Are determiners heads?

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The paper focuses on the relation between the determiner (D) and the common noun (N) in a noun phrase (NP). Four facts show that D depends on N: only N is relevant to whether NP can be used as an adjunct; possessive determiners are similar to clearly dependent possessives e.g. in Dutch and German; N decides whether or not D is obligatory; and in English only one D is possible per N. Three other facts show the converse, that N depends on D: in many languages D sometimes fuses with a preceding preposition (e.g. French *de le* = *du*; English *for each* = *per*); D decides whether or not N is obligatory; the ellipsis of N is a regular example of dependent ellipsis. Therefore D and N are mutually dependent, a relation which requires the structural flexibility offered by Word Grammar. This does not mean that NP has two heads, but rather that either D or N may be the head.

This article will reopen the debate about whether determiners are heads, where Van Langendonck and I have been on opposing sides (Van Langendonck 1994; Hudson 1990: 268)[1]. The discussion will throw up some rather fundamental questions about the nature of syntactic structure, and I shall argue that the syntax of determiners is rather more complex than some of us have assumed. The rather satisfactory outcome will be that Van Langendonck and I may both have been right. Specifically, I shall argue that the determiner and the common noun (henceforth **D** and **N**) each depend on the other, so either (but not both) of them may be the head of the noun-phrase[2] (**NP**). I shall then show how this extra complexity helps with more challenging examples like the following:

(1) a. John's tie
    b. these dozen oranges
    c. what colour tie
    d. a sort of tie

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Each of these examples shows the need for 'multi-dependency', in which one word may depend on more than one other word and complex patterns such as mutual dependency are possible.

One outcome of this discussion will be that dependency is separate from head-hood, although the two notions are clearly very closely related. Dependency is a relation between pairs of words, and if one word depends on another then they both, by definition, belong to a single phrase. But head-hood is a relation between a word and a phrase, whereby that word is the only word in the phrase which depends on some other word outside the phrase. The debate about determiners therefore splits into two separate questions about D, N and NP:

A. Which word depends on the other? Here I shall argue both that D depends on N, and that N depends on D. This mutual dependency means that either could be the head of NP.
B. Which word is in fact the head of the phrase? My answer to this question is that in most cases either word could be — the choice is free; but some constructions demand a common noun as head, while others demand a determiner.

My discussion will assume the theoretical structures of Word Grammar (**WG**) which are described in detail elsewhere[3]. Van Langendonck's discussion of determiners also shared this assumption, so the theoretical framework is neutral as to the question in hand. However it is not neutral as to the range of possible answers, because it limits the answer to a version of dependency structure rather than phrase structure, but it also offers a much wider range of possible answers than most versions of dependency structure. This extra flexibility will play an essential part in the solutions I shall suggest.

1. Defining determiners

What is a determiner? We all agree that the English determiners include words like *the, a, this, some, any,* and *my*, and we agree that these have two things in common which justify a cover term 'determiner':

(2) A singular countable common noun normally needs a determiner in order to be grammatical, e.g. I heard *(the) dog.

(3) Only one determiner is possible per common noun, e.g. I heard *the my dog.

These two characteristics are what distinguish determiners from adjectives, and make the traditional classification in terms of 'demonstrative adjectives', 'possessive adjectives' and so on completely inappropriate.

The resulting word class is quite heterogeneous semantically; for example, it includes some indefinite quantifiers such as *every* and *some*, as well as the definite demonstratives and possessives. Moreover, it includes some of the 'quantifiers', but not all:

a. The quantifier *all* never qualifies as a determiner because it never combines with a singular countable common noun (**all dog*) and it can co-occur with a clear determiner (*all the dogs*).
b. The numerals are often included among 'quantifiers', and also among the determiners, but this is hard to justify. The most obvious objection is that they combine easily with known determiners in phrases such as *my three brothers* and *the two problems*. The 'core' determiners do not combine with each other. An apparent exception is the numeral *one*, but even this may in fact support the claim because there are good reasons for believing that a phrase such as *one book* may in fact contain the determiner *a*. Why can we say *my one book* or *the one book* but not **a one book*? Why can we say *a nice one* but not *a one*? The easiest explanation (Rosta 1997) is that the sequence *a one* is in fact permitted in syntax, but it is realised morphologically as *one*. (We shall review a range of other examples of morphological 'fusion' in Section 3.1.)

In short, the category determiner is defined by its parochial syntax. It cannot be defined semantically because it does not correspond even approximately to a single semantic category, and it is parochial because it is tied to the details of English syntax. It is very easy to find languages which allow singular countable common nouns to occur without determiner-like words (e.g. Latin, Russian), and also languages in which several determiner-like words can occur together (e.g. Italian). For this reason I am very sceptical about cross-language generalisations about how 'determiners' are used. English grammar does require some important generalisations about determiners, namely our rules (2) and (3) above; and these generalisations in turn provide criteria for distinguishing determiners from other words. But it is pointless to discuss the supposedly universal characteristics of such a parochial category.

Indeed, I have argued (Hudson 1990: 270, 2000) that even English has no word-class 'determiner'. First, I noted the considerable overlap between determiners and pronouns which has led many others to argue that pronouns are determiners, but I argued that it makes more sense to reverse this relation

because there are far more pronouns than determiners (e.g. it seems odd to treat reflexive pronouns as determiners). Determiners, therefore, are a subset of pronouns ranging over many of the traditional pronoun types — demonstrative, possessive, interrogative and so on. Second, I pointed out that if N depends on D (as I assumed it did), determiners are merely the subset of pronouns which allow a common noun as their complement — 'transitive pronouns', as it were. Since this is a matter of valency, it need not be expressed in terms of word classes, so there is no need for a word class 'determiner'. Following this argument, our two rules (2) and (3) can therefore be rephrased in terms of pronouns rather than determiners[4]:

(4) A singular countable common noun normally needs a pronoun in order to be grammatical, e.g. I heard *(the) dog.

(5) Only one pronoun is possible per common noun, e.g. I heard *the my dog.

This conclusion will still follow even if we decide that D depends on N because D will still overlap with pronouns and the difference between determiners and other pronouns will still reside in their valency properties. So the question is really whether the pronoun or the common noun is head in an example like *this book*.

