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Does *Number* Agree? Structure of *Number of* N$_{PL}$ Phrases with Respect to Agreement

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English nominal phrases *a number of* N$_{PL}$ and *the number of* N$_{PL}$ show unusual subject-verb agreement patterns when in subject position. If the *number* (N1) is indefinite, there is an agreement in the plural (i.e. with the number features of N2 which is the complement of *of*). On the other hand, with the definite N1, the verb is in singular; in such cases, the N1 refers to a specific number of N2. There seems to be a correlation between (in)definiteness of N1 and the agreement in number. Tahe categorial identity of the constituents which plays a role in triggering the two distinct agreement patterns is investigated in the paper.

As there are apparently two nouns and thus two potential lexical heads contained in the phrases, the agreement seems to be triggered by the singular phi-features of N1 (*number*), as opposed to the plural phi-features of the *of*-complement. This paper tests the lexical vs. functional identity of the *number* N1, comparing some existing analyses, e.g. the indefinite *number* as a functional head or a semi-lexical head in a pseudo-partitive construction. I argue that the two agreement patterns relate to the categorial identity of the *number* N1 which in the case of the indefinite phrase is transparent for agreement, unlike the lexical number in the definite *number of* phrase.

KEYWORDS
noun phrase, functional and lexical category, agreement

1. INTRODUCTION: WHEN DOES *NUMBER* AGREE?

English grammars, such as Huddleston and Pullum (2002), formulate a descriptive observation that quantificational nouns[1] (QNN; *a lot*, *the rest*) take complements in singular or plural and, respectively, the verb agrees with the number of the complement as in (1–2).

1. *a lot of **things** are; a lot of **water** is*

2. *the rest of the **things** are; the rest of the **water** is*

Number in these constructions behaves unlike other QNNs. Due to its semantics, it only selects plural complements in the *of*-phrase. As with other QNNs, the subject-verb (SV) agreement in combination with the phi-features[2] of the *of*-complement is in the plural, see (3).

3. *a number of **things** were lost/*was lost*

However, *number* can appear with both definite and indefinite determiners, which seems to have an effect on the SV agreement, and this is unique among the QNNs. Examples (4–9) represent typical British National Corpus (BNC) data with respect to SV agreement. In (4–6), *the number of* N2 in subject position agrees with the verb in singular.

4. *No one knows for sure why the number of cases **has** increased so much in the past decade [...].*

5. *The number of businesses within a 400- or 1600-meter buffer around a participant's residence **was** [...].*

6. *The number of people **is** usually smaller than ten, and most frequently smaller than six.[3]*

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[1] Many labels are used for the QNN, i.e. the not fully lexical N1 in the partitive and pseudo-partitive constructions such as *a number of (the) people*. Van Riemsdijk (1998) calls them quantifier nouns, Löbel (2001) quantity-designating nouns. N1s in partitives and pseudo-partitives are further differentiated, the type considered in this paper being one in the typology. Since the other ones are not directly related to the issue of this paper, they are not given here.

[2] Phi-features are the number, person, gender features involved in the agreement of nouns and pronouns with the predicate, e.g. the subject-verb agreement. In English, only number and person features participate in agreement. The agree operation of phi-feature checking and valuation was proposed by Chomsky (2000); cf. Bobaljik (2006).

[3] People was the most frequent N2 appearing both in the definite and indefinite number of phrases**.**

In examples (7–9), *a number of* N2 subjects agree in plural.

7. *A number of clever software and hardware approaches* **have** *been devised [...].*

8. *A number of marine animals* **were** *spared [...].*

9. *Each year there* **are** *a number of people who die because a liver transplant was not available to them.*

Data that can be extracted from (4–9) suggest that the source of the singular phi-features for the verb to agree with originates from N1 in the definite variety, see (4–6), and N2 provides the plural features for agreement in the indefinite *number* phrases, see (7–9). In fact, in the literature (both grammars and theoretical studies) only the indefinite *number* is mentioned as QNN. Therefore, it can be assumed that, with the definite phrases, *number* acts as a lexical noun. The interpretation of *the number* denoting the specific cardinality of N2 supports this assumption. However, these predominant patterns of agreement are not the only ones attested. Marginally, *a number* agrees in the singular and *the number* in plural.

This paper is organised as follows. In Section 2, the data deviating from this predominant pattern are presented. Section 3 provides an overview of studies on nominal phrases with syntactic structures relevant with respect to *number* of N2 phrases, i.e. partitive, pseudo-partitive and lexical nouns with an *of*-complement. Section 4 singles out the definite variety of the phrase in question and considers the lexical headedness, which is relevant for agreement, and Section 5 provides a conclusion.

