Cumulative readings in focus contexts

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Overview. So-called cumulative readings are characterized by two universal inferences: for (1), that each of Amy and Bani was seen by a guard, the first conjunct of (2), and that each guard saw Amy or Bani, the second conjunct. One approach encodes cumulativity in the predicate, either as a lexical property (Scha 1984, Krifka 1992) or as derived from an operator on predicates (Beck & Sauerland 2000). We show (i) that a predicate-based approach predicts off-target inferences when cumulativity interacts with *only*, and (ii) building on Bar-Lev (2020) and Bar-Lev & Fox (2020), that our data can follow naturally if cumulativity is not encoded in the predicate, but instead derived by a higher operator from a weak existential meaning, e.g., by *only* itself.

(1) The guards saw Amy and Bani.

(2) $[\ \forall y{\leq_{AT}}G\ \exists x{\leq_{AT}}\text{Amy+Bani}\ [\ \text{saw}(y,x)\ ]\ ] \wedge [\ \forall x{\leq_{AT}}\text{Amy+Bani}\ \exists y{\leq_{AT}}G\ [\ \text{saw}(y,x)\ ]\ ]$

Puzzle. In (3), the prejacent of *only* can still be read cumulatively, and (2) is presupposed. The exclusive inference that *only* introduces is intuitively that no guard saw anyone other than Amy or Bani, say Carl, as in (4). Now, suppose cumulativity is encoded in the predicate, e.g. via Beck & Sauerland's operator ** in (5). As defined in (6), *only* presupposes that its prejacent is true, and asserts that innocently excludable (IE) alternatives (in ALT) are false, after Fox (2007). (2) is then derived from the LF for (3) in (7). But, is (4) derived as well?

(3) The guards only saw [Amy and Bani]$_F$. (4) $\neg\exists y{\leq_{AT}}G\ [\ \text{saw}(y,\text{Carl})\ ]$

(5) $[\![**]\!] = \lambda f.\ \lambda X.\ \lambda Y.\ [\ \forall y \leq_{AT} Y\ \exists x \leq_{AT} X\ [f(x)(y)]\ ] \wedge [\ \forall x \leq_{AT} X\ \exists y \leq_{AT} Y\ [f(x)(y)]\ ]$

(6) $[\![\text{only}]\!](\text{ALT}) = \lambda p.\ \lambda w\text{: } p(w).\ \forall q \in \text{IE}(\text{ALT})(p)\ [\ \neg q(w)\ ]$

(7) [only [$_{vP}$ the guards **saw [Amy and Bani]$_F$]]

Given the predicate's cumulativity, universal quantification will be present in each focus alternative: substituting Amy, Bani, and Carl for Amy+Bani in (2) yields the statements in (8). Two problems result. **Problem 1:** By negating ∀C, *only* would introduce just the entailment that not every guard saw Carl. This is *weaker* than (4), that *no* guard saw Carl. **Problem 2:** In addition, *only* should negate ∀A and ∀B, entailing that not every guard saw Amy and that not every guard saw Bani. This is *too strong*. If there are two guards, the sentence would entail that one saw only Amy and the other only Bani. Yet, (6) is intuitively true, e.g., in (9), where both guards saw Amy. In fact, (3) licenses no negative inferences about Amy or Bani at all.

(8) a. $\forall y{\leq_{AT}}G\ [\ \text{saw}(y,\text{Amy})\ ]$ (= ∀A)
b. $\forall y{\leq_{AT}}G\ [\ \text{saw}(y,\text{Bani})\ ]$ (= ∀B)
c. $\forall y{\leq_{AT}}G\ [\ \text{saw}(y,\text{Carl})\ ]$ (= ∀C)

(9)

	saw
guard 1	Amy
guard 2	Amy, Bani

A strategy. The actual inference in (4) offers a clue to a solution. To derive that no guard saw Carl, *only* must negate the *existential* statement that *some* guard saw Carl. The alternatives should be existential, not universal. How can the prejacent of *only* be read cumulatively, with universal inferences, while the alternatives are existential? We can make the cut if cumulativity is not encoded in the prejacent, but computed within just the presupposition of *only* itself.

Step 1: existential alternatives. Based on Bar-Lev (2020), after Magri (2014), we take *only*'s prejacent to say just that *some* guard saw Amy *or* Bani. In one implementation, the LF is (10). Cumulativity is not in the predicate, and definites come with the null $Op_\exists$ in (11a), which quantifies existentially over atoms, so the prejacent is (11b), and the focus alternatives revise to (12).

(10) [only [$_{vP}$ [$Op_\exists$ [the guards]] λ_1 [[$Op_\exists$ [Amy and Bani]$_F$] λ_2 [t_1 saw t_2]]]]

(11) a. $[\![Op_\exists]\!] = \lambda X.\ \lambda f.\ \exists x{\leq_{AT}}X\ [\ f(x)\ ]$
b. $[\![vP]\!] = \exists y{\leq_{AT}}G\ [\ \exists x{\leq_{AT}}A{+}B\ [\ \text{saw}(y,x)\ ]\ ]$

(12) a. $\exists y{\leq_{AT}}G\ [\ \text{saw}(y,A)\ ]$ (= ∃A)
b. $\exists y{\leq_{AT}}G\ [\ \text{saw}(y,B)\ ]$ (= ∃B)
c. $\exists y{\leq_{AT}}G\ [\ \text{saw}(y,C)\ ]$ (= ∃C)

For **Problem 1**, negating ∃C does derive that *no* guard saw Carl. For **Problem 2**, negating ∃A and ∃B would entail that no guard saw Amy and that no guard saw Bani. These are even stronger than the entailments that would have resulted from negating ∀A and ∀B. But, they are so strong that, together, they contradict the prejacent (11b). So, ∃A and ∃B are not innocently excludable, hence *only* will negate neither. Both problems resolve, and the predicted assertion is (4).