However it would probably be confusing to replace the term *determiner* by *pronoun*, so I shall stick to the traditional terminology, using *determiner* as an informal name for the particular subset of pronouns that combines with a following common noun according to rules (4) and (5). This is a much more conservative use of the term compared with what we find in some other places, and excludes a lot of words (or phrases) that others count as determiners. For example, Huddleston and Pullum apply the term 'determiner' to a grammatical function (roughly the left-periphery of the NP), a slot which may be filled not only by 'determinatives' (roughly corresponding to other people's word-class determiner) but also by 'genitive NPs' (e.g. *the boy's*) and other phrases such as plain NPs (e.g. *what colour tie*) and PPs (e.g. *over thirty ties*) (Huddleston and Pullum 2002: 355). Moreover, their list of determinatives includes some that are irrelevant to rules (4) and (5) because they only combine with plural or mass nouns (e.g. *a few, a little, many, much, enough, sufficient*) (ibid: 356). It is important to be aware of all these words because a grammar must integrate them all somehow, but I don't believe it is helpful to lump them all together in this way.

Of course an even more important issue is Huddleston and Pullum's claim that determiners are not heads (ibid: 357) of the NP. This is what I shall try to assess in the next two sections.

2. Evidence that D depends on N

My main source for the following pieces of evidence is Van Langendonck (1994), which is directly aimed at my own suggestion that D is head (Hudson 1984: 90, Hudson 1990: 271). However I have also included arguments from Huddleston and Pullum (2002: 357) and Osborne (2003).

2.1 Adjuncts

Van Langendonck's most powerful evidence concerns NP adjuncts such as the following:

(6) I saw him *this morning*.

(7) It's best to do it *my way*.

(8) Put it *this side of the line*.

He points out that the NPs which can be used in this way are defined exclusively in terms of their N; the D is more or less irrelevant, being freely selected according to the normal rules (with a few exceptions which I shall discuss below). The N is defined semantically (as a noun that refers to a time, a manner or a place), but unlike other NPs it cannot be replaced by a personal pronoun such as *it* or any 'noun-less determiner' such as *that*.

(9) *I saw him it.

(10) *It's best to do it mine.

(11) *Put it this.

Moreover, although the eligible nouns all refer to times, places and manners, they are also lexically quite restricted. In the extreme case, *way* can be used as an adjunct, but its (apparent) synonym *manner* cannot:

(12) I did it the usual way/*manner.

Among time nouns, *time*, *moment* and *day* can be used as adjuncts, but *point (in time)* cannot:

(13) I saw him that time/moment/day/*point in time.

And in general, nouns which refer to events rather than times cannot be used in this way, even though they can be extended metaphorically to refer to times; for example, *before the party* means 'before the time of the party':

(14) I saw him that time/*party/*lecture/*event/*occasion.

In conclusion, whether or not a noun can be used as an adjunct seems to depend both on the noun concerned and also on its meaning; for example, it is possible for *way* meaning 'manner', but not for *manner*.

If we assume, as I do, that a relation such as this must be carried by a single dependency, then there must be a direct dependency in (6) between *saw* and *morning*. If the head of a phrase is, by definition, the word which links to words outside that phrase, then the head of *this morning* must be *morning*, not *this*. The logic is irresistible. In the notation of WG, therefore, the structure of (6) must be as in Figure 1. (The arrows show dependencies, and point from one word to each of its dependents.)

One possible counter-argument is that determiners are in fact relevant, because some determiners are not possible in NPs that can be used as adjuncts; for example, *this morning* can be used as an adjunct, but *a morning* or *the morning* cannot:

(15) I'll do it this morning /*the morning /*a morning.

In short it is not just N that decides whether or not the NP can be used as an adjunct; D counts too. However this argument loses its force somewhat when we consider the details of the restrictions on D. For example, a possessive is possible with *way* (e.g. *my way* in (7)), but not with *time* or *day*, even though these nouns are possible in adjunct PPs:

(16) I'll do it in my (own) time.

(17) I'll do it on my day.

(18) *I'll do it my time/day.

Moreover, even *the* is possible if the noun has other modifiers:

(19) I'll do it the morning after we come back.

(20) I did it the same morning.

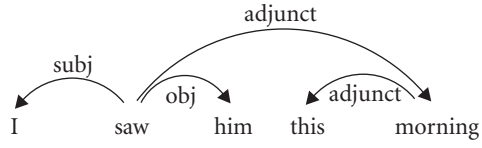

Figure 1.

These interactions seem to be internal to the NP, and are more easily handled in an analysis in which the main determinant of adjunct-hood is N. In other words, Van Langendonck's conclusion remains sound.

Indeed, his argument becomes even more persuasive if we consider how nominal adjuncts behave in relative clauses, for example (*day*) he left:

(21) I did it the day he left.

As in other relative clauses, the antecedent is part of both the higher and lower clauses, so in this example the relative clause is equivalent to *on which he left*, where *on which* is an adjunct. What we find in such cases is that precisely the same lexical restrictions apply to the antecedent noun as we found applying to adjuncts, and that these restrictions survive even when the antecedent noun is not an adjunct in the main clause, so the only possible explanation for them is internal to the relative clause. For example, *way* is possible but *manner* is not, and *time* is possible but *point (in time)* is not:

(22) The way/*manner he did it shocked us.

(23) I remember the time/*point he did it.

Such examples are highly relevant to the question of whether D or N is the head of an adjunct NP because they eliminate D. This conclusion must follow if we assume, with most other linguists, that the antecedent of a restrictive relative clause is N rather than the whole NP. On this assumption, (22) has the structure *The [way he did it] shocked us*, rather than [[*The way] he did it] shocked us.* This being so, the only word relevant to the relative clause is *way*, not *the*; so the relative clause is, in some sense, *way he did it*, with *way* depending as adjunct on *did*. In contrast, *manner he did it* is impossible because *manner*, unlike *way*, cannot be an adjunct.

These facts are as expected given the WG analysis of bare relative clauses in which the antecedent noun itself is part of the relative clause as in Figure 2[5]. (For more details see Hudson 1990: 397.) The obvious alternative would be to assume a covert relative pronoun in such cases, with *the way he did it* as a reduced version of *the way in which he did it*. However this would be quite wrong, because the excluded examples are fine with an overt relative pronoun:

(24) The manner in which he did it shocked us.

