

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

0. Introduction. A longstanding debate in the literature concerns whether universal quantifiers can scope out of tensed clauses. One reason is that examples like (1-a) allow a reading which is weaker than expected: instead of a particular student responsible for every invited speaker's ride, the student can vary by speaker (henceforth, a *variation reading*). In contrast, examples like (1-b) do not allow such a weakened reading.

- (1) a. A student made sure that [every invited speaker had a ride]. (Farkas and Giannakidou, 1996)
 b. A student claimed that [every speaker was right]. $\times \forall > \exists$
 c. LF: $[\forall \lambda_1 [\exists \text{ embedding predicate}_{\text{TCB}}[\dots t_1 \dots]]]$ 'TCB' = tensed clause boundary

Recently, it's been proposed that quantifier raising (QR) is responsible for the weakened reading in (1-a): the universal QRs out of *make sure*'s complement and above the subject indefinite to derive an inverse scope reading, as illustrated by the LF in (1-c) (Barker, 2022; Hoeks et al., 2022). However, and importantly, these proposals overgenerate since they have no principled way to block the variation reading for (1-b) and account for the observed predicate-dependence. This abstract i) argues that apparent inverse scope of universals doesn't involve an exceptional scope shifting mechanism like QR and ii) proposes an alternative analysis, the *cumulating approach*. This approach captures the weakened reading as a *cumulative inference* (CI), which effectively cumulates the contribution of each witness of the indefinite. The CI is enabled by assuming the different witnesses of the indefinite form a hidden plurality in the matrix subject position.

1a. Overgeneration challenge for QR. The example in (1-a) is meant to show that, in principle, the universal can scope out of the tensed clause and above the indefinite. This leads us to believe that the universal should be able to scope over other scope bearing elements in the matrix clause. Now, consider the interaction between the universal and the time adverbial in (2). The adverbial modifies *make sure* (and not *safe*) meaning that, structurally, the adverbial is outside the tensed clause. In principle, the bolded target sentence in (2) can be understood as in (3-a) or (3-b). However, the context is only compatible with the reading in (3-b) and to derive this reading, the universal must scope above the adverbial, and thus above *make sure*, as the LF in (3-b) shows. But this inverse scope reading is unavailable in (2), in contrast to (1-a).

- (2) [Sue wanted to know how long it would take to make sure all her new cabinets are safe to install. She timed herself for 5 cabinets. It always took her less than 2 minutes to inspect a single cabinet.]
#Sue made sure that every cabinet was safe in less than 2 minutes.
- (3) a. *Surface scope:* It took Sue less than a total of 2 min. to make sure all the cabinets were safe.
 b. *Inverse:* For each cabinet x, it took Sue less than 2 min. to make sure x was safe.
 LF: $[[\text{every cabinet}] \lambda_1 [\text{Sue} [\text{made sure} [\text{that } t_1 \text{ was safe}] [\text{in less than 2 min.}]]]]$

This means that, with a structurally higher modifier, the universal cannot scope above the modifier as it does with the indefinite in (1-a), which is unexpected if *make sure* allows QR, as Barker (2022) argues.

1b. Undergeneration challenge for QR. Other examples illustrate the same weakening phenomena as (1-a). In (4), the universal is replaced with a negative quantifier and we observe a weakened meaning where, rather than a particular student, students can vary by tour (as verified through an acceptability rating task). But this interpretation cannot be derived by scoping the negative quantifier above the indefinite. Empirically, (4) parallels (1-a) and should be analyzed similarly. But this broader pattern of weakening cannot be handled by exceptional QR, suggesting something other than QR is needed. This may obviate the need for QR.

- (4) [There are three tours of the department. One student, Ann, made sure the first tour started on time. Two other students, Bee and Carol, did the same for the second and third tours respectively.]
A student made sure that no tour of the department was late.
 LF: $[[\text{no tour}] \lambda_1 [\text{a student} [\text{made sure} [\text{that } t_1 \text{ started late}]]]]$

If variation readings don't involve QR, then following Fox and Sauerland (1996), I assume they are a case of pseudo-scope. Furthermore, the key to understanding variation readings involves getting a better handle on which predicates allow them. To this end, I propose an approach which builds on the cumulation properties exhibited by certain embedding predicates. As a result, variation readings arise indirectly through CIs. But first, I present evidence in favor of cumulation, namely that CIs and apparent inverse scope are correlated.

2. Evidence for cumulating approach. In contrast to standard cumulative interpretations, CIs don't involve a relation between two pluralities, but a cumulative contribution between the members of a subject plurality resulting in the truth of the embedded proposition, as in (5) (Harada, 2022). The predicate *make sure* licenses an inference combining the contributions of *Ann* and *Bea*, resulting in the truth of the embedded proposition: *that every problem was error-free*. Crucially, as illustrated in (6), CIs are not available with any predicate.

