

Prepositional Numerals¹

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Abstract

Many languages use prepositions to qualify numerals, as in *around ten* or *between ten and twenty*.

In this article we study the syntactic and semantic properties of these prepositions. We will argue that they take numerals as arguments and form full-fledged PPs that can function as numerals themselves. This leads us to reconsider the status of numerals.

Keywords: numerals, prepositions, approximation, predicate inversion

1. The status of numerals

1.1 Syntactic status

In syntactic theory, different hypotheses about the status of numerals have been brought forward, about their category and about how they relate to the noun. On the one hand, numerals have been treated as lexical categories heading the specifier of the noun or a functional projection of the noun:

- (3) a. [NP [NP a beautiful two] [N' weeks]] (Jackendoff 1977)
b. [NP [QP two] [N' weeks]] (Selkirk 1977)
c. [DP [D i] [AgrP [AP tre] [Agr' Agr [NP libri]]]] (Giusti 1991)
‘the three books’

This lexical category is either seen as a subcategory of N or A or a lexical category of its own, let's say Q or Num. In an alternative line of analysis, the numeral takes the nominal projection as its complement:

- (4) a. [QP [Q two] [NP weeks]] (Barbiers 1990, Cardinaletti and Giusti 1992)
b. [QP [Q tre] [DP [D e] [NP libri]]] (Giusti 1991, 1997)
‘three books’

The numeral in this view is one of the functional projections of the noun, in addition to D. Even though most syntacticians nowadays seem to hold the latter view, there is evidence in many languages that numerals are nominal and hence not functional.³ Ionin and Matushansky (2004) argue along similar lines, although arriving at a somewhat different structural and semantic analysis of numerals. Their argumentation is largely based on a separate set of

phenomena, primarily the case-marking properties of numerals in Russian and the structure and interpretation of complex numerals (like *two hundred*).

In Dutch, for example, numerals can complement pronominal determiners, sometimes even with plural (5b) or diminutive inflection (5c):⁴

- (5) a. [Wij mannen] begrepen er niks van
We men understood there nothing of
'We men didn't understand anything of it'
- b. [Wij vier(en)] begrepen er niks van
We four(-PL) understood there nothing of
'The four of us didn't understand anything of it'
- c. Ik heb [jullie drie-*tje*-s] niet gezien
I have you three-DIM-PL not seen
'I didn't see the three of you'

They can also combine with quantificational determiners like *elke* 'each' and *iedere* 'every':⁵

- (6) a. [*Elke drie* minuten] viel er een druppel water op zijn hoofd
Each three minutes fell there a drop water on his head
'Every three minutes a drop of water fell on his head'
- b. [*Iedere twee* seconden] kwam er een auto langs
Every two seconds came there a car along
'Every two seconds a car passed by'

That the structure is [[Quant Num] Noun] and not [Quant [Num Noun]] is suggested by the fact that the quantifiers *elk(e)* ‘each’ and *ieder(e)* ‘every’ can only combine with singular nouns (**elke minuten* ‘each minutes’, **iedere seconden* ‘every seconds’).

Something similar is found with the determiner-like element *zo 'n* ‘such a’ in Dutch, which has an indefinite demonstrative meaning in combination with a common singular noun (e.g. *zo 'n man* ‘such a man’; **zo 'n mannen* ‘such men’) but receives an approximative meaning in examples such as (7), where it precedes a numeral:⁶

- (7) a. Het concert duurde [*zo 'n veertig* minuten]
 The concert lasted such a forty minutes
 ‘The concert lasted approximately forty minutes’
- b. Jan bleef [*zo 'n twintig* seconden] onder water
 Jan stayed such a twenty seconds under water
 ‘Jan stayed approximately twenty minutes under water’

From the fact that *zo 'n* only combines with singular nouns in (standard) Dutch (e.g. **zo 'n minuten*, **zo 'n seconden*) we can conclude that the structure of the bracketed noun phrases is [[*zo 'n* Num] Noun] rather than [*zo 'n* [Num Noun]].

Another approximative pattern in Dutch which seems to provide support for the nominal status of numerals is the sequence *iets van Num* (something of Num; ‘approximately/close to Num’) in (8). As shown in (9), the sequence *iets van* also combines with nouns. In that case, it also has an approximation-like meaning. In (9a), for example, a brush-like object is asked for and in (9b) the person asks whether the addressee has any beer-like liquor in his house.

- (8) a. [Iets van dertig Engelse boeken] heeft Jan gelezen
 Something of thirty English books has Jan read
 ‘Jan read approximately thirty English books’
- b. Er waren [iets van veertig deelnemers]
 There were something of forty participants
 ‘There were approximately forty participants’
- (9) a. Heb je [iets van een verfkwast] in huis?
 Have you something of a house-painter’s-brush in house
 ‘Have you got any brush or brush-like thing here?’
- b. [Hebben jullie iets van pils] in huis
 Have you something of beer in house
 ‘Have you got any beer or beer-like liquor?’

The parallelism between the sequence *iets van NUM* and *iets van (een) Noun* may be taken as further support for the nominal status of numerals. Importantly, a sequence like *iets van dertig boeken* in (8) has the internal make-up *[[iets van dertig] boeken]* rather than *[_{NP} iets [_{PP} van [_{dertig} boeken]]]*. Evidence for this comes the possibility of replacing *boeken* by so-called quantitative *er* (cf. Bennis 1986). This weak pronominal element can substitute for a non-maximal nominal projection, leaving behind a quantificational (e.g. numeral) element. In (10), for example, *er* ‘pronominalizes’ the nominal projection *Engelse boeken*, leaving behind the approximative numerical expression *iets van dertig*:

- (10) Jan heeft [[veertig] *Engelse boeken*] gelezen en Marie heeft *er*_i vroeger [[iets van dertig] *t*_i] gelezen
- Jan has forty English books read and Marie has there in-the-past something of thirty -- read
- ‘Jan read forty English books and Marie read about thirty’

Er-substitution cannot apply to a nominal projection which is embedded too deeply within a noun phrase. This is exemplified in (11), where *er* substitutes for the nominal projection *Engelse kinderen* and the associated numeral is located ‘too deeply’ within the noun phrase.

- (11) *Jan heeft [_{NP} een foto [_{PP} van [vijf *Engelse kinderen*]]] en Marie heeft *er*_i [een portret [_{PP} van [drie *t*_i]]]
- Jan has a picture of five English children and Marie has there a portrait of three
- ‘Jan has a picture of five English children and Mary has a portrait of three English children’

This suggests that in (10) *iets van dertig Engelse boeken*, with *Engelse boeken* replaced by *er*, has the structure [[*iets van dertig*] *boeken*] rather than [_{NP} *iets* [_{PP} van [*dertig boeken*]]].