(25) I remember the point of time at which he did it.

These facts about relative clauses bear directly on the question of whether D or N is the head of the NP. If Figure 2 is the correct analysis for examples such as

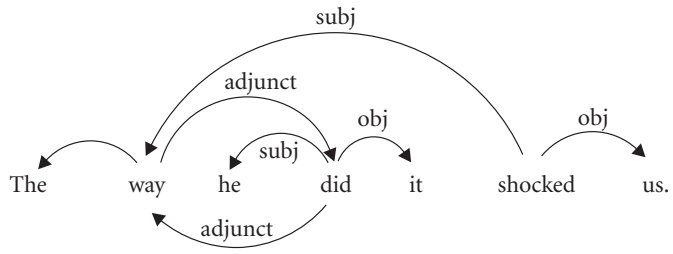

Figure 2.

the way he did it, it is clear that the adjunct in the relative clause is N, not D; so N is the head of the NP in a relative clause, and if this is possible in relative clauses, it must also be possible more generally. In short, the evidence for N as head at least in adjunct NPs is really rather overwhelming[6]. Wherever we look, it seems clear that the possibility of adjuncthood is decided not by D but by N.

2.2 Possessives

Slightly less directly relevant is the evidence from Dutch possessives — less relevant simply because it concerns Dutch rather than English, and I have always been careful not to claim that all languages are the same as English. However Dutch is so similar to English that we might expect them to need similar analyses, so if N is head in Dutch, the same should be true in English.

Van Langendonck's evidence concerns examples like (26) and (27).

(26) Moeders jurk "mother's dress"

(27) Peters moeders buren "Peter's mother's neighbours"

Clearly in these examples the phrase's meaning demands that the last noun — *jurk*, *buren* — must be the head; for example, mother's dress is a kind of dress, not a kind of mother. But unlike English, Dutch possessors are simply genitive nouns, rather than a combination of a noun with a very small determiner, _'s. The same is of course true of German genitives as in (28) and (29).

(28) Karls Freund "Charles's friend"

(29) Deutschlands Grenzen "Germany's borders"

The point of these examples is that the genitive noun must depend on the last noun, just like an ordinary modifier, but it also satisfies the latter's need for a determiner. Just as in English, a singular countable common noun cannot occur

on its own; but in Dutch and German, it needs either a determiner or a genitive noun. Moreover, this genitive noun cannot combine with a determiner, so these two languages have rules just like the English (4) and (5) except that they mention genitive nouns as well as determiners. But these striking similarities and complementarities between genitives and determiners suggest very strongly that they have the same structural status; and given that genitives must depend on the second noun, the same must be true of determiners; therefore at least in Dutch and German, D must depend on N. Once again the logic is impeccable.

Van Langendonck supports this argument by pointing out that even in English the analysis of possessives as head determiners[7] is problematic. The problem is that examples like the following are synonymous:

(30) the old man's hat

(31) the hat of the old man

This similarity of meaning points to similar syntactic structures as well. In (31) *the old man* clearly depends on *hat* though the relation is mediated by *of*; this analysis is shown in Figure 3. But this figure also shows the standard WG structure of (30), which looks quite different because *the old man* depends on the determiner _'s, not on *hat*. If the possessor depends syntactically on the possessed in one pattern, why not also in its synonym?

This argument is slightly weaker than the earlier ones because it rests entirely on semantics, so it is possible that a purely semantic solution is available. My analysis does in fact suggest an easy solution (Hudson 1990: 278): D and N have the same meaning. For example, *this book* defines some object (its referent) in terms of its position ('this') and in terms of its encyclopedic classification ('book'). WG semantics makes the usual distinction between a word's sense and its referent, so a word's total meaning consists of its sense and its referent, but D and N contribute in very different ways to this total meaning: D defines the referent, while N defines the sense. For example, in *this book*, *this* requires the referent to be nearby, whereas *book* requires it to be a book; in terms of the referent/sense contrast, *this* has no sense of its own, but *book*'s sense is 'book'. Since D and N complement one another in this way, their meanings can be

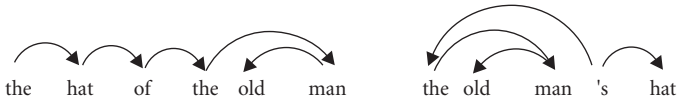

Figure 3.

combined into a single shared sense/referent pair, as shown in Figure 4. This shows separately the meanings of the words THIS and BOOK, and also the general pattern for all words whereby the referent 'isa' (is an example of) the sense; and then it shows how they combine in the meaning of *this book*.

Given this analysis of D N sequences, D and N are semantically equivalent; so depending on D is semantically exactly equivalent to depending on N. Consequently, *the old man* in *the old man's hat* does in fact depend on *hat* in the semantics, even if not in the syntax. Even so, Van Langendonck's objection does carry some weight in view of evidence which I shall now present for a purely syntactic link between possessed and possessor.

For example, take the idiom PULL X'S LEG, meaning 'tease', as in (32) and (33).

(32) She pulled everyone's leg.

(33) She pulled the leg of everyone she met.

(34) *She pulled the leg. (Meaning: She teased him/her/them.)

These examples show that the idiom allows the possessor to be expressed syntactically either before or after *leg*, but (34) shows that one of these two positions must be filled. This restriction rules out a purely semantic analysis in terms of the semantic role 'possessor' (which would in any case be hard to justify for this idiomatic meaning), because such roles can normally be elided syntactically and supplied contextually. For example, (34) would be fine in a literal interpretation when the leg's owner (e.g. a dead chicken) was contextually specified. In short, the idiom consists of three parts, all of which are syntactically obligatory: *pull* plus *leg* plus a _'syntactic possessor' for *leg*. That means that we must have a single dependency type covering possessors both before and after *leg*; but that in turn means that both kinds of possessor must depend

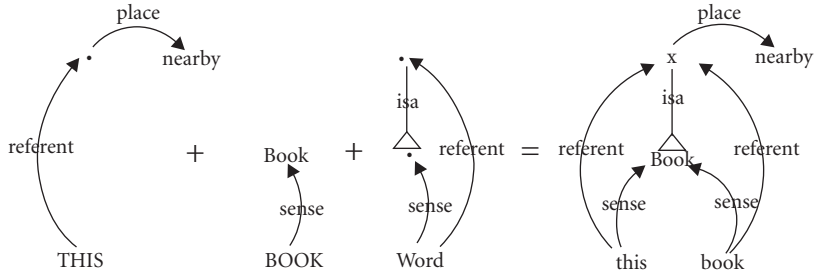

Figure 4.

on *leg*. Therefore *everyone* in (32) must depend on *leg* in the syntax as well as in the semantics. This conclusion gives strong support to Van Langendonck's argument that even English possessors are dependents rather than heads. (We shall consider a more sophisticated treatment of possessives in Section 5.1.)

