows for cumulation and the degree to which it licenses variation readings, which is as predicted by the cumlulating approach, but not predicted by the Buildup approach. These results provide evidence for the empirical generalization in (21):

(21) *Cumulation-variation correspondence*: An embedding predicate licenses variation readings (apparent wide scope of a universal) whenever it licenses cumulation with plural subjects.

The cumulating approach dispenses with the need for imposing a buildup constraint on non-local QR (and also the need for non-local QR out of tensed clause complements in general). That being said, the cumulating approach still captures the intuition that the truth conditions of examples like (2) involve adding up individual cases of making sure toward the overall reading. In conclusion, the results from these two experiments suggest variation readings are licensed by an embedding predicate's inferential/cumulating properties, and not simply the event structure of the matrix event. As a result, we can maintain that tensed clauses are scope islands for universal quantifiers after all and that apparent wide scope of the universal is derived indirectly via cumulation.

6. Variation readings with negative quantifiers. In section 4, we presented an argument in favour of the cumulating approach, namely, the correlation between the degree to which a predicate allows for cumulation and the degree to which it licenses variation readings. We now turn to a second argument in favour of the cumulating approach, put forth in Palucci 2024. Consider (22), where the embedded universal quantifier is replaced by a negative quantifier (i.e., *no problem*).

(22) *[There were three homework problems to review. As teaching assistants, Ann, Bea and Carol were asked to review the homework problems. Ann made sure that the first problem*

[4]There were some exceptions. The predicate *note down*, which we classified as cumulating based on intuitions, received a rather low cumulation score. Furthermore, some predicates which we classified as non-cumulating patterned more like cumulating predicates (*realize, fear* and *confess*) in terms of receiving higher cumulation scores.

didn't contain errors. Bea made sure that the second problem didn't contain errors. Carol made sure that the third problem didn't contain errors.]

A teaching assistant made sure that no problem contained errors.

The observation from Palucci 2024 is that (22) also licenses a variation reading where the teaching assistant can vary by problem. The challenge is that QR only delivers the right truth conditions when the embedded quantifier is a universal quantifier. Even if the negative indefinite were to undergo QR to a position above the subject indefinite, as illustrated by the LF in (23-a), the resulting truth conditions correspond to an unattested reading. These truth conditions are provided in (23-b), where we can observe that the resulting truth conditions don't correspond to a variation reading.

(23) a. [no problem] λ_1 [a teaching assistant made sure that $_{TP}$[t_1 contained errors]]

b. $\neg\exists$y [problem(y) $\wedge$ $\exists$x[TA(x) $\wedge$ make-sure(x, contained-errors(y))]]
'there's no problem y s.t. there's a teaching assistant that made sure y contained errors.'

Furthermore, Palucci 2024 reports, not only are variation readings licensed with negative quantifiers, but both kinds of sentences (those with embedded universal quantifiers and those with embedded negative quantifiers) pattern in a similar way and show the same predicate sensitivity. If this claim is true, it would be strong evidence in favour of the cumulating approach since a QR based approach can't even deliver the right truth conditions with embedded negative quantifiers. To test this claim, we replicated the experiment in Palucci 2024. Once again, this was an improved experiment with better stimuli, better experimental design, more predicates and more participants.

6.1. EXPERIMENTAL DESIGN. To test whether embedded negative quantifiers pattern like embedded universal quantifiers and exhibit the same predicate sensitivity, we conducted 2 sentence rating experiments. The first experiment (looking at cumulation with plural subjects) involved 38 participants. The second experiment (looking at variation readings) involved 32 participants. Similar to the previous experiments, participants were recruited on Prolific., with the same restrictions as in the first two experiments. The experimental design paralleled that of experiment 2 except all target sentences contained an embedded negative quantifier instead of a universal quantifier.

6.2. RESULTS. The results for experiment 3 are provided in Figure 3. The takeaway is that, while negative quantifiers seem to pattern in a similar way to universal quantifiers regarding predicate sensitivity, it is difficult to draw any conclusions concerning the interaction between predicate type and context. This is because acceptability ratings with non-cumulating predicates seem to be lower across the board: both control items (i.e., singular condition for cumulation and non-varying condition for variation readings) had lower acceptability ratings with non-cumulating predicates than with cumulating ones. It could be that participants simply dis-preferred the non-cumulating predicates, compared to the cumulating ones. In fact, upon further analysis, statistical models indicated no significant interaction between predicate type and context for both cumulation with plural subjects (β = -0.409, $p > 0.05$) and variation readings with singular indefinites (β = -0.254, $p > 0.05$). However, the results of this experiment do provide evidence that variation readings are available with negative quantifiers, just that the predicate sensitivity may be different than with universal quantifiers. If so, this suggests that mechanisms other than QR, which cannot deliver the

variation reading, must be available—even if it is not clear whether cumulation is that mechanism.[5]

