Cumulative readings of *every* do not provide evidence for events and thematic roles

Background. The question whether events and thematic roles are part of the logical representation of natural language sentences has been debated for over 40 years. Here are the main positions: In the traditional view, the *eventless representation*, a sentence like "John caught Mary" is simply translated as $catch_1(j, m)$. Against this, Davidson (1967) argued for the introduction of a variable representing the catching event: $\exists e.catch_2(e, j, m)$ – the *classical Davidsonian position.* I will refer to these two positions, $catch_1$ and $catch_2$, collectively as the *no-roles position.* The Neo-Davidsonian tradition (e.g. Parsons (1990) and Schein (1993)) represents thematic roles explicitly: $\exists e.catch_3(e) \wedge agent(e, j) \wedge theme(e, m)$. Kratzer (2000) argues that only the agent role is explicitly represented: $\exists e.catch_4(e, m) \wedge agent(e, j)$. I will refer to these two positions, $catch_3$ and $catch_4$, collectively as the *explicit-role position.*

Kratzer's argument. Kratzer (2000), based on Schein (1993), claims that we need to adopt the explicit-role position because cumulative readings (a kind of scopeless reading, see Scha (1981)) involving *every* can supposedly only be represented if explicit roles are available in the logical language. The point of this work is to refute her claim by showing how these readings can, in fact, be adequately captured using an eventless representation that does not use explicit roles. Kratzer's argumentation is based on her example (1):

(1) Three copy editors (between them) caught every mistake in the manuscript.

The cumulative reading of (1) expresses that there are three copy editors, each of which caught at least one mistake, and that every mistake was caught by at least one copy editor. Neither the surface scope reading ("Each of three copy editors caught every mistake") nor the inverse scope reading ("each mistake is such that it was caught by three copy editors") is equal to the cumulative reading, because they both – unlike the cumulative reading – entail that each mistake be caught by more than one copy editor. Now, in cumulative readings, two QNPs stand in a symmetrical, scopeless relation. But if "every mistake" is translated $\lambda P.\forall x.mistake(x) \rightarrow P(x)$, it cannot participate in a scopeless reading. The best we can do is to interpret it in situ, which leads to the interpretation (2). But this is just the surface scope reading!

(2) $\exists Y.[3editors(Y) \wedge \forall x.[mistake(x) \rightarrow {}^{**}catch_1(Y, x)]$ [1]

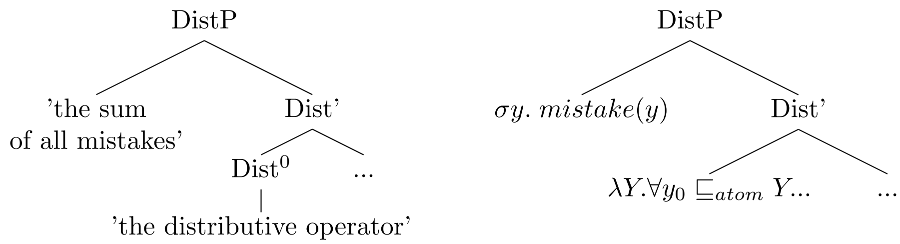
As Schein and Kratzer observe, if we adopt an explicit-role position, the cumulative reading can, after all, be represented adequately. Their idea is that once we have the agent role at our disposal, we can represent (1) roughly as "There is a sum of events E, the agents of these events amount to a sum X of three editors, and every mistake was caught in at least one of these events", as in (3):

(3) Kratzer's representation: $\exists E\ \exists X\ [3editors(X) \wedge\ {}^{**}agent(E, X)$
$\wedge \forall y\ [mistake(y) \rightarrow \exists e\ [e \sqsubseteq E \wedge catch_4(e, y)]] \wedge \exists Y\ [{}^{*}mistake(Y) \wedge {}^{**}catch_4(E, Y)]$

Kratzer's fallacy. Kratzer advances this as an argument that we need a predicate *agent* in our logical representation. Her claim is tacitly based on the assumption that the generalized quantifier $\lambda P.\forall x.mistake(x) \rightarrow P(x)$ is an adequate translation for "every mistake". While this is the standard assumption, it is by no means the only one. An alternative proposal for the semantics of