2.3 The need for determiners

One of the clearest facts about English determiners is (4): they are obligatory with singular, countable common nouns[8]. A noun such as *twig* or *end* simply cannot be used without a determiner, and one such as *table* or *dog*, which is normally countable, is forced into a mass interpretation if it has no determiner. In other words, whether or not D is needed is decided by N. Given standard notions of dependency, this means that D depends on N.

One possible way to avoid this conclusion is to argue that the determiner is needed in order to force a 'countable' interpretation onto an otherwise 'mass' meaning. This analysis makes good sense with nouns like *cake*, which may well be basically mass nouns which can be recycled as countables in the absence of a suitable alternative (such as *loaf* as the countable for *bread*). However it makes much less sense with nouns that are inherently countable, such as *thing, person, individual, item, end, edge* and *name*. It is very hard to imagine any of these nouns being used with a mass meaning, so a determiner is redundant. Moreover, the existence of inherently mass nouns such as *furniture* and *information* which are impossible to recycle as countables suggests that at least some common nouns are classified lexically as countable or mass, so we cannot assume that all nouns are inherently mass by default and need a determiner to make them countable. It seems unlikely, therefore, that there is a purely semantic explanation for the need for D before singular countables.

Another possibility would be to invoke the parallel case of auxiliary verbs in languages such as French, Italian and German. In these languages, 'unaccusative' verbs such as 'come' and 'die' select the auxiliary which translates literally as 'be', while other verbs select the one which translates as 'have':

(35) Marie est venue. 'Mary has come.' French

(36) Marie a dormi. 'Mary has slept.'

(37) Maria è venuta. 'Mary has come.' Italian

(38) Maria ha dormito. 'Mary has slept.'

(39) Maria ist gekommen. 'Mary has come.' German

(40) Maria hat geschlafen. 'Mary has slept.'

However we can also be quite sure that the lexical verb depends on the auxiliary verb in these languages, because the head of the clause must be the finite verb — the auxiliary. These languages therefore seem to provide a precedent for a dependent which selects the word on which it depends; for example, in French *venir* selects *être* as the perfect auxiliary on which its past participle may depend, whereas *dormir* selects *avoir*. If French verbs can select the auxiliary on which they depend, why can't English nouns do the same for determiners?

This argument is less clearly wrong, but it nevertheless contains a fundamental weakness. The choice of auxiliary is a choice between two different auxiliaries, whereas for determiners the choice is between some determiner and no determiner at all. The best precedent for this kind of behaviour is the selection of complements by verbs, with transitive verbs needing an object and intransitives not needing one. The safest conclusion, therefore, is that D does depend on N and, more specifically in view of this selection, that D is a complement of N.

This conclusion may seem odd given that complements generally follow their heads whereas D precedes N. Does this solution introduce a new and otherwise unmotivated category of 'pre-head complement' into English grammar? No, there are two kinds of precedent, though both of them are quite limited and very specific. First, we have the "possessive _'s" as in *John's book*, where there are very good reasons for recognising _'s as a separate word which is the head of the whole phrase (Hudson 1990: 277). If _'s is the head, then *John* must depend on it, and since it is obligatory it must be a complement — a pre-head complement. And second, there are certain prepositions which need a preceding NP. One such is *from* when this refers to a place rather than a path.

(41) He lives four miles from here.

(42) *He lives from here.

In this case the preceding NP must be a complement because it is obligatory. Generalising from this example, this NP is always a complement even when the preposition can occur without it, as with *before*:

(43) He came four hours before then.

(44) He came before then.

However there is at least one other word which needs a preceding NP: the mysterious *ago*, meaning 'before now'. Its meaning suggests an analysis as an 'intransitive' preposition:

(45) He came four hours ago.

(46) *He came ago.

These prepositions all seem to require or allow a complement NP which stands before the head, so they provide a second precedent for the pre-head complement analysis that I am suggesting we need for D in relation to N.

2.4 The single-determiner constraint

Another very clear fact about English determiners, which I mentioned in (3), is that they do not combine with one another. Unlike some other languages, English does not allow combinations like *a my* or *the this*. This important fact is obscured if we classify words such as *all* and the numerals as determiners, because these do combine freely to give phrases such as *all the three books*. Consequently, as explained in Section 1 I am limiting the determiners rather strictly to words which cannot combine with other determiners.

The obvious way to build this constraint into a grammar is to provide a single 'slot' for determiners, which in dependency terms means providing a single 'determiner' dependency. This is the 'pre-complement' dependency which we recognised in the previous subsection, so we can now call it 'det' (to distinguish it from the word-class 'determiner')[9]. Just as prepositions typically allow no more than one complement, and verbs no more than one object, so we can say that common nouns allow no more than one det.

One important advantage of this slot-based approach is to allow words of more than one class to share the same function. The case of German and Dutch genitives is a clear example where this is helpful. The fact is that in these languages a genitive noun counts as a determiner with respect to both the essential characteristics of determiners: it satisfies the needs of a singular countable common noun, and it is incompatible with another determiner. For example, a noun like the German *Buch*, 'book', cannot be used on its own, but needs either a determiner (e.g. *das Buch*, 'the book') or a genitive noun such as *Karls*, "Charles's"; but it cannot combine with a determiner as well as a genitive noun (**das Karls Buch*). Both of these facts are explained if we allow precisely one det dependent per common noun, and allow the det to be either a determiner or a genitive noun.