Another indication of the nominal status of numerals comes from structures like the following (see also Heeroma 1948):

- (12) a. Er zijn [[een *dikke* tweeduizend] exemplaren] verkocht
- There are a thick two-thousand copies sold
- ‘A good two thousand copies were sold’

- b. Ik had [[een *kleine* twintig] minuten] om me voor te bereiden
 I had a little twenty minutes for me PRT to prepare
 ‘I had close on twenty minutes to prepare myself’
- c. Ik heb [[een *goede* veertig] minuten] gelopen
 I have a good forty minutes walked
 ‘I have walked a good forty minutes’

A numeral phrase like *een dikke tweeduizend* ‘a good two thousand’ has the structure of a noun phrase consisting of the indefinite article, an attributive adjective and the numeral as the head.

A final indication for the nominal status of numerals is the existence of the sequence ‘Num P Num’ (cf. (13)), which is reminiscent of the pattern ‘(bare) noun + P + (bare) noun’ as exemplified in (14):

- (13) a. Ze verlieten *één voor één* de zaal
 They left one by one the room
 b. Ze kwamen *twee aan twee* de zaal binnen
 They came two by two the room PRT
 ‘They entered the room by twos’
- (14) a. Ze kwamen *voetje voor voetje* binnen
 They came foot by foot PRT
 ‘They entered the room foot by foot’
 b. Ze stonden *zij aan zij*
 They stood side by side

As we will see in section 2, prepositional numerals are another indication of the nominal status of numerals.⁷

1.2 Semantic status

In formal semantics, numerals are usually treated as determiners (relations between sets), in line with the theory of generalized quantifiers (see Keenan 1996 for a recent overview). The sentence in (15a) receives the analysis in (15b) in which *three* is the relation between the set of languages and the set of things that John speaks.

- (15) a. John speaks three languages
 b. $\text{three}(\text{languages}, \{x: x \text{ john speaks } x\})$ type $\langle\langle e,t \rangle, \langle\langle e,t \rangle, t \rangle\rangle$

Treating numerals as determiners captures the similarities with quantifiers like *all*, *most* and *some*. However, numerals have also been treated in at least three other ways in the literature (see Ionin and Matushansky 2004, Partee 1986, Krifka 1989):

- (16) a. $\exists x [\text{three}(\text{languages})(x) \ \& \ \text{John speaks } x]$ type $\langle\langle e,t \rangle, \langle e,t \rangle\rangle$
 b. $\exists x [\text{languages}(x) \ \& \ \text{three}(x) \ \text{and} \ \text{John speaks } x]$ type $\langle e,t \rangle$
 c. $|\{x: \text{language}(x) \ \& \ \text{John speaks } x\}| = \text{three}$ type e

In (16a) *three* is like an attributive adjective, a predicate modifier that picks out the three-membered groups from the plural property *languages*; in (16b) *three* is a predicate of groups that consist of three members; in (16c) *three* denotes a particular number which is identified to the cardinality of the set of the languages that John speaks, i.e. it is like an individual constant that can function as the value of a measure function.

One motivation for analyzing numerals as attributive noun modifiers along the lines of (16a), and not as determiners, is that numerals can follow determiners, as in *the three languages*. Krifka (1999) argues against a determiner analysis of numerals on the basis of complex numerals like *more than three* and *at least three*. The predicate analysis of (16b) receives support from cases where the numeral is used as a primary or secondary predicate, as shown in examples from English and French:

- (17) a. We are seven
b. Nous sommes trois
- (18) a. There were two turn-up beds in the room, and *we slept three* in a bed
b. Can *you lie three* in a bed?
c. *We went a hundred*, mother, and came home *forty-four*

As we will see, prepositional numerals provide evidence for the referential use of (16c).

2. Prepositional numerals in Dutch (and some other languages)

Prepositional numerals are combinations of a preposition and a numeral that can occur prenominaly.⁸ Here are some examples from Dutch:

- (19) a. [*Rond de twintig gasten*] kwamen er op het feest
round the twenty guests came there at the party
'Approximately twenty guests came to the party'

- b. [*Over de duizend kinderen*] zaten er in de zaal
 over the thousand children sat there in the hall
 ‘More than a thousand children were sitting in the hall’
- c. Ik heb [*tegen de honderd mensen*] uitgenodigd
 I have [against the hundred persons] invited
 ‘I invited approximately a hundred people’
- d. Er waren [*tussen de twintig en de veertig mensen*] uitgenodigd voor het feest
 There were between the twenty and the forty people invited for the party
 ‘Between twenty and forty people were invited for the party’
- e. Er waren [*in de buurt van de twintig deelnemers*]
 There were in the neighborhood of the twenty participants
 ‘There were about twenty participants’

It is important to distinguish between the prepositional numeral itself and the noun phrase in which it functions as an adnominal. We will put the prepositional numeral in italics and put the ‘matrix’ noun phrase between square brackets.

Plank (2004a) gives many examples from (various stages of) German and Wege (1997) discusses the phenomenon on the basis of English examples. However, the construction is not restricted to West-Germanic or even Indo-European languages. Although our argumentation and analysis in this article is based almost exclusively on Dutch, we want to illustrate the cross-linguistic character here with examples from Romanian, Spanish, Greek, Icelandic, Norwegian, Polish, Russian, and Hebrew.⁹

- (20) a. Au fost [*în jur de 20 de copii*] la petrecere. (Romanian)
 Have been in the vicinity of 20 de-prep children at party.
 ‘There were around 20 children at the party’
- b. Au fost [*între 20 și 30 de copii*] la petrecere.
 Have been between 20 and 30 de-prep children at party.
 ‘There were between 20 and 30 children at the party’
- c. Au fost [*sub 20 de copii*] la petrecere.
 Have been below 20 de-prep children at party
 ‘There were under 20 children at the party’
- (21) a. En la fiesta había [*alrededor de 20 niños*] (Spanish)
 at the party there-was around of 20 children
- b. En la fiesta había [*hacia/sobre unos 20 niños*]
 at the party there-was towards/on some 20 children
- c. En la fiesta había [*entre 20 y 30 niños*]
 at the party there was between 20 and 30 children
- (22) a. Ipirxan [*jiro sta 20 pedhja*] sto parti (Greek)
 There were round to.the 20 children to.the party
- b. Ipirxan [*eos 20 pedhja*] sto parti
 There.were till 20 children to.the party
- (23) Það voru [*um 20 börn*] í boðinu. (Icelandic)
 there were round 20 children at party-the