[1] Background assumptions and definitions: Here and below, $3editors$ is a shorthand that is true of any sum of three editors. — The definition of ** is the one from Krifka (1986) and Sternefeld (1998): Given a complete join semilattice $\langle S, \sqsubseteq\rangle$ (Link, 1983) and a binary relation $R \subseteq S \times S$, $^{**}R$ is the smallest relation R' such that (i) if $R(X, Y)$ then $R'(X, Y)$; (ii) if $R'(X_1, Y_1)$ and $R'(X_2, Y_2)$ then $R'(X_1 \oplus X_2, Y_1 \oplus Y_2)$). Star operators come with all lexical predicates *catch* etc. by default; their distribution elsewhere is governed by syntax (Kratzer, 2007).

every N has been advanced by Szabolcsi (1997b); Beghelli and Stowell (1997); Matthewson (2001) on independent grounds. According to them, “every mistake” consists of an exhaustive and a distributive component, as below on the left, which can take scope separately under limited conditions (Szabolcsi, 1997a). The tree on the right shows a way of formalizing this idea:



A novel assumption in this work is that ** can take scope between the two components of *every*. (When nothing takes scope between the components, they instead combine to form the familiar generalized quantifier *every*. So the familiar results from GQ theory are not lost.) Then the cumulative reading of (1) can be represented as in (4), where $\langle X, Y\rangle \in {}^{**}P$ is a shorthand for $({}^{**}P)(X)(Y)$. Here and in (5), the parts contributed by “every mistake” are underlined:

(4) $\exists X\ 3editors(X) \wedge \langle X, \underline{\sigma y.\ mistake(y)}\rangle \in {}^{**}\lambda X'\lambda Y'\ \underline{\forall y_0 \sqsubseteq_{atom} Y'}\ [{}^{**}catch_1(X', y_0)]]$.

This is provably equivalent to Kratzer's representation in (3), provided that $catch_1(x, y)$ holds whenever $\exists e\ [agent(e, x) \wedge catch_4(e, y)]$ and that (at least) the second argument of $catch_1$ and $catch_4$ is always atomic. This assumption is independently necessary to model the fact that if two mistakes A and B get caught, this always implies that A gets caught and B gets caught.

The solution extends to mixed distributive-cumulative configurations. Contra Schein (1993) and Bayer (1997), I show that sentences in which distributive and cumulative readings cooccur can also be represented without explicit reference to events or thematic roles. For example, “Three video games (between them) taught every quarterback two new plays” (Schein, 1993) has a reading in which “every quarterback” distributes over “two new plays” but stands in a cumulative relation to “three video games”. It entails that there were two plays per quarterback and that the total number of games involved was three. (5) has the desired entailments:

(5) $\exists X$ 3-*video-games*(X)
$\wedge \langle X, \underline{\sigma y.quarterback(y)}\rangle \in {}^{**}\lambda X'\lambda Y'\ \underline{\forall y_0 \sqsubseteq_{atom} Y'}\ [\exists Z\ two\text{-}plays(Z) \wedge {}^{***}taught(X', y_0, Z)]]$

The idea here is that the exhaustive component of “every quarterback”, $\sigma y.quarterback(y)$, interacts cumulatively with “three video games”, while the distributive component, $\forall y_0 \sqsubseteq_{atom} Y'$, distributes the quarterbacks over the sums of two plays. (*** is the ternary equivalent of **.)

In sum, cumulative readings of “every” do not pose a special problem for eventless representations. They do not constitute an argument that the logical representations of natural language sentences must make use of events or of thematic roles.

Selected references. **Beghelli & Stowell 97.** Distributivity and negation: The syntax of *each* and *every*. In Szabolcsi 97b. **Kratzer 00.** The event argument and the semantics of verbs, chapter 2. Manuscript, semanticsarchive.net. **Kratzer 07.** On the plurality of verbs. In Dölling et al. (ed.), *Event structures in linguistic form and interpretation.* de Gruyter. **Matthewson 01.** Quantification and the nature of crosslinguistic variation. *NLS 9.* **Scha 81.** Distributive, collective and cumulative quantification. In Groenendijk et al. (ed.) *Formal methods in the study of language.* Amsterdam. **Schein 93.** *Plurals and events.* MIT Press. **Szabolcsi 97a.** Strategies for scope taking. In: **Szabolcsi 97b** (ed.) Ways of scope taking. Kluwer.