2. MORE MARGINAL PATTERNS OF AGREEMENT WITH *NUMBER*

In contrast with the predominant patterns of agreement, when the definite *number of* N~PL~ in subject position agrees with the verb in singular and the indefinite *number* in plural, data such as (10–14), although much less frequent in corpora, are grammatical (i.e. acceptable). Löbel's example (10) illustrates the wavering of the agreement between the expected plural and the singular.

10. *A large number of books* **was/were** *published last year.*
    (Löbel 2001, 248)

(11) shows an indefinite *number* phrase, which agrees with the verb in singular, (12) exemplifies the definite variety in which the N2 is also definite

as manifested by the in the of-phrase and (13) exemplifies a subject in which the N2 is postmodified.[4]

11.   *[...] and once <u>a sufficient number of statements</u> **was** available, the category was labeled.*
(COCA 2006: ACAD: RoeperReview)

12.   *And through this period, <u>the number of the martyrs</u> **have** reached to more than 2,000 [...].*
(COCA 2014: SPOK: CNN)

13.   *The number of community colleges that use English tests after students **are** admitted are reported in Table 2.*
(COCA 1996: ACAD: Community College Review)

All of these constructions (4–13) consist of two nouns, and so, when in subject position, potentially two sources of phi-features for the verb to agree with exist (the N1 [*number*] is singular and N2 plural). It is generally agreed that only lexical heads provide features for agreement, therefore the following sections focus on the lexical vs. functional identity of N1 and its effect on agreement. For data such as (12) and (13), I will suggest that the agreement with the plural phi-features of the derivationally lower of the two lexical nouns is the effect of linear closeness, which is post-syntactic.

3. PARTITIVES AND PSEUDO-PARTITIVES AND THEIR RELEVANCE FOR SUBJECT-VERB AGREEMENT

The structural differences in the linear strings Det N1 *of* N2 have been studied at least since Selkirk (1977)[5], who laid foundations for distinguishing partitives (PT), pseudo-partitives (PSP) and lexical nouns with an *of-*complement (NC) phrase.

In NC constructions, such as (14), only the higher of the two nouns, i.e. N1, is the source of phi-features for agreement as it is the highest and therefore closest matching goal for the probe on the verb (Chomsky

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[4] Apart from the corpus data, the marginal patterns of agreement with *number* in the context of indefinite determiner agreeing in the singular and *the number* agreeing in plural were informally confirmed with a few English native speakers.

[5] Selkirk (1977) is interested in the internal structure of the nominal phrases. She is primarily concerned with the difference between PT and PSP and does not discuss the definite variety of *number* phrases with respect to agreement. Implicitly, only the indefinite *number* is considered a quantifier and thus is in the scope of interest of the author.

2000). Unlike verbs, nouns do not require obligatory arguments; therefore, any nominal of-phrase complementation is optional.

14.　[DP1 *a* [N1 *copy*] *of* [DP2 *the* [N2 *notes*]]] *is*

PTs, on the other hand, denote a portion of a larger set: for example, in (15) *the students* are the larger set, and *a group* is the portion of it. According to Stickney (2004; 2007) DP2 makes a barrier for movement[6] and modification, therefore in (16) only *box* can be *mouldy*, not *chocolates*. Crucially, Selkirk (1977) points out that nouns such as *group* are ambiguous between functionality and lexicality. When functional, these nouns form a measure phrase[7] so that the interpretation is the indication of the amount of N2 (*students*); on the other hand, when N1 is lexical, it "functions as a head noun and is further characterized or qualified by the phrase (*of*) *the* [*students*]" (Selkirk 1977, 303).

15.　[DP1*a* [*group* N1]] *of* [DP2 *the* [*students* N2]] [8]

16.　 *a mouldy box of those chocolates*
　　　(Stickney 2004)

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[6] Both movement and barriers for movement were key concepts of generative linguistics since Ross (1967). Movement, or displacement, refers to a realization of an element in a different position than the one in which it was generated. A classic example is wh-movement; in wh-interrogatives, the constituent is question is fronted, therefore not realized in the default position, as in (i) and (ii).

(i)　　**What** *does she really love?*
(ii)　　*She really loves* **snorkelling**.

When movement is blocked, it is due to a domain, typically called an island, from which such movement is intended. Islands were first comprehensively researched by Ross (1967) and (i) is his example of ungrammatical movement from a complex DP. t stands for "trace" and signifies the default position for the moved constituent.

(iii)　　* **Who** *did you hear [NP the rumor [CP that Mary kissed* **t** *]].*

The domains which constitute a barrier for movement are a topic of ongoing research. See, for example, Chomsky (1986) and Cinque (1990). Stickney (2004, 2007) experimentally tests and concludes that DP is such barrier.