- (24) a. Det var [*rundt 20 unger*] på festen. (Norwegian)
 it was round 20 kids on party-the
- b. Det var [*over 20 barn*] der.
 it was over 20 kids there
- (25) a. Było [*około dwudziestu dzieci*] na przyjęciu. (Polish)
 Be-PART.SG.NEUT about twentyGEN childrenGEN.PL on party.
- b. Było [*od dwudziestu do trzydziestu dzieci*] na przyjęciu.
 Be-PART.SG.NEUT from twentyGEN to thirtyGEN childrenGEN.PL on party.
- (26) Na prazdnike bylo *okolo dvadcati detej* (Russian)
 On party be3SG.NEUT about twentyGEN childrenGEN.PL
- (27) a. hayu *be-svivot 20 yeladim ba-mesiba* (Hebrew)
 there-were in-environs 20 children in-the-party
- b. hayu *beyn 20 le/ve-beyn 30 yeladim ba-mesiba*
 there-were among 20 to/and-among 30 children in-the-party

Although prepositional numerals occur in many languages, the number of prepositions that participate in the constructions varies. In Dutch there are close to a dozen, but in Russian, for example, it seems much more restricted. An analysis of such differences, and of other language-particular features of the construction, go beyond the scope of this article.

3. Prepositional numerals as adnominal PPs

Prepositional numerals pose an interesting puzzle for grammatical analysis. Are words like *around* and *over* in these constructions still prepositions that project a full PP or are they really a kind of non-projecting adverbs, analogous to adverbials like *roughly* and *at least*? Do they combine with the whole noun phrase or only with the numeral? All together there are four possibilities:¹⁰

- (28) a. adverb with noun phrase: [DP around [DP ten languages]]
b. adverb with numeral: [DP [numeral around ten] languages]
c. preposition with noun phrase: [PP around [DP ten languages]]
d. preposition with numeral: [DP [PP around ten] languages]

As we will see, the syntactic and semantic evidence of Dutch points to analysis (28d).

3.1 Syntactic arguments

There are at least five arguments that show that the phrase as a whole is not a prepositional phrase, but a noun phrase., i.e. that analysis (28c) must be wrong.

Prepositional phrases in Dutch can undergo PP-over-V, a displacement operation that optionally moves PPs, but not DPs, to the right across the verb. Phrases with prepositional numerals behave like DPs in this respect, and not like PPs:

- (29) a. *Ik heb -- uitgenodigd [twintig kinderen] DP
I have invited twenty children
'I invited twenty children'

- b. Ik heb -- gedanst [rond de twintig tafels] PP
 I have danced round the twenty tables
 ‘I danced around the twenty tables’
- c. *Ik heb -- uitgenodigd [rond de twintig kinderen] prepositional numeral
 I have invited round the twenty children
 ‘I invited approximately twenty children’
- d. *Ik heb -- verstuurd [tegen de twintig kaarten] prepositional numeral
 I have sent against the twenty postcards
 ‘I have sent close to twenty postcards’

Split topicalization, an operation that topicalizes a nominal element from out of DPs, but not from out of PPs, is possible with prepositional numerals:

- (30) a. *Volgelingen* heeft Jomanda [tweeduizend --] DP
 Followers has Jomanda two thousand
 ‘Jomanda has two thousand followers’
- b. **Volgelingen* heeft Jomanda [met [tweeduizend --]] gepraat PP
 Followers has Jomanda with two thousand talked
 ‘Jomanda talked with two thousand followers’
- c. *Volgelingen* heeft Jomanda [ruim over de tweeduizend --] prepositional numeral
 Followers has Jomanda wide over the two thousand
 ‘Jomanda has well over two thousand followers’
- d. *Kaarten* heb ik [tegen de tweeduizend --] verstuurd prepositional numeral
 Postcards have I against the two thousand sent
 ‘I sent close to two thousand postcards’

Extraction of the pronoun *er*, a pro-noun, is possible again from DPs, but not so good from PPs.

- (31) a. Jomanda heeft *er* [tweeduizend --] DP
 Jomanda has there two thousand
 ‘Jomanda has two thousand of them’
- b. ?Ik heb *er* met [tweeduizend --] gepraat PP
 I have there with two thousand talked
 ‘I have talked with two thousand of them’
- c. Jomanda heeft *er* [*ruim over de tweeduizend* --] prepositional numeral
 Jomanda has there far over the two thousand
 ‘Jomanda has far over two thousand of them’
- d. Ik heb *er* [*tegen de tweeduizend* --] verstuurd prepositional numeral
 I have there against the two thousand sent
 ‘I have close to two thousand of them sent’

Positions that allow (i.e. are subcategorized for) DPs but not PPs, do allow phrases with prepositional numerals:

- (32) a. Jan ontmoette [de kinderen] DP
 Jan met the children
- b. *Jan ontmoette [rond de kinderen] PP
 Jan met round the children

- c. Jan ontmoette [*rond de twintig* kinderen] prepositional numeral
 Jan met round the twenty children
 ‘Jan met approximately twenty children’
- d. Jan ontmoette [*tegen de twintig* kinderen] prepositional numeral
 Jan met against the twenty children
 ‘Jan met close to twenty children’

In particular, prepositional numeral constructions occur as objects of prepositions that only select DPs:

- (33) a. Ik reken op [de kinderen] DP
 I count on the children
- b. *Ik reken op [*rond de kinderen*] PP
 I count on round the children
- c. Ik reken op [*rond de twintig* kinderen] prepositional numeral
 I count on round the twenty children
 ‘I count on approximately twenty children’
- d. Ik reken op [*tegen de twintig* kinderen] prepositional numeral
 I count on against the twenty children
 ‘I count on close to twenty children’

On the basis of these data we can rule out analysis (28c) in which the preposition is the head of the whole phrase. The phrase that contains the prepositional numeral must be a DP.

