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<td>Citation</td>
<td>Hitomi Mizutani: 奈良女子大学英語学英米文学論集, 第42号, pp.83-101</td>
</tr>
<tr>
<td>Issue Date</td>
<td>2016-03-31</td>
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<tr>
<td>URL</td>
<td><a href="http://hdl.handle.net/10935/4333">http://hdl.handle.net/10935/4333</a></td>
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The Internal Structure of English Noun Phrases: 
Head-Nonhead Conflict in Partitive Noun Phrases

Hitomi Mizutani

1. Introduction

There are various types of noun phrases with an of-prepositional phrase in English expressions. This paper focuses on partitive noun phrases such as some of her objections and few of her friends. Although phrase structure rules have been developed in theoretical linguistics, including those for the structure of noun phrases, few studies have ever tried to formulate rules for partitive noun phrase structure.

This article aims to reveal what syntactic and semantic structures partitive noun phrases have. Examining the construction will make a contribution to the problem of how syntax relates to meaning. The issue of the autonomy of syntax has been discussed for a long period of time, but it is now still in controversy.

The outline of this paper is as follows: Section 2 reviews the internal structure of typical noun phrases. Sections 3 and 4 critically review two previous studies. Section 3 examines the partitive noun phrase structure proposed by Selkirk (1977), and Section 4 the fused-head construction suggested by Huddleston and Pullum (2002). Section 5 demonstrates that there exists a head-nonhead conflict between the syntactic and semantic structures of partitive noun phrases. Section 6 concludes the study.

2. Noun Phrase Structure

This section describes the internal structure of general noun phrases in English. Phrases (or clauses) have an internal syntactic structure, namely a hierarchical structure. Words in phrases are structured into successively larger groups, or constituents. Each word or each constituent is labeled with a syntactic category such as noun, verb, adjective, preposition, determiner and so on. Each phrase depends on the category of the central element in it; the central element determines the category of the whole phrase. This element is dubbed head.
Phrases contain specifier, complement (with adjunct) as well as the head. A specifier defines the head to some extent and precedes it. A complement describes the head in some way and, in English phrases, follows it. A specifier and a complement are general terms for the syntactic function of a word unit, not syntactic categories.

To illustrate, let us take a typical English noun phrase, *a student of linguistics*, as an example:


(The following abbreviations are used in the examples: D = Determiner; N = Noun; P = Preposition; Q = Quantifier; N' = Nominal constituent; N'' = a larger Nominal constituent; NP = Noun Phrase; PP = Prepositional Phrase; QP = Quantificational Phrase). We can say that *student* is a noun, *a* is a determiner, and *of linguistics* is a prepositional phrase. It is the internal structure in form that is demonstrated in (1) above. It is also considered, in respect of meaning, that the noun *student* functions as the head, the determiner as the specifier of *student*, and the prepositional phrase as the complement of *student*. The determiner indicates that the student is not anyone specific and the prepositional phrase shows what the student is studying. Both the determiner and the prepositional phrase explain the head noun. Note that the syntactic structure of the normal noun phrase agrees with the semantic one. To be precise, the syntactic head *student* corresponds to the semantic head.

3. Partitive Noun Phrase Structure

In this section, Selkirk (1977) will be reviewed from the perspective of what constituent is the syntactic head in partitive noun phrases.

3.1. Selkirk (1977)

Selkirk (1977) divides English noun phrases, based on the syntactic features of the elements specifying the head noun, into the following two: the simple noun phrase
and the partitive noun phrase. In the simple noun phrase, "the determiner precedes the head noun directly" (Selkirk 1977: 288). On the other hand, the partitive noun phrase "contains a noun phrase within a noun phrase" (ibid.: 288). Examples of the two types are listed in (2) and (3), respectively.