[7] *Measure phrase* and *noun* as a cover term for nouns with functional characteristics is in later studies further divided into several subtypes according to the interpretation of the N1, e.g. items such as *number*, in a *number* is labeled quantity noun by Van Riemsdijk (1998) for Dutch and German.

[8] Selkirk (1977) treats of in NCs as a preposition, whereas in PTs and PSPs it is not present in syntax; it is a grammatical formative inserted postsyntactically. Alexiadou, Haegeman and Stavrou (2007) acknowledge the problematic status of of in English and Romance languages in comparison with e.g. Greek or Dutch for the mono-projectional analysis working with a semi-functional type of projection. This issue is not addressed in the current paper.

It is generally agreed that the contrast between PTs and PSPs lies in the missing DP layer between N1 and N2 (see Selkirk 1977; Van Riemsdijk 1998). The whole construction thus has the interpretation of one referent, e.g. in (17) *students* are the referent which is quantified.

17.   [DP *a* [N1 *group*] *of* [N2 *students*]]

Löbel argues that the "quantity-designating nouns [i.e. N1s] lack substance as a meaning component" and they only express different dimensions of quantity, unlike "[N2, *students*] which contain both form and substance as part of their meaning" (2001, 247).

Furthermore, similarly as in PSPs, the function of N1s is also ambiguous, as they fluctuate between the functional and the lexical level. When N1 is a lexical noun, it provides the phi-feauters for the agrees with the verb, when it is functional it is invisible for agreement.

When considering Dutch and German, Van Riemsdijk (1998), following Vos (1999), categorises N1s into several subtypes according to their syntactic behaviour into functional, lexical and semi-lexical. Quantifier nouns (QN, e.g. Dutch: *aantal* [English: *number*]) show the largest number of functional characteristics with respect to the other subtypes and are thus considered truly functional closed-class items, e.g. (18).

18. *een   aantal   voorbeelden*
    a   number   examples
    (Van Riemsdijk 1998, 12)

The functional characteristics, some of which are language-specific and which QNs in Dutch all fulfil, are listed below.

1. N2 can take its own determiner

2. Two N2s can be coordinated under N1

3. N1 can head an indirect partitive

4. N1 can be used as an answer to quantity questions

5. N2 can be extracted under topicalization

6. N2 can be elliptic, licensed by quantitative *er* given a specific choice of N1

(Van Riemsdijk 1998)

Moreover, neither in Dutch nor German are QNs treated as direct partitive constructions which manifest a single projection behaviour; thus, for example, only one of the two Ns can be selected by the governing verb in both languages (Van Riemsdijk 1998). According to this criteria, functional QNs do not agree, they are invisible for agreement and so the verb agrees with the phi-features percolated from N2.

According to Selkirk (1977), who studied the structure of PSPs, including the characteristics of N1, in English, the *number of* phrases (19a) and (19b) both contain a functional measure phrase (*a number*), PSP in (19a) and PT (19b). Whereas (19b) contains two full DPs and the lower N2 is definite, (19a) has only one complete DP projection, containing two NPs, the lower being non-definite. Semantically in (19b), *a numbe*r denotes a portion of the larger set of *objections*.

19. a. *A number of objections were raised.*
    b. *A number of the objections were not addressed.*

Crucially, according to Selkirk (1977), N1s can be semantically ambiguous, e.g. they can be interpreted as functional measure phrases or they can function as lexical heads. *Number* is not analysed as differing from other N1s in MPs, Selkirk focuses on the distinct underlying syntaxes of measure-phrases containing structure of PTs and PSPs. Many syntactic tests are adduced to corroborate the argument that PTs and PSPs have a dissimilar syntactic structure. The conclusion relevant for the present goals is that the lexical head of the phrase controls the agreement with the verb but the highest N1 is not always a lexical head.

With respect to agreement, the wavering between singular and plural in the case of PTs and PSPs is not that surprising, considering the ambiguity of the N1 (instantiating a functional measure noun or a lexical noun). Nevertheless, (12–13) attest the definite *number* phrase, therefore not a functional (PT or PSP) head, but a lexical *number* NC in the subject position and yet in plural agreement with the verb. If the N1 in NC is unambiguously lexical, there should be no possibility of such agreement, but it is attested.[9] Section 4 therefore addresses the question of headedness with the definite *number* phrases which deviate from predictions in the literature, and proposes a solution.

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[9] For Czech, Veselovská (2001) argues for a typology of N1s in relation to nominal constructions containing a quantifying element ranging from QA (Universal Quantifiers), QN (Group Nouns), QGEN (Existential Quantifiers) to NQ (Lexical nouns) based on syntactic, semantic and pragmatic evidence. Such typology is, however, not applicable to languages such as English, which are morphologically poor.