The next series of data show that the preposition together with the numeral forms a PP, as in analysis (28d). First, the prepositional numeral can be specified or modified in the same way as bona fide PPs:¹¹

- (34) a. Er hebben zich [*ergens in de twintig* deelnemers] aangemeld voor het spelletje
 There have REFL somewhere in the twenty participants registered for the game
 ‘Between twenty and thirty participants registered for the game’
- b. Er hebben zich [*iets boven de twintig* mensen] aangemeld voor het spel
 There have REFL a-bit above the twenty people registered for the game
 ‘A little over twenty people registered for the game’
- c. Er waren [*ruim boven de duizend* feestvierders] op het trouwfeest
 There were wide above the thousand feasters at the wedding-party
 ‘There were way over a thousand feasters at the wedding-party’
- d. [*Ruim achter in de veertig* mensen] waren er
 Wide back in the forty people were there
 ‘Close to fifty people were there’

Possibilities of modification are also seen in other languages:

- (35) a. Erau [*cu mult peste 50* de oameni] in autobuz. (Romanian)
 Were with a lot above 50 de-prep people in bus.
 ‘There were a lot more than 50 people in the bus.’
- b. [*Langt umfram þrjú* tilboð] voru gerð í húsið. (Icelandic)
 Far more than three offers were made on the house.

- c. *litt/saavidt over/under 20 blyanter* (Norwegian)
 a-bit/barely above/below 20 pencils
- d. hayu [*harbe me'al 20 yeladim*] ba-mesiba (Hebrew)
 there-were much/many above 20 children in-the-party

Secondly, in Dutch, the prepositional numeral often contains a definite article:¹²

- (36) a. Er waren [*rond (de) twintig* deelnemers]
 There were round (the) twenty participants
 ‘There were around twenty participants’
- b. Er waren [*tegen *(de) twintig* deelnemers]
 There were against (the) twenty participants
 ‘There were close to twenty participants’

Notice that adverbs that fulfil the same role as (approximative) prepositions are never accompanied by an article.¹³

- (37) a. Er waren [*ongeveer (*de) twintig* deelnemers]
 There were approximately (the) twenty participants
- b. Er waren [*hoogstens (*de) twintig* deelnemers]
 There were at-most (the) twenty deelnemers

The article can be taken as indicating that the numeral functions as the argument of the preposition.

The third reason to believe that prepositional numerals are PPs, is that the preposition can sometimes be a complex expression, as we see in examples from Dutch and French:

- (38) a. Er waren [*in de buurt van de twintig deelnemers*]
 There were in the neighborhood of the twenty participants
 ‘There were close to twenty participants.’
- b. Il y avait [*dans les environs de vingt étudiants*]
 He there had in the neighbourhood of twenty students
 ‘There were close to twenty students.’

Expressions like *in de buurt van* or *dans les environs de* do not make sense as adverbs, of course.¹⁴

The preposition *between* that features in the prepositional numerals of most languages that we saw, adds a fourth argument for our analysis. The four possible ways of analyzing *between ten and twenty languages* are given below:

- (39) a. adverb with noun phrase: [DP between [DP ten and twenty languages]]
- b. adverb with numeral: [DP [numeral between ten and twenty] languages]
- c. preposition with noun phrase: [PP between [DP ten and twenty languages]]
- d. preposition with numeral: [DP [PP between ten and twenty] languages]

The crucial thing is that the conjunction of *ten and twenty* depends on *between*. It does not make sense to say *ten and twenty languages*. This rules out (39a) and (39c), where this dependence cannot hold in a natural way and it favours (39d) over (39b), because if *between*

is an adverb adjoined to the complex numeral *ten and twenty*, we would expect it to be optional.

We conclude that the only viable analysis for prepositional numeral constructions is the following:

(40) [DP [PP around ten] languages]

Let's see how this analysis is confirmed by the semantic interpretation of prepositional numerals.

3.2 *Semantic arguments*

Prepositional numerals have the same global semantic structure as spatial PPs. In spatial PPs, the preposition maps its objects (the ground or reference object) to a region of space, a set of positions. Optional modifiers can map the region to a subregion. The figure or located object is located in the region.¹⁵ The following example shows the interpretation of a locative sentence in Dutch:

- (41) a. Er is een gat 2 cm boven de deur
There is a hole 2 cms above the door
- b. $\exists x [\text{HOLE}(x) \wedge \text{LOC}(x) \in 2\text{CM}(\text{ABOVE}(d))]$

In (41b) LOC is a function that maps objects to their location. The location LOC(*x*) of the hole *x* is an element of the region that we get by first applying the ABOVE function to the door *d* and then the modifying function 2CM to this region.

The analysis of prepositional numerals has the same general structure. The main difference is that while spatial PPs are interpreted with respect to three-dimensional physical space, numerical PPs are interpreted with respect to a one-dimensional space of natural numbers. The sentence in (42a) can be analyzed as in (42b):

- (42) a. Er zijn [*ver boven de honderd* studenten]
 There are far above the hundred students
 ‘There are well over a hundred students’
- b. $\exists X [\text{STUDENTS}(X) \ \& \ |X| \in \text{FAR}(\text{ABOVE}(100))]$

(42b) represents exactly what it should represent: there is a set of students and the cardinality of this set is an element of the set of numbers that are a lot higher than 100. Instead of mapping objects to spatial regions, the prepositional function ABOVE maps a number to an interval on the number line and the modifier takes a subinterval of this.

- | | | |
|-----------------------|-----------------------|---------------------|
| (43) boven de honderd | 0---100+++++..... | { $n : n > 100$ } |
| ver boven de honderd | 0---100-----++++..... | { $n : n \gg 100$ } |

The role that location plays in spatial PPs is played by cardinality in prepositional numerals. While LOC maps objects to spatial regions, the cardinality function maps sets to numerical regions.

Note that the syntactic analysis that we rejected in the previous section would not give the correct semantics for prepositional numerals. There is no compositional way to get the interpretation in (44b) from the structure in (44a), because of the fundamental mismatch between the syntactic and the semantic structure.

- (44) a. Er zijn [_{PP} boven [_{DP} de honderd studenten]]
- There are above the hundred students
- ‘There are over a hundred students’
- b. $\exists X [\text{STUDENTS}(X) \ \& \ |X| \in \text{ABOVE}(100)]$

According to the syntax of (44a), *boven* should apply to *de honderd studenten* ‘the hundred students’, but the denotation of this expression is not what ABOVE should apply to. So, also from the semantic point of view, (44a) is not an adequate representation.¹⁶

The space of numbers is a much simpler kind of structure than physical space, having defined over it only a linear order and a distance metric. As a result, only some of the spatial prepositions are transferred to the numerical domain and those that are used numerically, lose those semantic components that don’t make sense on a number scale. Because the number scale is metaphorically related to verticality (Lakoff and Johnson 1980), we find ‘vertical prepositions’ like *boven*, *over* ‘above’, *onder* ‘below’ in prepositional numerals, but not ‘horizontal prepositions’ like *voor* ‘in front of’ or *naast* ‘to the side of’. Dynamic prepositions like *over* ‘over’ and *tegen* ‘against’ lose their motion sense and keep only the ordering sense and the proximity sense, respectively. We don’t want to go in the details here, the important thing for this section is that the lexical semantics of numerical prepositions is very close to their spatial sources.