If D is the det of N, then a fortiori D depends on N. It is true that it is possible to capture the single-determiner constraint in part without making this assumption. If N depended on D, then it would naturally follow that N could only depend on one D and multiple Ds would be ruled out. Other languages

would then have rules which allowed some Ds to depend on another D, but such rules would not exist in English. This approach would rule out combinations of determiners, but it would do nothing for the genitives discussed above. To accommodate these we would have to duplicate all the dependency patterns of determiners: what takes a common noun as its dependent is either a genitive or a determiner, and what a common noun needs as its complement is either a genitive or a determiner. This analysis amounts to a stipulation that genitives happen to share two important characteristics of determiners. In contrast, the analysis in terms of the dependency det avoids this stipulation, so it is preferable. We can therefore stick with our earlier conclusion: D depends on N.

2.5 Extraposition from NP

Another piece of evidence in favour of N rather than D as head of NP comes from extraposition from NP, which displaces a postdependent of N to a position outside (and after) the NP.[10] For example, the relative clause *who have been waiting ten years* is in its expected position in (47) but extraposed in (48).

(47) People [who have been waiting ten years] are still on the list.

(48) People are still on the list [who have been waiting ten years].

However, extraposition is possible only if the antecedent N (*people*) is a direct dependent of the verb to which extraposition attaches the relative clause (*are*). Consequently, if *people* depends on some other noun, extraposition is impossible:

(49) *Names of people are still on the list [who have been waiting ten years].

In short, extraposition allows a post-dependent of N to be positioned as a post-dependent of V provided that N depends directly on V.

This simple generalisation provides a useful test for dependency structures within NP. If N depends on D, extraposition should be blocked by D just as it is blocked in the last example by *names of*. In fact, of course, D makes no difference at all to the possibility of extraposition:

(50) Some people are still on the list [who have been waiting ten years].

(51) That book is really good [that you told me about].

These data suggest strongly that it is N, rather than D, that depends on the verb.

The inescapable conclusion from the evidence on adjuncts, on possessives, on determiner selection, on the single-determiner rule and on extraposition is that D must depend on N[11].

3. Evidence that N depends on D

Having decided that D depends on N, we must consider the evidence from the other side. As a long-time advocate of this position I am happy to report strong support for it.

3.1 Preposition + determiner fusions

Unfortunately the most overwhelming evidence comes from other languages, but we shall see that we may have a similar pattern in some English dialects. Many western European languages allow a combination of a preposition and a definite article to fuse into a single word-form[12]:

(52)	du (= *de le) village 'from the village'	(French)
(53)	au (= *à le) village 'to the village'	(French)
(54)	al (= *a el) cine 'to the cinema'	(Spanish)
(55)	del (= *de el) cine 'from the cinema'	(Spanish)
(56)	do (= *de o) campo 'from the countryside'	(Portuguese)
(57)	na (= *em a) casa 'in the house'	(Portuguese)
(58)	pelo (= *por o) parque 'through the park'	(Portuguese)
(59)	nella (= *in la) scatola 'in the box'	(Italian)
(60)	im (= in dem) Dorf 'in the village'	(German)
(61)	sto (= *se to) trapezi 'on the table'	(Greek)
(62)	yn (= yn y) ty 'in the house'	(Welsh)
(63)	bhon (= bho an) 'from the'	(Gaelic)
(64)	dhan (=dha an) 'to the'	(Gaelic)

In cases like these it is clear that two syntactic words fuse into a single morphological word, much as with cliticization. There is nothing at all to be said for an analysis in which the syntax, slavishly following the morphology and phonology, recognises *du*, *au* and so on as single words. Equally clearly, the fusion cannot be left to the phonology, because it is only found with specific prepositions and articles, so it must be handled as a matter of morpho-syntax.

This fusion pattern is relevant here because it is sensitive to syntactic structure: it only applies if the article introduces an NP which is the preposition's complement. For example, in French the object pronoun *le*, "him"

(which is arguably the same word as the article *le* because all the definite articles have the same possibility of being used as object pronouns) can be used at the beginning of an infinitival clause such as *le voir hier*, "to see him yesterday"; and such a clause may be the object of the preposition *de*, as in (65).

(65) J'ai oublié de le voir hier.
I have forgotten of him to-see yesterday
I forgot to see him yesterday.

In this case it is quite impossible to fuse *de le* into *du*.

Why should this restriction apply? If it is the NP's N that depends directly on the preposition, the restriction on fusion is simply arbitrary because the article is a dependent of N just as it is in infinitival clause. On the other hand, the restriction is completely natural if the preposition's dependent is D because then fusion of (say) *de le* would be possible only if *le* depended directly on *de* as it does in *de le village* but not in *de le voir*. The difference is shown in Figure 5.

How does this evidence apply to English? Fusion of preposition + *the* is not part of standard English, but it may be found in some dialects of northern England, especially in Cheshire, Lancashire and parts of Yorkshire. The data are complex and somewhat hard to interpret[13], but it seems that examples like the following are possible:

(66) I'm going [ʔ] pub.

In this example, the glottal stop doubles as realisation of both *to* and *the*, a fusion just like the examples from other languages. Both *to* and *the* can separately be realised as glottal stops (or something acoustically similar), but it is possible that their fused realisation is slightly different. However, whatever the phonetic facts may be, the fused form is presumably learned and stored as a peculiarity of the preposition + article sequence, just as in the other languages. If so, we have clear evidence of a direct relation between *to* and *the*, so at least in these dialects *the* must be the head of its NP. And if this is true, it seems reasonable to generalise not only to other determiners, but also to other dialects of English.

A very different example of preposition-determiner fusion in English (including standard English) may be found in the word *per*, as in *per page*:

Figure 5.

(67) They pay five pounds per page.

(68) We brought two bottles per person.

The word *per* is unusual in several respects (apart from its origin in a Latin preposition). It is generally used like a preposition, but it refuses preposition stranding:

(69) *What did you pay a pound per?

Its complement must be a singular countable noun; plurals are impossible.

(70) We brought one bottle per couple.

(71) *We brought one bottle per two people.

And finally, this complement noun exceptionally has no determiner, and indeed cannot have a determiner:

(72) *We brought one bottle per a/every/each person.