(2) a. some people
    b. many objections

(Selkirk 1977: 288)

(3) a. some of her objections
    b. many of these people

(ibid.: 288)

Selkirk proposes the following hypothesis about the structure of simple noun phrases (my boldfaces):

(4) Simple Noun Phrase Structure

\[ [\text{NP} \quad [(\text{D})][\text{N}][\text{QP} \quad [\text{D}][\text{Q'}][\text{N'}][\text{N}]]]] \] (modified from Selkirk 1977: 302)

D and N’ compose the NP. (The parenthesized D in (4) indicates that it "will have to be either optionally developed, or null and 'indefinite'" (Selkirk 1977: 302)). QP and N' form N''. Within QP, another D as well as Q' is generated. There are two positions for D occurring in the simple noun phrase structure, which Selkirk (1977: 299) calls "the dual-Det hypothesis". There occurs a Q in Q', and an N in N'. This N is defined as the head.

Selkirk derives the bold-faced structure in (4), that of N'', from the syntactic and semantic similarity between determiners in NPs and degree particles in adjective phrases (APs). Each structure is demonstrated in (5a) and (5b), respectively.
(5) a. \([NP \ [QP \ [\{D \ as/ \ too/ \ so \ }[Q \ little \ ]][N^[N \ interest \ ]]]\]
    \[AP \ [QP \ [\{D \ as/ \ too/ \ so \ }[Q \ little \ ]][A^[A \ interesting \ ]]]\]
    (Selkirk 1977: 297)

Superlative the and demonstratives can be analyzed as follows within this framework.
((6), which accords with her theory, is added by the present author.)

(6) a. \([NP \ [D \ \emptyset \ ][QP \ [D \ the \ ]\{Q \ most \ ]][N^[N \ interest \ ]]]\]
    \[AP \ [QP \ [D \ this \ ]\{Q \ much \ ]][N^[N \ length \ ]]]\]

(7) a. \([AP \ [QP \ [D \ the \ ]\{Q \ most \ ]][A^[A \ interesting \ ]]]\]
    (modified from Selkirk 1977: 298)
    \[AP \ [QP \ [D \ this \ ]\{Q \ much \ \rightarrow \emptyset \ ]][A^[A \ long \ ]]]\]
    (Selkirk 1977: 298)

Superlative the in (6a) and the demonstrative in (6b) are regarded as determiners in QP within NP in the same way as those in (7a) and (7b) are considered to be determiners in QP within AP. In this light, the NP-determiners within the QP are given a degree interpretation. Given “that whenever any NP-Det is generated in QP it has a degree interpretation, and that when it is generated outside of QP it does not have this sort of interpretation” (ibid.: 299), we might adopt the dual-Det hypothesis.

However, as Selkirk notices, (4) is defective. This structure generates deviant phrases like (8) below. Double determiner sequences are not permitted in modern English. She does not formulate this constraint in her article, though.

(8) a. *those how many heroes of bygone days
    b. *his as few virtues
    c. *the so little interest
    d. *the too many kids
    (ibid.: 299)
The Internal Structure of English Noun Phrases:
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Selkirk also suggests the following theory as to the structure of partitive noun phrases:

(9) Partitive Noun Phrase Structure
\[
[\text{NP} ([\text{D }][\text{N}' [\text{QP} [\text{NP} ]])])
\]
(modified from Selkirk 1977: 312)

The partitive noun phrase structure is based on the simple noun phrase structure, repeated below as (10).

(10) \[
[\text{NP} ([\text{D }][\text{N}' [\text{QP} [\text{D }][\text{Q }[\text{N }]]][\text{N'}[\text{N }]])])
\] (= (4))

The matrix NP in (9) above, which is almost the same as (10), is made up of D and N'. As shown in (10), N' holds QP and N', and N' consists of N. Now, we have to establish the following additional rule (11) below, which produces (9) from (10).

(11) \[ \text{N'} \rightarrow \text{NP} \]

(Selkirk 1977: 312)

After (11) is applied to (10), N' can contain NP as we can see in (9). This NP is defined as the lower NP. In partitive noun phrases, the matrix NP contains the lower NP. The internal structure of QP or NP within N'' is quite the same as that in (4). The point to notice is that the head noun in the lower NP is also the head in the whole partitive noun phrase. Note also that the partitive construction is recursive and right branching.