Prepositional numerals also inherit certain spatial monotonicity properties of spatial PPs. As Zwarts (1997) and Zwarts and Winter (2000) show, the regions denoted by spatial PPs have certain mathematical closure properties. Some prepositions lead to bounded (non-monotone) regions, like *rond het huis* ‘around the house’ and *tussen het huis en de schuur* ‘between the house and the barn’. If we move away from the reference object, the house, we

will inevitably end up at a location that is no longer around the house or between the house and the barn, irrespective of the direction that we take. Other prepositions, however, lead to unbounded (monotone) regions, like *boven het huis* ‘over the house’ and *onder het huis* ‘under the house’. In these cases there are directions in which we can move away from the house, without ever leaving the region defined by the PP.

When applied to numerical scales, the distinction between monotone and non-monotone carries over, but it is combined with a directional (upward, downward) distinction that is specific to the numerical scale. This is informally illustrated in the following diagrams:

- (45) a. Downward monotone: 0+++++]----- (onder)
 b. Upward monotone: 0-----[+++++... (boven)
 c. Non-monotone: 0---[+++++]----- (rond, tussen)

These spatially grounded monotonicity properties lead directly to quantificational entailments, illustrated here with English examples:¹⁷

- (46) a. Under 50 students ate meat \implies ate pork (Downward monotone)
 Under 50 students ate meat $\not\implies$ ate something
 b. Over 50 students ate meat $\not\implies$ ate pork (Upward monotone)
 Over 50 students ate meat \implies ate something
 c. Around 50 students ate meat $\not\implies$ ate pork (Non-monotone)
 Around 50 students ate meat $\not\implies$ ate something

We can understand the quantificational effects of prepositional numerals when we treat them in basically the same way as spatial PPs. This gives semantic support for the PP analysis that we argued for in the previous section.

We would finally like to point out an interesting minimal pair:

- (47) a. Er staan [getallen *boven de 100*] op het bord
 There stand numbers above the 100 on the blackboard
 ‘There are numbers above 100 on the blackboard.’
- b. Er staan [*boven de 100* getallen] op het bord
 There stand above the 100 numbers on the blackboard
 ‘There are over 100 numbers on the blackboard.’

The only obvious syntactic difference between these two sentences is the position of the prepositional numeral *boven de 100* ‘over a 100’: postnominal in (47a) and prenominal in (47b). Obviously, the prepositional numeral in (47a) can only be a PP. Now, if *boven de 100* is a PP in (47a), then it should be a PP in (47b) too, because *boven de 100* makes the same contribution in the two sentences. That can be seen in the truth conditions:

- (48) a. $\exists X [\text{GETALLEN}(X) \wedge \forall x \in X [x \in \text{ABOVE}(100)]]$
- b. $\exists X [\text{GETALLEN}(X) \wedge |X| \in \text{ABOVE}(100)]$

In both cases there is a predicate ABOVE(100), the set of numbers higher than 100, but in (48a) it applies to individual numbers of a set X, in (48b) to the cardinality of the whole set. The position of the PP must be responsible for this difference and we will see how in the next section.

4. Prepositional numerals as numerals

The conclusion that we reached in the previous section is that prepositional numerals are *prenominal* PPs:

(49) [DP [PP around ten] languages]

This is a surprising conclusion given what we know about the distribution of PPs within noun phrases. All other ‘normal’ PPs, spatial or non-spatial, occur *postnominally*. It has always been assumed that the placement of PPs inside noun phrases is entirely a matter of their categorial status, but prepositional numerals show that there must be another property that plays a role.

It seems that prepositional numerals occur *preminally*, in spite of being PPs, because they function as *cardinal* numerals. In a sense to be made more precise they are PPs and numerals at the same time. Let’s return to the minimal pair that we already saw above:

- (50) a. Er staan *getallen boven de 100* op het bord
There stand numbers above the 100 on the blackboard
‘There are numbers above 100 on the blackboard.’
- b. Er staan *boven de 100 getallen* op het bord
There stand above the 100 numbers on the blackboard
‘There are over 100 numbers on the blackboard.’

We argued that one and the same PP *boven de 100* predicates over individual numbers postnominally and over the cardinality of sets prenominally. In other words, it functions as a first-order predicate in the former case and a second-order predicate in the latter case, through the cardinality operator.

What we propose is that the cardinality operator is at the basis of their prenominal placement. Suppose cardinality is associated with a specific configurational position, say Spec,NumP. The functional head NUM ‘assigns’ the cardinality property to an element (a numeral or PP) in Spec,NumP (or, within a checking theory, ‘checks’ it).¹⁸ Cardinality is not an inherent semantic property of words or phrases, but it is one of the functions that number-referring expressions can have (in addition to the ordinal function and maybe others). This idea can be worked out in two ways. One possibility is that numerals and numeral PPs are base-generated (i.e. externally merged) in Spec,NumP and receive their cardinal interpretation from NUM:

- (51) a. [NumP [NP 20] [Num' NUM [NP kinderen]]]
 b. [NumP [PP rond de 20] [Num' NUM [NP kinderen]]]
 ‘(around) 20 children’

Cardinality is then a kind of thematic role assigned by NUM to its specifier, maybe similar to the possessor role assigned by the possessive marker *-s* to the specifier in English.¹⁹ One way to make this more concrete in the syntax is through a feature [card] that Num assigns to the phrase in its specifier position or through Spec-Head agreement between the features of the numeral and the features of Num.

The other option is that all the material that ends up in Spec,NumP started out in the lexical domain and is moved into Spec,NumP. Schematically:²⁰

- (52) a. [NumP [NP 20]_i [Num' NUM [NP kinderen t_i]]]
 b. [NumP [PP rond de 20]_i [Num' NUM [NP kinderen t_i]]]
 '(around) 20 children'

The numeral and the numeral PP are merged inside the NP. Being predicates, they follow the DP-internal nominal 'subject' (i.e. *kinderen*) over which they predicate. That is, 'underlyingly', we find the linear order 'subject-predicate'. Suppose now that the 'surface' order, in which the (prepositional) numeral precedes the noun, is a derived one. Movement brings the 'predicate numeral' to Spec,NumP, where (under a theory of feature checking) its cardinality feature enters into a checking relationship with the cardinality feature on Num. Obviously, if numerals are predicates, this DP-internal leftward displacement would give us another instance of DP-internal predicate movement (Kayne 1994, Den Dikken 1995, Bennis et al. 1998, Corver 1998, 2003).

