Event Readings of Numeral NPs

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Introduction NPs with a numeral specifier have been argued to have both an *object-related* (OR) and an *event-related* (ER) reading. The two readings, first discussed by Krifka (1990) for a sentence like (1) below, are given in (1a) and (1b), respectively, following the representation in Doetjes and Honcoop (1997):

(1) 4000 ships passed through the lock last year.

a. OR: 4000 ships are such that each of them passed through the lock last year

b. ER: there were 4000 events in which a ship passed through the lock last year

The difference between the two interpretations is that while for (1a) to be true, the existence of 4000 different ships that passed through the lock is obligatory, (1b) can be true even if there were only 2000 ships that passed through the lock each two times over the time span covered by 'last year'.

In this paper, we will argue for an empirical correlation between ERs and *weak readings* (WRs) of numerals as a class of weak quantifiers (WQs), on the basis of Milsark (1974)'s generalization. Our argument will be grounded on linguistic data involving split topicalization (ST) in German and Romanian, specificity and partitivity tests for ERs, the difference between i-level and s-level predicates with respect to ERs, and the selectional restrictions of verbs regarding the choice of a collective/ distributive argument NP.

We will offer an HPSG formal analysis, in which the quantified NP in an ER will be treated as one syntactic entity, (i.e. the argument of the verb), made of two semantic ones: the nominal content and the numeral quantifier, quantifiying over the situation variable of the verb. This generalization, we will show, implements very easily within a lexicalist theoretical framework like HPSG, where a new lexical entry for the numeral quantifier can be written so that the latter can bind an event variable.

ERs and WRs of numeral quantifiers The main claim of the present account will be that in ORs, the numeral quantifies over the variable contributed by the noun, within the NP domain, while in ERs, it quantifies over events, within the verbal domain.

Milsark (1974) cites sentences like in (2), and concludes that strong quantifiers are ungrammatical in existential sentences (cf. (2a)), and WQs display a strong reading with 'property' (i.e. i-level) predicates in (2b)[1]:

(2) a. There are four/ many/ sm/ *some/ *most students in the room.

b. Four/ many/ *sm/ some/ most students are tall.

In our view, the strong reading in (2b) is a kind of OR like in (1a), while the ER in (1b) is subsumed by the WR in (2a). One argument for this is the observation in Doetjes and Honcoop (1997) that ERs obtain only with quantifiers that display the *symmetry* property[2]. The WQs in (3a) can yield an ER because they are symmetric, while the strong ones in (3b) cannot, because they are not symmetric:

(3) a. Last night, many/ some/ (at least/ exactly) 4000 ships passed through the lock. OR/ER

b. Last night, most/ every/ the 4000 ships passed through the lock. OR/*ER

The numeral in split topicalization (ST) in German is an instance of WR (cf. Diesing (1992)) and has been convincingly argued in Nakanishi (in press) to measure within the verbal domain. This is exactly, what we think happens with the numeral in non-split NPs with ERs. If the parallelism between ST and ER can be proven, then ST would be a syntactic test for ERs, and they should display the same properties. Most importantly, it looks like in ST sentences an OR is impossible:

(4) a. Zece vapoare au trecut prin ecluză anul trecut. OR/ER
ten ships have passed through lock year last

b. Vapoare au trecut zece prin ecluză anul trecut. *OR/ER
ships have passed ten through lock year last

The Romanian sentence with ST in (4b) does not make any commitment to the existence of ten different ships that passed through the lock. It merely says that there were ten 'ship-passing' events.

Since in ST only an ER is available, and non-split numeral NPs - in case they trigger an ER - automatically presuppose an ambiguity between OR and ER, the possiblity of having a ST syntactic version, qualifies a sentence as having an ER. The general claim we want to make is that ST and ER display the same semantic characteristics; the only difference between them lies in the syntax. So from now on, the semantic properties that a ST numeral NP displays will be taken to be shared by the numeral in ERs too.

Specificity and partitivity are two properties that have always been argued to characterize strong quantifiers (cf. Diesing (1992) and others). In our case, they should go with ORs, while in ERs they shouldn't be available. This is exactly what happens: Van Geenhoven (1998) shows that ST numeral NPs cannot receive a partitive or a specific interpetation. The same results show up with i-level predicates.

[1] The difference between *sm* and *some* is mainly phonologic, but is argued in Milsark (1974) to parallel the dichotomy weak vs. strong in the interpretation of the WQ.

[2] In Generalized Quantifiers Theory, a quantifier Q is symmetric just in case Q(A)(B) iff Q(B)(A).

ERs as quantification over the event variable Since cardinal numerals specify cardinality for the variable they bind, an ER would be expected to be forbidden in constructions where the cardinality of the event is already set. This is what happens with one-time events. The Romanian sentence in (5a) only allows a collective reading for the NP, since the destruction of a unique sandcastle cannot take place more than once:

(5) a. Cinci copii mi-au distrus castelul de nisip.
five children my(CL)-have destroyed castle of sand
'Five children destroyed my sandcastle.

b. * Copii mi-au distrus cinci castelul de nisip.

The ST version in (5b) is ungrammatical because the ER of the numeral in (5a) is prevented to appear: the event has its cardinality already set to 'one', so the cardinal 'five' cannot bind the event anymore. Distributivity therefore seems to be another requirement for numeral NPs in order to convey an ER. This is not unexpected, since a collective reading for a numeral obviously measures the cardinality within the NP, and thus obligatorily triggers the OR. Genuinely collective predicates will be shown to be also ungrammatical with ERs.

An HPSG analysis Here, we will adopt a modified version of the HPSG framework in Pollard and Sag (1994), to which we accommodate the innovations on the quantifier theory that Pollard and Yoo (1998) bring in, regarding the placement of the QSTORE feature under the local domain of a sign. To this, the lexical retrieval mechanism from Manning et al. (1999) will be added. Another necessary ingredient concerns the presence of an event variable (index) within the semantics of a verb, and it follows the line in Sag et al. (2002), among others.

We account for ERs mainly via the lexical entry we provide for cardinal numerals. In our view, a cardinal numeral is allowed to bind an event variable with the condition that its SPEC feature specifies a nominal with semantic content of type *weak-nominal* and its value is in a determined relation *ref(erential)-cont(ent)* with the content of the quantifier. This relation ensures that although the numeral plays the syntactic role of a specifier for the N', it binds the situation variable of the verb for which the index of the nominal is a thematic argument. At the same time, the RESTR of the noun is collected by the RESTR of the quantifier, next to the one of the verb. *Ref-cont* allows us to maintain the SPEC Principle in Pollard and Sag (1994) unchanged.

We will prevent the subjects of i-level predicates to get an ER, by constraining them to be semantically of *strong-nominal* type. *I-level* will be a subtype of the semantic type *psoa*. A *distr(ibutive)-rel(ation)* as subtype of *qf-psoa* - thus subsuming all the particular distributive relations like *pass-rel*, *walk-rel* - will be assigned as the type of the nucleus the situation index of which will be bound by the numeral. This is enforced via *ref-cont*.

Conclusion In this paper, ERs are accounted for as deriving from WR contexts of WQs. The HPSG framework offers us the possiblity to analyze them as an instance of a lexical ambiguity that characterizes numerals, as WQs. The special conditions on the verb's semantic type can best be captured within a type-hierarchy.

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