Selkirk provides further support for her theory of the two phrase structures, taking as an example a bunch of the flowers, which can be either a real partitive noun phrase in (12) or a noun phrase with a complement in (13) (my boldfaces and underlines).

(12) Real Partitive Construction
\[
[\text{NP} [\text{N'}[\text{NP} ([\text{D } a] [\text{N'}[\text{N } [\text{bunch }]])]) (\text{of}) [\text{NP} [\text{D } \text{the } [\text{N'}[\text{N } \text{flowers }]])]])]]
\]

(ibid.: 312)
(13) Noun Complement Construction

\[
[\text{NP } [d a ] [N[N[N' bunch ]] [PP [P of ]][\text{NP } [d the ] [N[N[N'.flowers ]]]]]]] \] (ibid.: 312)

(12) is considered as parallel to (9), and the structure except the PP in (13) to (4). In
the real partitive construction in (12), \textit{flowers} is defined as the head noun. This noun
(N) is dominated by the underlined \textit{N”} and \textit{N’}, both of which are dominated by the
underlined NP, not by a PP. \textit{Of} is inserted by transformation in the context NP_N’,
the bold-faced one, in the real partitive noun phrase structure. (More generally, the
same goes for the partitive noun phrase structure.) (13) is a simple noun phrase with
a complement and thus, of course, its head noun is \textit{bunch} and \textit{of the flowers} is a PP
complement. In the noun complement construction, the preposition \textit{of} forms PP with
the following NP \textit{the flowers}.

There are three pieces of evidence for these ideas that the noun ‘complement and
real partitive constructions should differ in their internal structures; they are concerned
with number agreement, pronominalization and selectional restrictions:

(14) Number agreement

\textit{A bunch of those flowers} \{\textit{was/ were}\} thrown out on the back lawn.

(15) Pronominalization

\textit{A bunch of those flowers} could be put in the vase, couldn’t \{\textit{it/ they}\}?

(16) Selectional restrictions

\textit{She} {\textit{broke/ drank}} \textit{a bottle of that good wine}.

As demonstrated in (14) through (16), each sentence behaves differently depending
on which noun of each noun phrase functions as the head. If noun phrases have a
different head, then they also have a distinct syntactic structure. First, we will take
the noun phrase *a bunch of those flowers*, for example. In (14), when the subject NP *a bunch of those flowers* takes *bunch* as its head the sentence has the singular auxiliary *was*, while when the head of the subject NP is *flowers* the plural *were* is used. Likewise, in (15), if *bunch* is the head noun, the sentence requires the tag pronoun *it*; in contrast, if *flowers* is the head, the sentence needs *they*. The noun phrase *a bottle of that good wine* in (16) is also syntactically ambiguous. When *bottle* is the head noun, the sentence makes sense with the verb *broke*. When *wine* is the head, the sentence is compatible with *drank*.

However, concerning extraposition from NPs, noun phrases with the real partitive and noun complement constructions behave similarly:

(17) a. Only a handful of those questions about electromagnetism were answered.

       b. Only a handful were answered *of those questions about electromagnetism*.

       c. *Only a handful of those questions were answered *about electromagnetism*.  

       (ibid.: 311)

(18) a. Several reviews of those books on the martial arts were published.

       b. Several reviews were published *of those books on the martial arts*.

       c. *Several reviews of those books were published *on the martial arts*.

       (ibid.: 311)

Note that we cannot see from the results of extraposition the ambiguity of these two structures. As Selkirk remarks, it is simply because “both contain an NP embedded within an NP” (ibid.: 311).