The simplest explanation for this collection of facts is to invoke an underlying *each*, so that the form *per* is syntactically equivalent to *for each*. This explains all three peculiarities: the preposition cannot be stranded without its complement because the two are realised as one word-form; its complement must be singular and countable because this is what *each* needs; and no other determiner is possible because the NP already has one: *each*. Moreover this analysis gives exactly the right meaning, 'for each'. But if this analysis is correct, it follows that *each* must depend directly on *for*, so at least *each* must be the head of its NP.

3.2 The need for N

Another reason why N must depend on D is that some determiners need N but others do not. This of course is similar to the argument in Section 2.3 in favour of the reverse conclusion. In that case we noted that some nouns (countable, singular common nouns) do need a determiner, while others do not, and concluded that D must depend on N. Here I shall use similar facts as evidence for the reverse conclusion.

Most determiners can be used either with or without N; for example, *any* can be used without N:

(73) I looked for spots but couldn't find any.

In some cases the presence or absence of N affects the shape of D itself: *no* alternates with *none*, *my* with *mine* and so on (through five of the seven possessive determiners). Of course we could take this variation of form as evidence that where there is no N, the word is not a determiner at all, but a pronoun. However this would be a mistake because in other respects these 'pronouns' have very similar properties to the corresponding determiners, so it is much better to recognise them as variants of the same word. This seems much better than the alternative of recognising a pronoun *any* coexisting with a separate item, the determiner *any*, which happens to share its meaning and syntax (apart from the N).

Given that *any* is the same lexical item, belonging to the same word class, whether or not it is followed by N, it follows that we need to explain the relation between pairs like *any* and *any spots*. In the next subsection we shall consider the semantics of this relation, but the syntactic relation is important too. If D (*any*) depends on N (*spots*), it is strange that *any* can occur as a free NP without *spots*. This is not in general possible for other dependents of nouns (though we shall consider some rather limited exceptions in the next subsection), but determiners are clearly different. Part of the explanation lies in the classification of determiners as pronouns: if they are pronouns, then, like other pronouns, they can be used on their own. But if *any* is a pronoun which depends on *spots* then this implies that it has the same relation to *spots* as any other dependent noun, such as *ink* in *ink spots*. The two cases are clearly very different because *any* always presupposes a following N, and if this is missing it has to be recovered anaphorically (as we shall see in more detail in Section 3.3); but this is not true of *ink*. The difference between *any (spots)* and *ink (spots)* suggests that their syntactic structures may be radically different.

The obvious alternative is to take N as the complement of *any*, reversing the dependency relation. This immediately explains the difference between *any* and *ink*, because *any* is the head of its NP in *any spots* as well as when it is used without N. However it also explains why some determiners cannot be used without N. The determiners concerned are *the, a/an* and *every*, all of which are always absolutely ungrammatical if used without N:

(74) I found some old books and I read every *(one).

If N is the complement of D, then we should expect lexical variation from D to D according to whether N is obligatory or optional, just as with prepositions and verbs:

(75) I found a box and put the books inside (it).

(76) I had a problem so we talked about *(it).

(77) I told them she was ill but they already knew (it).

(78) I told them she was ill but they denied *(it).

Moreover, some determiners show the uncertainty about complement status that we find with prepositions and verbs. For example, *each* is only marginally freer than *every* to occur without N:

(79) I considered several guidebooks and I read ?(each) before eventually choosing one.

This is similar to the uncertainty around prepositions such as *without*:

(80) I couldn't find the pen so I had to manage without ?(it).

This kind of lexically-specific uncertainty is exactly what we expect in complement patterns, so we can safely conclude that N is the complement of D.

3.3 Elliptical N

The next reason for thinking that N depends on D involves the semantics of elided N. As I pointed out in the previous subsection, N can easily be omitted after most D (including possessives):

(81) Mary's bike is cleaner than John's [= John's bike].

(82) We've run out of sugar, so we'd better get some [= some sugar].

(83) If you want an umbrella, you can borrow this [= this umbrella]

In all these examples, the missing N is reconstructed anaphorically. In these cases the semantic link to the antecedent is identity-of-sense anaphora, just as in examples like the following:

(84) While looking for dinosaur eggs I found two possible examples [= examples of dinosaur eggs].

(85) If you want a hat I've got a collection [= collection of hats] here.

What these examples share with their antecedents is the sense — 'bike', 'sugar', and so on — rather than specific referents, but identity-of-reference anaphora is also common:

(86) I didn't see that car's number-plate, but I do remember the colour [= its colour].

(87) When he says one thing she always says the opposite [= the opposite of it].

I assume that both identity-of-sense anaphora and identity-of-reference anaphora are basically examples of the same phenomenon, which I shall call '**anaphoric ellipsis**'; and both are found with ordinary common nouns such as *example, collection, colour* and *opposite*.

The point of these examples is that, leaving the determiner examples aside for the moment, anaphoric ellipsis is typically found in dependents. This is very clear in examples (84) to (87), where the elided prepositional phrase obviously depends on the noun, and arguably is the noun's complement in each case. Anaphoric ellipsis can also be found after prepositions and verbs:

(88) I found this shoe by the case so I put it in [= in the case].

(89) When I came to the tree I walked round [= round it] three times.

(90) I turned on the television and watched [= watched it] for a few minutes.

(91) When they asked my name I told them [= told them it].

(92) Don't ask me when I'll be back, because I don't know [= know when I'll be back].

(93) I may not manage it, but I'll try [= try to manage it].

(94) John was late but Mary wasn't [= wasn't late].

In (88) to (94) the elliptical noun is the complement of the preceding word, and in the next examples it is the subject of a non-finite verb.

(95) When I dived in it was really hard to see [= for me to see] the bottom.

(96) What held us up was missing [= us missing] the bus.

Anaphoric reconstruction is clearly possible in adjuncts as well, as for example (97):

(97) I met Bill and discussed politics [= discussed politics with him].

However the absence of an adjunct probably does not count as 'ellipsis' because its absence does not require reconstruction in the way that a missing subject or complement does.

In short, anaphoric ellipsis is common among dependents, and perhaps especially among subjects and complements. In contrast, it is not generally possible in heads (we shall consider exceptions below); for example, we cannot omit a repeated preposition or verb in examples like the following:

(98) *He sat on the floor and she lay the bed [= on the bed].