We adopt here the predicate displacement analysis for DP-internal numerals in Dutch. Before turning to some empirical arguments based on Dutch in support of a displacement analysis, let us briefly consider numeral constructions in a language like Romanian. In Corver (2001), a predicate movement analysis of numeral constructions in Romanian is defended on the basis of the appearance of the linking morpheme *de*, which often features in DP-internal predicate inversion constructions (as in the French *N de N*-construction *un amour d'enfant*) and can be seen as a kind of nominal copula 'be' (cf. Den Dikken 1995).²¹

- (53) treizeci de lei (Romanian)
 thirty of lei
 'thirty lei'

Along the lines of Den Dikken (1995) and Bennis et al (1998), Corver analyzes the sequence in (53) as in (54).

(54) $[_{FP} \text{treizeci}] [_{F'} F+X_i (= \textit{de}) [_{XP} \textit{lei} [_{X'} t_i t_j]]]]$ (FP = NumP)

According to this analysis, the displaced predicate originates in a DP-internal small clause configuration, i.e. XP. This XP is asymmetrically constituted such that the argument (*lei*) of the predicate (*treizeci*), located in the complement position of the Small Clause head X, occupies the specifier position of XP. Predicate displacement involves movement of the predicate to the specifier of a higher functional projection FP, which we would identify here with NumP. What characterizes this movement operation is that the inverted nominal predicate skips an intermediate A-position, viz. that of the small clause subject (i.e. Spec,XP). Under the assumption that this type of predicate displacement is of the A-movement type, the movement of the nominal predicate appears to be a non-local A-movement. The predicate movement can be taken as a local operation, however, if one adopts Chomsky's (1993) locality theory in terms of equidistance (see Den Dikken 1995). Under this theoretical proposal, the moved predicate can cross the subject as long as the two nominals are technically equally far away from the predicate's extraction site (i.e. t_j in (54)). Under Chomsky's assumptions, this situation is obtained by the application of a domain-extending head movement operation that creates a minimal domain that contains both the raised predicate and the small clause subject. Den Dikken (1995) argues that in the case of DP-internal predicate inversion, the requisite domain extending head-movement operation consists of raising of the functional head (X) of the small clause to a higher functional head

(labeled here as ‘F’). The resulting complex head (F+X) spells out as a nominal copula, e.g. *de*.

Prepositional numerals would work in the same way in Romanian: As depicted in (55), the prepositional numeral (PP) starts in the complement position of the small clause. After domain-extending head movement has applied (i.e. X-to-F movement), the prepositional numeral can undergo predicate inversion to [Spec,FP].

- (55) a. [[sub 20] de copii]
 below 20 of children
 ‘less than 20 children’
- b. [FP [sub 20]_j [F’ F+X_i (= *de*) [XP copii [X’ t_i t_j]]]] (FP= NumP)

In line with Chomsky’s (2001) *Uniformity Principle* — “In the absence of compelling evidence to the contrary, assume languages to be uniform, with variety restricted to easily detectable properties of utterances” — we will assume that a language like Dutch also features movement of a ‘predicate numeral’ (i.e. a nominal predicate or a prepositional one) from a postnominal position to a prenominal one. Unfortunately, Dutch lacks the appearance of a nominal copula in these structural contexts. The question therefore arises what other evidence there is in support of a predicate displacement analysis? The argument we would like to give may be characterized as a ‘stranding’ argument, i.e. material is left behind in a postnominal position that goes with the displaced numeral.²² Before giving the relevant Dutch facts, consider the following examples from Romanian:

- (56) a. *aproximativ douăzeci* de oameni
 approximately twenty of men
 ‘approximately twenty men’
- b. *douăzeci* de oameni *aproximativ*

In (56a), the numeral *douăzeci* is modified by the approximative adverb *aproximativ*. Importantly, the adverb and the numeral form a continuous unit. Adopting a predicate displacement analysis, this sequence may be derived as follows:

- (57) $[_{FP} [\text{aproximativ douăzeci}]_j [_{F'} F+X_i (= de) [_{XP} \text{oameni} [_{X'} t_i t_j]]]]$ (FP= NumP)

Consider next (56b), where the approximative adverb and the numeral are in a discontinuous relationship. Notice now that the dependency relation between the two elements is captured directly if it is assumed that the numeral originates in a postnominal position. More specifically, the numeral *douăzeci* forms a constituent with *aproximativ* in its postnominal ‘base’ position. The difference between (56a) and (56b) is that in the former example the adverb is moved along with the displaced numeral (i.e. pied piping) whereas in the latter example the adverb is stranded. The derived structure of (56b) then look as follows:²³

- (58) $[_{FP} [\text{douăzeci}]_j [_{F'} F+X_i (= de) [_{XP} \text{oameni} [_{X'} t_i [\text{aproximativ } t_j]]]]]$ (FP= NumP)

With this stranding analysis of the Romanian example (56b) in mind, consider now the following examples from Dutch:

- (59) a. [*Ongeveer twintig* mensen] heeft hij geïnterviewd
 Approximately twenty people has he interviewed
- b. [*Twintig* mensen *ongeveer*] heeft hij geïnterviewd

Just like Romanian, Dutch has a continuous pattern (59a) and a discontinuous one (59b). Analogously to the Romanian analysis of (56b), the latter pattern may be analysed in terms of predicate movement with stranding of the approximative adverb (see (60b)). The continuous pattern simply involves movement of the unit ‘adverb + numeral (i.e. noun),’ as is depicted in (60a).