In conclusion, Selkirk asserts that “the simple noun phrase and the partitive noun phrase are thus significantly different in underlying (and surface) structure” (ibid.: 288). Each underlying structure is represented in (19) and in (20), respectively. ((20b) is added by the present author according to her theory. Note in passing that irrelevant details are omitted.):
(19) a. \[ \text{NP [D some ][N people]} \]  
   b. \[ \text{NP [QP many ][N objections]} \]  

(20) a. \[ \text{NP [D some ] (of) [NP [D her ][N objections]]} \]  
   b. \[ \text{NP [QP many ] (of) [NP [D these ][N people]]} \]  

(iband.: 288)

3.2. Problems

Let us now examine the structure in (3a), some of her objections. As we have seen above, this noun phrase is classified into a partitive noun phrase and objections is the head noun. What has to be considered here is whether objections, not some, is the syntactic head. Selkirk (1977) points out that NP-determiners are similar to degree particles not only in syntax but also in semantics. It might be true that there is a similarity between the syntactic structures of noun phrases and adjective phrases, as seen in (5), but when grouping these two constituents together, one must depend heavily on how they are interpreted, that is, their meaning. Even though of is inserted in partitive noun phrases, we cannot say that both of the phrases are alike in their structures, too. Of-insertion must affect the structure of partitive noun phrases; it seems that the syntactic head does not agree with the semantic one. The question which element is the head in syntax will be dealt with further later in Section 5.

Selkirk (1977) has also analyzed the structure of syntactically ambiguous noun phrases. When we judge which constituent is the head in the real partitive and noun complement constructions, particularly in terms of selectional restriction ((16)), we are also concerned with their meanings. We should pay more attention to the results of extraposition from NP in (17) and (18). It must be these results that demonstrate their syntactic structures. This issue will also be discussed later.

The dual-Det hypothesis and the ungrammaticality of double determiner sequences in English relate somewhat to the partitive noun phrase structure, but they are beyond the scope of this paper.
4. Fused-Head Construction

In this section, Huddleston and Pullum (2002) will be reviewed with respect to what element is the semantic head in fused-head noun phrases.


Huddleston and Pullum (2002: 410) propose fused-head NPs, where “the head is combined with a dependent function that in ordinary NPs is adjacent to the head.” The following example in (21) is considered to be a fused-head noun phrase and its structure is diagramed in (22).

(21) few of her friends  
(Huddleston and Pullum 2002: 412)

(22)

\[
\begin{align*}
\text{NP} & \\
\text{Head:} & \\
\text{Nom} & \\
\text{Det-Head:} & \\
\text{Comp:} & \\
D & \\
PP & \\
few & of her friends
\end{align*}
\]

(ibid.: 412)

As (22) illustrates, \textit{few} is labeled as a determiner (D) and \textit{of her friends} as a prepositional phrase (PP). The determiner \textit{few} fuses with the head and functions both as a determinative, or specifier, and a head. The prepositional phrase \textit{of her friends} serves as the complement of \textit{few}. The whole phrase functions as a noun phrase (NP).

There are three main cases where the fusion of a determiner and the head is possible. The first one is the simple fused-head construction, as seen in (23). A fused head is interpreted anaphorically; namely, in (23), we understand \textit{very few} to be \textit{very few books}:

(23) While Kim had lots of books, Pat had \textit{very few}.  
(ibid.: 411)
The second is the partitive fused-head construction. It has two types: the explicitly partitive construction as in (24a) and the implicitly partitive construction as in (24b).

(24) a. *Few of her friends* knew she was ill.
   b. We made numerous suggestions but *few* were taken up. (ibid.: 411)

In (24a), “the head is followed by a complement consisting of $of + a$ partitive oblique” (ibid.: 411). *Few* in (24b) is understood to be *few of the suggestions* as if there were some constituents after the fused-head determiner in the same as (23).

The third case consists of fused determiner-heads with special interpretations. We interpret *few* in (25) as “few people”:

(25) *Few* would quarrel with that assessment. (ibid.: 414)

Heads are fused not only with determiners but also with internal modifiers¹. Huddleston and Pullum attempt to treat every word unitarily for the sake of simplicity and generality. In their approach, each word belongs to a single category. When a word behaves differently, it is not its category but its function that changes. For instance, *many* in (26a) functions as a head whereas the *many* in *many people* in (26b) serves as a determinative, both of which are labeled as determiners:

(26) a. *Many* would agree with you.
   b. *Many people* would agree with you. (ibid.: 421)