- (5) CONJOINED SUBJECT/VARYING INDEFINITE CONTEXT: [*Ann and Bea are teaching assistants. The professor asked the teaching assistants 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/A teaching assistant} made sure that every problem was error-free.**
- (6) CONJOINED SUBJECT/VARYING INDEFINITE CONTEXT: [*Ann and Bea are teaching assistants. The professor asked the teaching assistants 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/#A teaching assistant} claimed that every problem contained errors.**

This predicate-variability of CIs is not limited to *make sure* and *claim*; it also correlates with apparent inverse scope. We ran a series of acceptability rating tasks to show that the same predicates which license CIs give rise to apparent inverse scope. The task involved 10 predicates: 5 which license CIs (*make sure, confirm, establish, prove, verify*—henceforth, *cumulating predicates*) and 5 which don't license CIs (*claim, notice, confess, heard, believe*—*non-cumulating predicates*). Sample contexts for conjoined subject and varying indefinite conditions are illustrated in (5)–(6) with the bolded target sentences. Controls involved non-conjoined/non-varying indefinites that simply referred to a single individual.

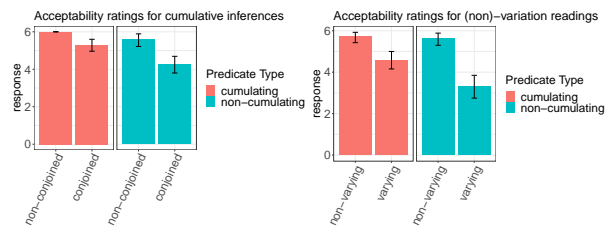


Figure 1: Left: Cumulative inferences with plural subjects. Right: Variation readings with singular indefinites.

Figure 1 illustrates a higher acceptability of CIs with plural subjects (left-hand plot) and variation readings with indefinites (right-hand plot) for cumulating predicates (red bars) compared to non-cumulating predicates (blue bars). The significance of this interaction in mixed effects models supports the empirical generalization in (7):

- (7) THE CUMULATING CORRESPONDENCE: A clause embedding predicate will license variation readings (i.e. apparent wide scope of a universal) whenever the predicate licenses cumulative inferences.

3. Locating the plurality. If apparent inverse scope involves CIs, this raises the question of where the subject plurality comes from with the singular indefinite. One way to make sense of this is to posit that the singular indefinite is interpreted as a free variable ranging over (partial) functions from events to individuals which receives its value from the context. This analysis then predicts that variation readings are contextually available insofar as the context introduces a set of events relating students to speakers, as in (8-a). A plurality is then retrieved by collecting together the students from each event. Thus, contrary to appearances, variation readings underlyingly involve a plurality of individuals in the subject position, as illustrated in (8-b).

- (8) a. [*There are three invited speakers. Student 1 (s_1) made sure speaker 1 had a ride (p_1); student 2 (s_2) made sure speaker 2 had a ride (p_2); student 3 (s_3) made sure speaker 3 had ride (p_3).]*
A student made sure that every invited speaker had a ride. (p_{\forall})
- b. [$\exists e_1[f(e_1) = s_1 \wedge \text{make-sure}(f(e_1), p_1)] \wedge \exists e_2[f(e_2) = s_2 \wedge \text{make-sure}(f(e_2), p_2)] \wedge \exists e_3[f(e_3) = s_3 \wedge \text{make-sure}(f(e_3), p_3)]$] $\rightarrow \exists E [\text{make-sure}(f(E), p_{\forall})]$ ($E = \{e_1, e_2, e_3\}$; $f(E) = \{s_1, s_2, s_3\}$)

The CI goes through due to the predicate *make sure*: the plurality of individuals, $f(E)$, can serve as the subject of *make sure* since it is a cumulating predicate; in contrast to a non-cumulating predicate like *claim*.

References. Barker, C. (2022). Rethinking scope islands. In *LI* 53(4), 633-661. | Farkas, DE. and Giannakidou, A. (1996). How clause-bounded is the scope of universals?. In *SALT* (Vol. 6, pp. 35-52). | Fox, D. and Sauerland, U. (1996). Illusive scope of universal quantifiers. In *NELS* (Vol. 26, 1, p. 7). | Harada, M. (2022). *Locality effects in Composition with Plurals and Conjunctions* (PhD Thesis, McGill University). | Hoeks, M., Özyıldız, D., Pesetsky, J., Roberts, T. (2022). Event plurality & quantifier scope across clause boundaries. In *SALT* (Vol. 1, pp. 443-462). |