- (60) a. [_{FP} [_{FP} *ongeveer twintig*]_j [_F F+X_i [_{XP} mensen [_{X'} t_i t_j]]]]
- b. [_{FP} *twintig*_i [_F F+X_i [_{XP} mensen [_{X'} [_{FP} *ongeveer t_j*]]]]]]

Another approximative pattern that seems to provide support for a leftward predicate displacement analysis comes from the Dutch examples in (61):

- (61) a. [*Twintig* meisjes *of zo*] heeft Jan gezoend
 Twenty girls or so has Jan kissed
 ‘Jan kissed about twenty girls’
- b. Er stonden [*twintig* meisjes *of zo*] voor de deur
 There stood twenty girls or so in-front-of the door
 ‘There were about twenty girls in front of the door’

The sequence *of zo* is interpreted as ‘belonging to’ the numeral in prenominal position. That is, the numeral in combination with the sequence *of zo* (i.e. the disjunctive coordinator *of* ‘or’

plus *zo* ‘so’) receives an approximative interpretation: ‘twenty or in the vicinity of twenty.’ Although for some reason it is impossible in Dutch to have the numeral *twintig* and *of zo* in a continuous, prenominal pattern (i.e. **[twintig of zo meisjes]*), it is important to observe that this continuous pattern is permitted in a language like English:²⁴

- (62) a. John solved the problem in [[twenty or so] minutes]
 b. She visited [[twenty or so] theatres]

As noted in Corver (2001), the disjunctive coordinator in (62) (and also (61)) expresses an alternative, adversative relation: what is expressed by the left conjunct is considered to be an alternative for what is expressed by the right conjunct. Being coordinated with a numeral (i.e. a number-denoting noun), the indefinite element *so* also receives a quantitative interpretation, under the assumption that members that stand in a coordinate relationship are of the same semantic type. Thus, *so* in a way inherits its quantitative meaning from the left member of the coordinate structure. Since *so* is indefinite — i.e. it does not designate a definite number — we get the approximative reading ‘twenty or a number like twenty.’

Under a predicate displacement analysis, the continuous pattern in (62) involves movement of the phrase *twenty or so* (arguably a Conjunction Phrase) to Spec,NumP (see (63a)). The discontinuous pattern (61) arguably involves movement of only the left conjunct (i.e. the numeral occupying the specifier position of ConjP). The rest of the Conjunction Phrase is ‘stranded’ in a postnominal position (see (63b)).

- (63) a. $[_{FP} [_{twenty\ or\ so}]_j [_{F'} F+X_i [_{XP} minutes [_{X'} t_i t_j]]]]$
 b. $[_{FP} [_{twintig}]_j [_{F'} F+X_i [_{XP} meisjes [_{X'} t_i [_{ConjP} t_j\ of\ zo]]]]]]$

On the basis of the above-mentioned DP-internal ‘stranding facts’, we conclude that numerals in Dutch originate in a postnominal position and undergo DP-internal leftward movement to Spec,NumP.

Returning to the topic of this article, prepositional numerals, we would like to point out that our line of analysis, according to which DP-internal predicate inversion is also found with prepositional predicates, opens interesting parallels with the phenomenon of predicate displacement within the sentential system. More in particular, ‘locative inversion’ is an instance of displacement of a prepositional predicate (PP) within the sentential domain (Emonds 1976, Hoekstra and Mulder 1990, Den Dikken 1995):

- (64) a. [Down the hill] rolled the baby carriage
b. [In each hallway] hangs a large poster of Lincoln
c. We suddenly saw how [into the pond] jumped thousands of frogs

It is generally assumed that the preposed PP starts out as a predicate of the subject noun phrase (DP) and moves into the subject position of the sentence. Schematically:

- (65) [_{IP} PP_i [_I I [_{VP} V [_{SC} DP t_i]]]] (SC = Small Clause)

Thus, both in nominal phrases and in clauses there can be movement of a prepositional predicate into a position to the left of its subject. This, then, is another piece of symmetry between the clausal and nominal domains. Although, obviously, this symmetry is interesting from a conceptual point of view, it is quite clear that this symmetry between the placement of prepositional numerals and the phenomenon of locative inversion is in need of further empirical exploration. We will leave this to future work.²⁵

What we also have to leave to future work is the relation between prepositional numerals and other complex numerals, with the same function, but using comparative constructions (e.g. *less than 50*, *more than 50*), superlative PPs (like *at most 50* and *at least 50*) and adverbs (*exactly*, *roughly*). It has always been assumed, both in the generalized quantifier approach (Keenan 1996) and in generative studies of quantification (Beghelli 1996) that these form one big homogeneous family. Semanticists have only recently become more aware of the variation (Krifka 1999, for example). At a superficial level the syntax may seem similar too, but it is not difficult to find differences here (e.g. with respect to postnominal use *50 books at least*, **50 books over*). It seems that the grammar draws on a variety of syntactic and semantic structures to achieve the same functional goal, e.g. express approximation (Plank 2004b) We believe that the detailed study of one of these constructions, undertaken in this article, will also help us to get a better grip what is going on in the other complex numeral constructions.

5. Conclusion

We started this article with the following question: what is the status of numerals? Our excursion through the empirical domain of prepositional numerals leads us to the conclusion that there is no separate syntactic category of numerals, in addition to the usual inventory of syntactic categories (noun, verb, adjective, preposition and their functional categories). This conclusion was also independently arrived at in Ionin and Matushansky (2004). On the one hand we have seen that words like *four* and *twenty* behave in all sorts of respects as nouns and the fact that they can occur as complements of prepositions is another illustration of this. On the other hand, PPs can function in very much the same way as words like *twenty*. So, categorially, there is no coherent class of numerals: they can be nouns, PPs and maybe also

adjectives. What is common to these expressions is a semantic and structural property: they all refer to a number or range of numbers. The typical way in which these number-referring expressions are used is as predicates over the cardinality of the noun, a function that is associated to the specifier of NumP. We further proposed that these predicates originate in a postnominal position and end up in Spec,NumP as a result of DP-internal predicate displacement.

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Endnotes

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² Plank (2004a) is a detailed study of the same construction, focussing especially on the approximative instances ('around') and on the diachronic side.

³ Although some numerals, often the lower ones, may be adjectival.

⁴ Plural morphology (*-en* in Dutch, as in *boek-en* (book-pl; 'books')) is also found on numerals like *honderd* (hundred), *duizend* (thousand), *miljoen* (million), *miljard* (milliard); see (i) and (ii). The occurrence of the plural morpheme *-en* on these numerals is another indication of the noun status of numerals. Besides a plural interpretation, attachment of *-en* to these numerals yields an indefinite meaning. The meaning of *honderden* in (ia), for example, is: 'an indefinite number x 100.'

- (i) Er stonden [honderden studenten] voor het gebouw
There stood hundreds students before the building
'There were hundreds of students in front of the building.'
- (ii) De aardbeving heeft [duizenden slachtoffers] gemaakt
The earthquake has thousands victims made
'The earthquake caused thousands of victims.'

As indicated by the English translations, English also permits plural morphology (-s) on numerals like *hundred* and *thousand*. See Jackendoff (1977) for a discussion of such numerals.