(99) *I found the second clue before Mary the first [= Mary found the first].

On the basis of examples like these, then, we can conclude that anaphoric ellipsis is confined to subjects and complements. This conclusion fits nicely with the observation that the possibility of anaphoric ellipsis is determined by the head word: non-finite verbs allow an elided subject, but finite verbs do not; some prepositions and verbs allow an elided complement, but others do not:

(100) I opened the case and put the shoe in/*into.

(101) I don't know whether I can do it, but I'll try/*attempt.

Moreover, as we saw in (84) to (87) nouns vary lexically according to whether their complements allow identity-of-sense or identity-of-reference anaphora in their elided complements. In short, there are good reasons for believing that anaphoric ellipsis applies only to complements.

If this generalisation is true, it provides extremely strong evidence that N depends on D, and more precisely, that N is the complement of D. If N depends on D, the anaphoric ellipsis of N is covered by the general rule, but if not, it needs a separate rule. It is true that there is an apparently weak link in this argument: although ellipsis is indeed typically found in complements, it is sometimes found in heads. However, my counter-argument will be that the ellipsis in these cases is not anaphoric ellipsis. The most obvious case of this kind of ellipsis is 'fragments' which build anaphorically on a preceding utterance, such as answers to questions:

(102) Who did it? John [= John did it].

In this example, *John* is a fragment whose interpretation requires anaphoric reconstruction, very much like what we find in anaphoric ellipsis; but in this case what has to be reconstructed is the entire sentence, including the head *did*. Perhaps we can ignore such examples as they do seem to involve rather different processes from ordinary anaphoric ellipsis. The same is probably true for gapping and other kinds of ellipsis which are more or less restricted to coordination:

(103) The men carried the cases and the women, the bags [= the women carried the bags].

We are not concerned here with the peculiarities of coordination, and all the kinds of ellipsis considered so far could have been illustrated across sentence boundaries, so it seems reasonable to put these examples on one side.

However it is less easy to ignore cases where head nouns are omitted:

(104) Lucy likes young dogs but I prefer old [= old dogs].

(105) Knut wanted the French caterers, but I wanted the Italian [= the Italian caterers].

These examples (taken from Huddleston and Pullum 2002:417) both show adjectives being used like nouns, but without actually being nouns; for example, if *Italian* had been a noun it would have been plural (*Italians*), and *old* must be an adjective because it can be modified by *very*:

(106) Lucy likes very young dogs but I prefer very old [= very old dogs].

These seem to be genuine cases of noun modifiers being used without a modified noun. Let us call this pattern **'head-noun ellipsis'**. The question, then, is whether elided N after D is an example of head-noun ellipsis rather than anaphoric ellipsis. If it is, then the argument so far obviously collapses.

The two kinds of ellipsis in fact seem rather different. First, the environments where head-noun ellipsis is possible seem to fall into three groups. The first group contains the rather formal and literary 'generic' pattern in which the omitted word is always *people*:

(107) The rich cannot enter the kingdom of Heaven.

(108) The Dutch tend to be tall.

In all these cases the determiner is *the*, so the simplest account would allow adjectives, exceptionally, to depend directly on this determiner. These examples are obviously very different from anaphoric ellipsis because they are not anaphoric. The second group contains superlatives and ordinals:

(109) He made many mistakes, but his biggest [= his biggest mistake] was to emigrate.

(110) That was my first point, and my second [= my second point] is similar.

Omitting the common noun is both easy and common after these adjectives, and may well be an example of anaphoric ellipsis. This possibility is supported by the fact that, as with generic ellipsis, these adjectives seem to have a direct dependency link to the determiner (compare **a biggest mistake* and the special meaning of *every second mile*), so it is easy to argue that the noun depends on the adjective (Hudson 1990:310): so in *his biggest mistake*, *biggest* depends on *his* and *mistake* depends on *biggest*. The first two groups, then, are irrelevant to the question of whether heads can be omitted by anaphoric ellipsis.

It is only the third group that challenges my assumption that they cannot. This group contains the cases of genuine head-noun ellipsis after ordinary adjectives.

(111) Lucy likes big dogs but I prefer small [= small dogs].

This ellipsis is quite restricted, and the restrictions look rather different from those that we find in genuine anaphoric ellipsis after verbs and prepositions (and, arguably, determiners). There are at least three special restrictions on this head-noun ellipsis:

A. Not all adjectives allow it, and those that do seem to be definable in semantic terms. It is possible after modifiers denoting colour, provenance, composition or physical properties such as age and size (Huddleston and Pullum 2002:417). For example, Huddleston and Pullum contrast semantically simple adjectives like *small* with more complex ones such as *aggressive*, which do not allow head-noun ellipsis:

(112) *Lucy likes friendly dogs but I prefer aggressive [= aggressive dogs].

These restrictions are quite unlike any that apply to anaphoric ellipsis, where the restrictions tend not to be semantically motivated but lexical and arbitrary, as illustrated by examples (100) and (101).

B. The modifier whose head noun is elided is normally paired with a contrasting modifier in the earlier NP; so in (111) *small* contrasts with *big* in *big dogs*. All the examples quoted by Huddleston and Pullum are like this, and concocted examples are clearly ungrammatical even when they are pragmatically plausible.

(113) *Lucy likes dogs in general but I only like small [= small dogs].

In contrast, there is no such restriction on anaphoric ellipsis, illustrated by (114) and (115).

(114) He opened the box and put the note inside [= inside it].

(115) He turned on the television and watched [= watched it] for a few minutes.

These examples do not contrast *inside* or *watched* with some other word.

C. Anaphoric ellipsis may be cataphoric (i.e. it may refer forward to a later 'antecedent', so strictly speaking the term 'anaphoric ellipsis' is too limiting), but this is not possible for head-noun ellipsis.

(116) If you look inside [= inside it], you'll find that any book has an ISBN.

(117) *If you like small [= small cats], then you probably won't like big cats.

Admittedly these examples are different in another way as well, because the cataphora in (116) involves identity of reference in contrast with the identity-of-sense cataphora in (117). However, identity-of-sense cataphora is also possible after determiners:

(118) If you have any [= any sugar], I'd like some sugar please.

In short, ellipsis after a determiner patterns with the anaphoric ellipsis after a verb or preposition rather than with head-noun ellipsis.