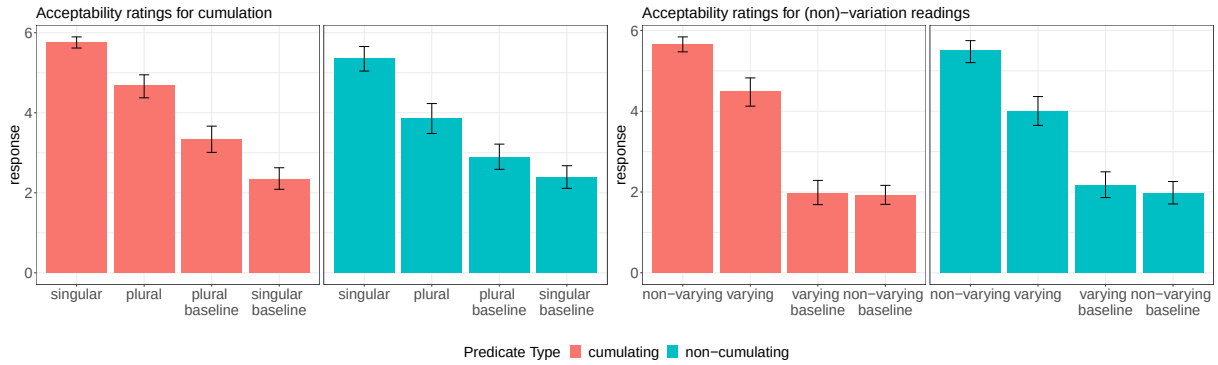

Figure 3: Cumulation/Variation readings with embedded negative quantifiers.
Left: cumulation with singular/plural subjects. Right: variation readings with singular indefinites.

In sum, the experimental results with negative quantifiers don't provide support for the cumulating approach but they do provide evidence that mechanisms other than QR are needed to account for variation readings, and as such, these results fit into the larger research program of identifying 'pseudo-scope' mechanisms (i.e., mechanisms which derive similar truth conditions as QR but don't involve covert scope shifting/covert movement) (Fox & Sauerland 1996).

7. Concluding remarks. In this paper, we focused on the relative scope between an embedded universal DP and a singular indefinite in the the matrix clause, following Barker 2022, Hoeks et al. 2022. However, when looking at scope-taking over expressions other than indefinites, it seems that wide scope from within a tensed clause is impossible. Consider (24), taken from Palucci 2024.

(24) *[The race can only have one winner.]* #I consider it possible that every runner will win.

In principle, there are two readings of (24). The first is a surface scope reading, where there is more than one winner and everyone wins. This reading is ruled out by the scenario though. The second is the inverse scope reading, where each runner has a chance at being the winner: for each runner x, I consider it possible that x wins. This reading is compatible with the scenario. If non-local QR is possible, the inverse scope reading should be available and the sentence should be felicitous—contrary to fact. This suggests that the inverse scope reading is not attested. Again, we can make sense of this if, contrary to apparent counterexamples, tensed clauses may be scope islands for QR after all, and apparent counterexamples are due to other mechanisms, such as cumulation.

[5]In fact, we even have a second reason to doubt that variation readings with negative quantifiers involve the same underlying mechanism as variation readings with universal quantifiers. Consider the contrast between (i-a) and (i-b).

(i) a. A different student made sure that every speaker had a ride.
b. #A different teaching assistant made sure that no problem contained errors.

The relevant observation is that (i-a) licenses an internal reading of the adjective *different*, while (i-b) doesn't. If the same underlying mechanism derived variation in both cases, prima facie, we would expect both sentences to license internal readings of *different*, contrary to fact. One possibility we consider for future research is that variation readings in the cases with embedded negative quantifiers arise due to the singular indefinite subject denoting an individual concept (a function from worlds/situations to individuals), instead of an existential quantifier.

References

Anderson, Catherine. 2004. *The structure and real-time comprehension of quantifier scope ambiguity*: Northwestern University dissertation.

Barker, Chris. 2022. Rethinking scope islands. *Linguistic Inquiry* 53(4). 633–661. https://doi.org/10.1162/ling_a_00419.

Chomsky, Noam. 1975. Questions of form and interpretation. In *Scope of American Linguistics*, 159–196. Berlin: De Gruyter Mouton. https://doi.org/10.1515/9783110857610-008.

Farkas, Donka F & Anastasia Giannakidou. 1996. How clause-bounded is the scope of universals? In *Semantics and Linguistic Theory (SALT) 6*, 35–52. https://doi.org/10.3765/salt.v6i0.2764.

Fox, Danny & Uli Sauerland. 1996. Illusive scope of universal quantifiers. In *North East Linguistics Society (NELS) 26*, 71–85.

Harada, Masashi. 2022. *Locality effects in composition with plurals and conjunctions*: McGill University, Montreal dissertation.

Hoeks, Morwenna, Deniz Özyıldız, Jonathan Pesetsky & Tom Roberts. 2022. Event plurality & quantifier scope across clause boundaries. In *Semantics and Linguistic Theory (SALT) 32*, 443–462. https://doi.org/10.3765/salt.v1i0.5393.

May, Robert. 1977. *The grammar of quantification.*: Massachusetts Institute of Technology dissertation.

Palucci, Jonathan. 2024. Pseudo-scoping out of tensed clauses: the case of cumulation. In *North East Linguistics Society (NELS) 54*, .

Syrett, Kristen. 2015. Experimental support for inverse scope readings of finite-clause-embedded antecedent-contained-deletion sentences. *Linguistic Inquiry* 46(3). 579–592. https://doi.org/10.1162/LING_a_00194.

Wurmbrand, Susanne. 2018. The cost of raising quantifiers. *Glossa: a journal of general linguistics* 3(1). https://doi.org/10.5334/gjgl.329.