4.2. Problems

The fused-head construction proposed by Huddleston and Pullum (2002) makes clear how each word or phrase is labeled as it is. The category labels in (22) are certainly true. In English noun phrases, prepositional phrases as a complement to a noun are postposed to the head noun. In the phrase *few of her friends* ((21)), because *of her friends* belongs to a prepositional phrase and functions as a complement, *few*
can be the syntactic head. A question, however, arises when we deal with the meaning of the whole partitive noun phrase, which Huddleston and Pullum name *explicitly partitive fused-head construction*. That is to say, it is not immediately clear whether *few* is also the head semantically.

We will now consider the meaning of the elements generated in the fused determiner-head position. In (21), *few* shows how small the number of people is. Since it expresses quantity but does not directly indicate any entity, it is difficult to say that *few* is the semantic head and takes any complements. It is, rather, natural that we should see it as a modificational constituent, or *specifier*. It will not be acceptable for *few* to be the semantic head, despite its syntactic function as the head.

Let us then recall the standard definitions of head, specifier and complement. As discussed in Section 2, a head is defined as the central element of the whole phrase.

---

1 Examples of fused modifier-heads are as follows: most fused modifier-heads consist of cardinal numbers such as (i).

(i) This copy is defective but the other *two* are fine. (Huddleston and Pullum 2002: 416)

Comparatives comparing two entities and superlatives are fused with a head. They “constrain the denotation of the noun they modify” (ibid.:416):

(ii) a. There are two sisters, but the *elder* is already married.
    b. I went up that skyscraper in Boston, but the *tallest* is in Chicago.  
    (ibid.: 416)

Ordinal adjectives accept fusion:

(iii) The first student wanted to take linguistics, but the *second* did not.  
    (ibid.: 416)

Modifiers can also be fused which describes colors, provenance, composition, basic physical properties, nationality or characteristics of human beings, or something abstract:

(iv) a. Knut wanted the purple wallpaper, but I wanted the *mauve*.
    b. Henrietta likes Russian vodka, and I like *Polish*.
    c. I prefer cotton shirts to *nylon*.
    d. Lucie likes young/big dogs, but I prefer *old/small*.
    e. The *French* do these differently from the *Dutch*.
    f. How will the new system affect the very *poor*?
    g. We are going to attempt the utterly *impossible*.
    (ibid.: 417)
A specifier defines its head and precedes it; and a complement describes its head and, in English phrases, follows it. By these definitions, few does not describe and follow but specifies and precedes friends, as her does, in (21). We may well think that friends, rather than few, functions as the semantic head, and thus, it appears that the semantic head disagree with the syntactic head.

Which constituent, then, functions as the semantic head in partitive noun phrases? Further discussion of this subject will be presented in the next section.

5. Head-Nonhead Conflict

In the preceding sections, we have examined the internal structure of general and partitive noun phrases. The syntactic and semantic heads do not seem to match in the partitive noun phrase construction, although they do in the normal noun phrase structure. There are four possibilities of head-nonhead combination in syntax and semantics (I will use the terms the upper and the lower respectively to refer to “the preceding partitive” and “the following noun” in partitive noun phrases. For example, in the partitive noun phrase some of her objections, some is called the upper element and objections is called the lower element.):

Hypothesis A: The upper element is both the syntactic and semantic heads.

Hypothesis B: The lower element is both the syntactic and semantic heads.

Hypothesis C: The upper element is the semantic head and the lower element is the syntactic head.

Hypothesis D: The upper element is the syntactic head and the lower element is the semantic head.

We will investigate in this section which of these hypotheses is correct. In what follows, it will be demonstrated that there is a mismatch between the syntactic and semantic heads in partitive noun phrases.
5.1. Semantic Head

We start first with the following question: Which element functions as the semantic head, the upper or the lower? Now, let us have a close look at the results of my informant survey. The following is a result of one-substitution:

(27) Some of my pictures appeared online yesterday. The first one was taken indoors.