4. THE HEADEDNESS AND AGREEMENT WITH THE *NUMBER OF* N2 PHRASES

In order to determine the lexical headedness of N1 in the definite *number of* phrases, tests used by Selkirk (1977) will be applied to the new data. These are based on the dissimilar behaviour of lexical and functional heads, or more specifically, lexical heads can be pronominalized and can be pragmatic antecedents to pronouns; they can be postmodified by an independent relative clause and be selected by a verb; the lower *of* NP can be elided and they can be premodified by a wide range of adjectives. On the other hand, purely functional heads lack the referential meaning of lexical items and they are not selected by a verb.

Each test contrasts (4) and (12), the two sentences containing the definite *number* in the subject and showing the predominant (4) vs. marginal (12) patterns of agreement. There are three outcomes to this testing: N1 behaves either uniformly a) lexically, b) functionally, or c) it shows mixed characteristics or ambiguity between being purely lexical or functional. The pronominalization test (I.), shows that the subject from the main clause is co-referential with the pronoun in the question tag. In (20) it has the singular number feature as *number* does, but the plural *they* is ungrammatical. With respect to (21), the grammaticality judgment is less clear due to the scarcity of such data.

I. Pronominalization

> 20. *The number of cases has increased so much in the past decade,* **hasn't it/*haven't they?**

> 21. *The number of the martyrs have reached to more than 2,000,* **??hasn't it/??haven't they?**

Similarly, in (II.), a lexical noun, but not a functional item, can be postmodified by an independent relative clause. Examples (22) and (23) indicate that in both cases, *the number* fulfils this criterion.

II. Postmodification by a relative clause

> 22. *The number of cases,* **which was considered**, *has increased so much in the past decade.*
> 23. The number of the martyrs, **which was considered**, have reached to more than 2,000.

With respect to semantic selection or subcategorization, (III.), lexical nouns are selected by a verb, unlike purely functional items. Examples (24) and

(25) illustrate that both the verb *increase* and *reach* select for *number*.

III. Verbal semantic selection

24. *The number of cases has* **increased** *so much in the past decade.*

25. *The number of the martyrs have* **reached** *to more than 2,000.*

The contrast between functional and lexical items with respect to ellipsis in (IV.) is that with lexical nouns *of*-complementation is optional but with functional heads lacking referential meaning, it is not allowed. (26) with elided *of*-complement shows the lexicality of *number*. In (27), however, the elision of the complement does not produce a grammatical result with the verb in plural. This is one of the reasons why linearity closeness-triggered agreement is proposed as an account of data such as (12–13); *number* in (12–13) is referential and thus has lexical properties, the *of*-complement may be elided but the agreement with the verb needs to change from plural to singular.

IV. Ellipsis

26. *The number* **Ø** *has increased so much in the past decade.*

27. *The number* **Ø*have/has** *reached to more than 2,000.*

As for the test (V.), with both (4) and (12) *number* may be premodified by a range of adjectives, as attested in (27) and (28).

V. Premodification by a wide range of adjectives

28. *The* **huge/small/sufficient/scandalous/unexpected** *number of cases...*

29. *The* **unprecedented/increasing/rough/growing/proposed** *number of the martyrs...*

Apart from (21) and (27), the results of the other tests are clear[10]. They show that, even with the definite *number of* phrases, the agreement with the verb is attested both in singular and plural, the lexical head and the source

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[10] An anonymous reviewer points out that two out of five tests is a large portion. Given that the two tests in question do not present counter-arguments for the lexicality of N1, rather the pronominal test is inconclusive and an alternative explanation is suggested for the outcome of the ellipsis test, the result of the three other test indicating the status of *number* as lexical are considered sufficient.

of the phi-features for the verb is N1. Example (27) shows that although the *of* N2 part of the complete phrase can be elided, and so N2 is not the lexical head of the phrase, the agreement with the verb is affected. In the case of *the number of* N2 agreeing in plural, such contradiction suggests that it is the result of post-narrow syntax linear closeness effect, i.e. the fact that N2 carrying plural features immediately precedes or is closer to the verb in the linear string. Needless to say, this is a very tentative claim which requires extensive further research.

5. CONCLUSION

This paper considered the patterns of Subject-Verb Agreement with *number of* N$_{PL}$ constructions, with focus on the headedness in the phrases. These relational nominal phrases can have three structures: the partitive, the pseudo-partitive or the noun with an *of*-complement. Whereas with the indefinite varieties the N1 head can waver between having either lexical or functional status and thus agree in the former case and be invisible for agreement in the latter, in the definite *number of* phrases, it was shown that the categorial identity of N1 is uniformly lexical, even though agreement in plural is attested, which is in discord with phi-features of N1. This paper suggested that the source of plural phi-features for the verb to agree with the lower N2 is a post-syntactic linear closeness effect, and triggering such agreement was proposed as a future avenue of research.

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