Step 2: presupposing cumulativity. Bar-Lev (2020) proposes that cumulativity is an implicature. Alxatib (2014) observed that (13) presupposes (14). Cumulativity in (3) will then arise from the same mechanism as the free choice implicature in (13). Either *only* itself can compute certain implicatures in its presupposition (Bar-Lev & Fox 2020), or *only* occurs with an Exh which applies to its presupposition (Alxatib 2020). For concreteness, we spell-out the former. Bar-Lev & Fox re-define *only* as (16). Rather than presupposing just the prejacent, *only* presupposes all *innocently includable* (II) alternatives. These are alternatives which are not IE and can together be true without contradicting the entailments from negating IE alternatives. The alternative set for (13) includes those in (15), which are not IE, but are II, and presupposing them yields free choice. Bar-Lev introduces an II-based Exh in data like (1), and (3) may involve an II-based *only*.

(13) You're only allowed to have cake or ice cream.

(14) $\diamond$cake ∧ $\diamond$ice.cream

(15) a. $\diamond$cake
b. $\diamond$ice.cream

(16) $[\![\text{only}]\!](\text{ALT}) = \lambda p\,.\,\lambda w : \forall p' \in \text{II(ALT)}(p)\,[\,p'(w)\,]\,.\,\forall p'' \in \text{IE(ALT)}(p)\,[\,\neg p''(w)\,]$

∃A and ∃B are not IE, but they are II. So, (3) will presuppose ∃A and ∃B, capturing the second conjunct of (2), that each of Amy and Bani were seen by a guard. To derive the first conjunct of (2), the alternatives for *only* must include not only focus alternatives to the object, but also *sub-domain alternatives to the non-focused subject*. We assume that these are computed independently from the focus alternatives. The sub-domain alternatives are like the prejacent, but the higher $\text{Op}_\exists$ quantifies over a subset of $\{x : x \leq_{AT} G\}$. With two guards, the sub-domain alternatives distinct from the prejacent are in (17), that guard 1 saw Amy or Bani and that guard 2 did. Negating both would contradict (11b), so these are again not IE, but are II. Together, they yield the first conjunct of (2), that each guard saw Amy or Bani — deriving cumulativity in full as a presupposition.

(17) a. $\exists x \leq_{AT} \text{Amy+Bani}\,[\,\text{saw(guard 1, x)}\,]$
b. $\exists x \leq_{AT} \text{Amy+Bani}\,[\,\text{saw(guard 2, x)}\,]$

Outlook. A central feature of the proposal presented is that cumulativity is not derived within the complement of *only*. Instead, the focus alternatives are mere existentials so as to render the A- and B-alternatives non-IE and strengthen the inference from the C-alternative. Are there other ways to achieve the same effect? Building on Chatain (2020), one would be to equip the universal focus alternatives in (8) with a homogeneity presupposition that either all or none of the guards saw Amy, Bani, and Carl, respectively, as in (18) (after Schwarzschild 1994, Löbner 2000, Križ 2016). Taking homogeneity into account, the negations of the universal alternatives in (8) strengthen to the negations of the existential alternatives in (12). This could pave the way for cumulativity to be encoded in the complement of *only* after all.

(18) a. $\forall y \leq_{AT} G\,[\,\text{saw(y,Amy)}\,] \vee \neg\exists y \leq_{AT} G\,[\,\text{saw(y,Amy)}\,]$
b. $\forall y \leq_{AT} G\,[\,\text{saw(y,Bani)}\,] \vee \neg\exists y \leq_{AT} G\,[\,\text{saw(y,Bani)}\,]$
c. $\forall y \leq_{AT} G\,[\,\text{saw(y,Carl)}\,] \vee \neg\exists y \leq_{AT} G\,[\,\text{saw(y,Carl)}\,]$

Still, if the homogeneity presuppositions in (18) were taken to project globally, so as to strengthen the alternatives that *only* can target for exclusion in (3), the concomitant effect would be to also strengthen the prejacent presupposition triggered by *only*, (2). This would result in the inference that *each* of the guards saw *each* of Amy and Bani, which is not what (3) is intuited to imply. So, the success of this approach is contingent on an analysis of *only* that limits the strengthening effects of homogeneity to the alternatives themselves.

References. Alxatib. 2014. NELS 44. | Alxatib. 2020. NALS. | Bar-Lev. 2020. L&P | Bar-Lev & Fox 2020. NALS. | Beck & Sauerland. 2000. NALS | Chatain. 2020. Ms, MIT. | Fox. 2007. “Free choice . . . ” | Krifka. 1992. “Thematic relations . . . ” | Križ. 2016. JofS | Löbner. 2000. L&P | Magri. 2014. “An account for the homogeneity effects . . . ” | Scha. 1984. Amst. Colloq. | Schwarzschild. 1994. NALS.