⁵ Jackendoff (1977) presents a similar argument in support of the nominal status of English numerals. In the example *That two weeks we spent in Bermuda was awful*, the demonstrative *that* cannot combine with the plural noun *weeks* (cf. **that weeks*) and therefore must ‘belong’ to the numeral *two*.

⁶ The indefinite demonstrative pronoun that combines with plural nouns is *zulk-e* (such-INFL) in standard Dutch: e.g. *zulk-e mannen*, ‘such-INFL men.’

⁷ If numerals like Dutch *tien* ‘ten’ and English *twelve* are nouns, then what distinguishes them from nouns like *tiental* ‘ten-count’ or *dozen*, respectively? Even though we have no answer to this question, we don’t believe that assuming a separate category of numerals is a good solution either.

⁸ The construction is also possible with nouns like *aantal* ‘number’: *rond het maximale aantal studenten* ‘around the maximal number of students’.

⁹ These examples were collected through a questionnaire in which we asked informants to render a few English examples in their mother tongue. Plank (2004a) gives also examples from a range of languages, including Ancient Greek and Latin, Lithuanian, Hungarian and Amharic.

¹⁰ Even though we have argued that numerals are nouns, we do not want to entertain the possibility that *around* is an attributive adjective modifying *ten* in *around ten languages*. One clear sign that *around*, and other prepositions combining with numerals, are not adjectives is that, as the examples in (12) show, adjectival modification of numerals triggers the appearance of the indefinite article before the modifier (see also Ionin and Matushansky 2004). In prepositional numeral constructions, we get a *definite* article *after* the preposition.

¹¹ The following examples show that the modifiers in (34) can co-occur with ‘regular’ PPs:

- (i) a. De sleutels liggen [ergens in de kast]
The keys lie somewhere in the cupboard
- b. Jan scoorde [iets boven het gemiddelde]
Jan scored something above the average
‘Jan scored a little above average’
- c. We zitten [ruim boven het gewenste bedrag]
We sit considerably above the desired amount
‘We are far above the desired amount’
- d. De zweer zat [achter in haar keel]
The ulcer sat back in her throat
‘The ulcer was in the back of her throat’

¹² Further investigation is needed to lay bare the precise nature of the definite article that is found in prepositional numeral constructions. One remarkable property, pointed out to us by Gertjan Postma, is the fact that it is possible in Dutch to say *[[rond de miljoen] mensen]* (round the_[-neuter] million people, ‘around a million people’) even though the definite article that normally combines with the numeral noun *miljoen* is the neuter definite article *het* (i.e. *het miljoen*). It could be that *de* is chosen under the influence of the plural noun *mensen*; see *de mensen* (the people). Further investigation is needed here.

¹³ This might suggest that *circa* in *circa 20 deelnemers* ‘around 20 participants’, which never takes an article, is not a preposition (as it was in Latin), but has become an adverb in Dutch.

¹⁴ Strangely enough, these complex prepositions are awkward inside other PPs:

?Ik heb op in de buurt van de 20 deelnemers gerekend

I have on in the neighbourhood of the 20 participants counted

‘I counted on approximately 20 participants’

Presumably, such sequences of ‘small’ prepositions like *op* and *in* violate independent constraints.

¹⁵ This is the analysis chosen in many different frameworks, see for instance Jackendoff (1983).

¹⁶ The best we can get compositionally is $\exists X [|X| \in \text{ABOVE}(\{Y \mid \text{STUDENTS}(Y) \ \& \ |Y|=100\})]$, but this formula is already true if there is a set which has more than 100 members, not necessarily students.

¹⁷ Some readers might tend to interpret *around 50 students* as non-motone, because they pragmatically extend the meaning to ‘at least around 50 students’, an extension that is common with numerals (Horn 1992).

¹⁸ Remember that in our analysis of (Dutch) numerals, numerals are nouns (i.e. a lexical category). As such they can occupy as XPs the specifier position of the functional head Num. That numerical expressions can be phrasal is not only suggested by the prepositional numerals that are central in this article, but also by such approximative phrases as in (6), (7) and (8). These complex numerals clearly have a phrasal status.

¹⁹ In formal semantic terms, NUM takes a predicate over sets and yields a function from sets of numbers to predicates over sets: $\lambda P \lambda N \lambda X [P(X) \ \& \ |X| \in N]$. This means that Num’ takes the number expression as an argument, which is equivalent to saying that it receives a thematic role.

²⁰ In this scenario [card] is like a type shift function that takes a set of numbers and maps it to a function from predicates to predicates, i.e. $\lambda N \lambda P \lambda X [P(X) \ \& \ |X| \in N]$. Notice that only the order of application is different from the previous analysis.

²¹ The occurrence of a linking element between the numeral and the noun is also found in Welsh (Maggie Tallerman, p.c.):

- (i) tri o blant
three of children
'three children'
- (ii) chwech o ferched
six of girls
'six girls'

²² Compare, for example, the floating quantifier phenomenon in (ii), which has been treated in terms of movement (cf. Sportiche 1988). Under the VP-internal subject hypothesis, the external argument *all the children* in (i) has moved from a VP-internal position to Spec,IP. In (ii), only the lower DP-segment (i.e. *the children*) has been moved to Spec,IP. The (floating) quantifier *all* is stranded, i.e. it is not moved along with the rest of the DP.

- (i) [DP All the children]_i have [VP t_i written a poem]
- (ii) [The children]_i have [VP [DP all [DP t_i]] written a poem]

²³ As an alternative analysis, one might propose an analysis in which the split pattern in (56b) derives from a 'base structure' in which the numeral, together with the approximative adverb, is base-generated in a left branch, prenominal position. The split pattern would then be derived by rightward movement of the approximative adverb to a postnominal position. Following Kayne's (1994) theory of antisymmetry, we assume that rightward displacement is excluded as a syntactic operation.

²⁴ As noted in Corver (2001), *zo/so* are pro-predicates. The possibility of conjoining a numeral like *twenty* and the pro-predicate *so* further corroborates our analysis of numerals as nouns, i.e. nominal predicates — this under the assumption that conjoined elements must be of the same semantic type (e.g. [argument Conj argument], [Pred Conj Pred]).

²⁵ An obvious difference between clause-internal locative PPs, on the one hand, and DP-internal prepositional numerals, on the other, is that the former can remain in their base

position (e.g. *The baby carriage rolled down the hill*), whereas the latter must move obligatorily (e.g. **[copii [sub 20]]*). Further investigation is clearly needed here.