Since one is a substitutional pronoun, it refers to the preceding nominal, that is, the head noun without determinative (and modificational) constituents. One, in (27), is interpreted as picture. It follows that picture, rather than some, functions as the semantic head in the phrase some of my pictures.

It is shown more clearly from the following result that picture serves as the semantic head:

(28) Some of my pictures appeared online yesterday. The pictures that appeared online yesterday were all taken indoors.

Some of my pictures is rephrased in the second sentence into the pictures that appeared online yesterday in (28). This means that we comprehend the topic in the first sentence as pictures. That is why the lower noun pictures is the semantic head. In sum, the lower element is the semantic head in the partitive noun phrase structure.

Incidentally, elements functioning as a complement cannot be either the semantic nor syntactic head:

(29) *Some of my pictures of dogs appeared online yesterday. The first one was running.

In (29), one is interpreted as picture and cannot be regarded as dog, which is why the sequence sounds anomalous and unacceptable. (According to one of my informants,
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we would instead have to say, “The first dog was running” or “In the first picture, the dog was running.”

These arguments lead us to the first conclusion: the lower element is the semantic head. Consequently, Hypotheses A and C are rejected.

5.2. Syntactic Head

Having clarified what is the semantic head in the partitive noun phrase structure, we come now to the stage to deal with the syntactic head. Let us take some of their objections as a sample of partitive noun phrases.

(30) Since it first appeared, Althusser’s work has attracted a great deal of attention, and his opponents have focussed in particular on his holist stance. Some of their objections are easily disposed of, but others reveal serious lacunae and inconsistencies which require to be dealt with.

(The British National Corpus)

Noun phrases have a noun (or a pronoun) as their head. Some of their objections in (30) is the subject NP. In this phrase, there are two possibilities as to what is the head noun. Which element is the syntactic head, the upper some or the lower objections? Now, I would like the reader to pay careful attention to the following contrast, where the noun phrase generated after of is replaced with a pronoun:

(31) a. Some of them are easily disposed of.
   b. *Some of they are easily disposed of.

(31a), where the pronoun is in the oblique case, is grammatical, while (31b), where the pronoun is in the nominative case, is deviant, in spite of the fact that both some of them and *some of they occur in subject position. It is true that the phrase some of them as a whole is a noun phrase as the subject and that this whole phrase is assigned the nominative case, but as we can see in (31) there is no doubt that the
lower element *them* is not the central element of the subject NP. The element which is not the center of the phrase is not the head and does not function as the syntactic head.

Turning back to the phrase *some of their objections, their objections* is in the oblique case and the lower element *objections* cannot play the role of the syntactic head. Thus, the lower element is not the syntactic head in the partitive noun phrase construction. Therefore, Hypothesis B, as well as C, is rejected.

The only remaining possibility is Hypothesis D. It then follows that the upper element *some* serves as the syntactic head. Even if the *of*-phrase is excluded from the subject NP in (30), we can infer what *some* means from the context:

(32) Since it first appeared, Althusser’s work has attracted a great deal of attention, and his opponents have focussed in particular on his holist stance. *They have some objections. Some are easily disposed of, but others reveal serious lacunae and inconsistencies which require to be dealt with.*

We interpret *some* in (32) to be *some of their objections*, or to be a partitive, although the *of*-phrase is implicit. In the partitive construction, the upper element functions as the syntactic head.

However, what is less clear is whether the syntactic head *some* is categorized as a noun. Let us look at the following results of extraposition from NPs:

(33) a. Some of my pictures appeared online yesterday.
    b. *Some appeared online yesterday of my pictures.*

(34) a. Some of my pictures of dogs appeared online yesterday.
    b. *Some appeared online yesterday of my pictures of dogs.*

(35) *Some of my pictures appeared online yesterday of dogs.*
(33) involves a partitive noun phrase, and (34) and (35) partitive noun phrases with the complement PP of dogs. As we can see in the (b)-sentences in (33) and (34), neither phrase allows extraposition. As seen in (35), extraposition of the complement alone is not permitted, either.

Noun phrases with the partitive construction behave in a different way from those with the real partitive or noun complement constructions. Compare (34) with (36) and (37):

(36) a. Only a handful of those questions about electromagnetism were answered.  
    \[=(17a)\]
   b. Only a handful were answered of those questions about electromagnetism.  
    \[=(17b)\]

(37) a. Several reviews of those books on the martial arts were published.  
    \[=(18a)\]
   b. Several reviews were published of those books on the martial arts.  
    \[=(18b)\]

Both (36b) and (37b) allow extraposition from NPs; each constituent, such as only a handful or several reviews, is left in subject position.

It is certain that several reviews in (37) is labeled as an NP and that reviews is a noun. Moreover, reviews is the syntactic head of the whole NP several reviews of those books on the martial arts. It is also certain that (only) a handful in (36) is labeled as an NP and that handful is a noun, but it is not certain that the noun handful is the syntactic head. On the other hand, as seen in (34b) above, some alone cannot occur in subject position when the following of-phrase is extraposed. But in (32) some seems to be a subject NP by itself. These facts in turn will lead us to the view that some belongs to a noun or that the syntactic head of partitive noun phrases is not a noun, on the premise that a phrase has a head. However, the relationship is not yet clear between the possibility of extraposition from NPs and the element
functioning as the syntactic head of NPs.

Finally, we will take a brief look at the results of word stress. Both of my informants responded that they pronounce *some* in (34) with a weak form. Regarding *some* in (33), one answered that it is pronounced with a weak form. The other responded that it is pronounced with a strong form, which is only because the *some* occurs in the beginning of a sentence. The latter respondent also told me that in (33) the strongest stress is not put on *some* but that *pictures* is pronounced with a stronger stress than *some*. It is only when they want to emphasize the quantity, intending to convey *not all*, that they pronounce *some* with a strong form. We, however, leave to future research how stress is related to syntactic structure. All we can say here is that the lower element is not the syntactic head.

5.3. Head-Nonhead Conflict

In the preceding two subsections, we have put the four hypotheses to the test. They are repeated below:

*Hypothesis A:* The upper element is both the syntactic and semantic heads.

*Hypothesis B:* The lower element is both the syntactic and semantic heads.

*Hypothesis C:* The upper element is the semantic head and the lower element is the syntactic head.

*Hypothesis D:* The upper element is the syntactic head and the lower element is the semantic head.

The discussion has led us to the following two conclusions about the partitive noun phrase structure:

(i) The lower element is the semantic head.

(ii) The lower element is not the syntactic head.

As we have seen, Hypotheses A, B and C are rejected; there remains Hypothesis D.
Whether Hypothesis D is correct is open to question for the present as we have discussed above. We can conclude for certain that the syntactic head does not completely correspond to the semantic head in the partitive noun phrase construction.

6. Conclusion

We have discussed noun phrase structure in English. In the first place, we have seen the definition of syntactic function of a head. “Head” is the central constituent which determines the syntactic category of the whole phrase. English noun phrases in general have an identical element as the head in syntax and in semantics.

Selkirk (1977) takes the lower constituent as the syntactic head in partitive noun phrases, but her analysis depends heavily on the phrasal meaning. According to Huddleston and Pullum (2002), the syntactic head is fused with the determiner function, but they take no account of the meaning.

Our informant survey of one-pronominalization and intersentential reference has revealed that the lower element is the semantic head. The examination of another case of pronominalization has made clear that the lower element is not the syntactic head. Therefore, we have concluded that the syntactic and semantic heads in the partitive construction do not accord with each other.

There still remain three problems to be discussed. The first is concerned with which syntactic category the upper element belongs to: a noun, a determiner, or something else. The validity of syntactic category labeling must be verified. This appears to be relevant to the ungrammaticality of double determiner sequences in English. The second issue is related to whether or not the upper element functions as a specifier. We need to establish how the upper element is connected to the lower noun. Finally, why is it that the syntactic head does not match with the semantic one in partitive noun phrases? The motivation for the head-nonhead conflict should be analyzed. These are issues left for future research.
References

Data Source
The British National Corpus