What emerges from this discussion of head-noun ellipsis is that this kind of ellipsis is in fact significantly different from the ellipsis that we find not only after verbs and prepositions, but also after determiners. Head-noun ellipsis is therefore not a counter-example to the generalisation that anaphoric ellipsis always involves dependents. Given this generalisation, and the observation that the N after D is subject to anaphoric ellipsis, it follows that N must depend on D.

4. A compromise: Mutual dependency

In Section 2 we saw conclusive evidence that D must depend on N but Section 3 contained equally conclusive evidence in favour of N depending on D. The obvious conclusion is that each depends on the other.

Mutual dependency may seem an unattractive solution for theoretical reasons, but in fact there are strong precedents for it in other areas of grammar (Hudson 1990: 119). For example, take an embedded question such as (119).

(119) I wonder what happened.

What is the structure of the clause *what happened*? Two facts show that *happened* depends on *what*. Firstly, *wonder* requires a 'question-word' as its complement, and this requirement is clearly satisfied by *what* rather than by *happened*; and secondly, *what* can occur without *happened*, but not vice versa:

(120) Something terrible has happened, but I don't know what.

(121) *I don't know what is going to happen, but I do know happened already.

But at the same time there is equally strong evidence that *what* depends on *happened*. Since *happened* is a finite verb, it must have a subject, which is clearly *what*; but a verb's subject is one of its dependents, so *what* must depend on

happened. The structure of (119) is shown in Figure 6. In this figure, one of the dependencies is drawn below the words in order keep the main dependency structure 'regular' — i.e. free of tangles and other conflicts. The only general restriction that WG imposes on dependency structures is that every sentence should have a conflict-free structure, even if it also has other dependencies which produce conflicts. This restriction has variously been called the Adjacency Principle (Hudson 1984: 98, Hudson 1990: 114), the No-tangling Principle (Hudson 1998: 20, Hudson 2000b) and Order concord[14].

The important point to notice in this diagram is that the clause actually has only one head, if by 'head' we mean the word which carries the clause's external relations. This must be *what*, and not *happened*, because it is only *what* that is relevant to *wonder*. On the other hand, it can be argued (Hudson 2003b; Hudson 1999) that in other cases it is the verb that heads the clause, because only this allows an adjunct to appear before the wh-word as in (122) and (123).

(122) Yesterday what happened?

(123) After the party, why don't we go for a drink?

If *what* and *yesterday* both depend on *happened*, either can precede the other; but if *happened* depends on *what*, its own dependents such as *yesterday* should not be able to stand before *what*. The structure for (122) should therefore be as in Figure 7.

This discussion of the very simple clause *what happened* has shown that each word depends on the other, but that this does not mean that the clause has two heads[15]. Instead, I am suggesting that **either** word may be the head — in other words, we must choose between the two candidates. In some constructions only one choice is grammatical — so after *wonder* it must be *what* and with front-shifted *yesterday* it must be *happened*. Since these constructions are independent of each other, we may expect problems when we try to combine them, and the result is indeed ungrammatical:

(124) *I wonder yesterday what happened.

This is ungrammatical because *wonder* and *yesterday* make conflicting demands.

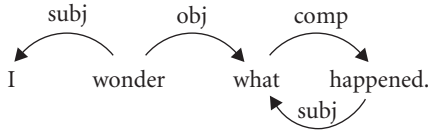

Figure 6.

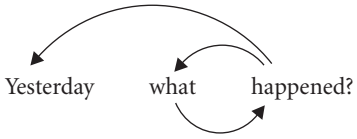

Figure 7.

If *happened* is the head, then *what* cannot be, and vice versa. If *happened* is the head, then *yesterday* can be front-shifted, but *wonder* rules this out by demanding a wh-word as its complement, not a finite verb. On the other hand, if *what* is the head this demand is satisfied but *yesterday* cannot be front-shifted without producing a conflict (crossing arrows) in the dependency structure. The two possible structures are shown in Figure 8, with circles showing the offending arrows.

Returning to D and N, this discussion of mutual dependency in subordinate clauses provides the basis for a solution of the apparent impasse. Since we have seen that D and N depend on each other, either of them can be the head of the NP, and the choice can be left to the surrounding construction. Our arguments for dependency focussed on just two constructions where the external relations were conclusive: NPs used as adjuncts, and NPs (in other languages) used as complement of a preposition. Since these constructions are mutually exclusive, no problem will arise if N is the head in the former and D is the head in the latter. So although D and N are always mutually dependent, *morning* is the head of *this morning* in (125) but *le* (the) is the head of *le village* in (126).

(125) I saw him this morning.

(126) Marie vient de le [= du] village. 'Mary comes from the village.'

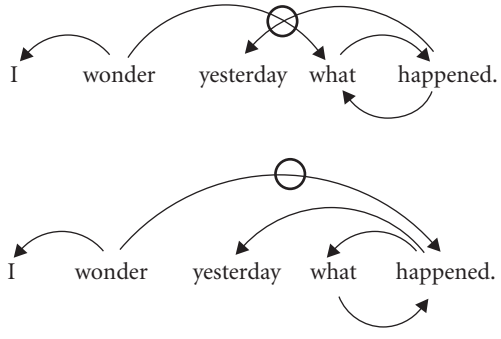

Figure 8.

The structures for these examples are shown in Figure 9.

This solution does seem to resolve most of the disagreement between Van Langendonck and myself in a theoretically satisfying way, but it involves a more complex structure for the NP than has generally been considered until now, with multiple dependencies where we have hitherto only seen single dependencies. In the next section I shall show that the same is true of other parts of NP structure.

5. Other multiple dependencies in the NP

D and N are not the only parts of NP structure where dependency is problematic. The same is true of all the following examples, which we shall discuss below.

(127) John's hat

(128) a dozen oranges

(129) this colour tie

(130) a sort of tie

5.1 Possessives

Section 2.2 showed that possessives like *John's hat* are semantically similar to dependents such as the Dutch and German inflected genitive, and the English preposition *of*. Moreover, the idiom PULL X'S LEG shows that *John's* and *of John* are equivalent even in syntax.

What we need, therefore, is an analysis of *John's hat* which shows its similarities to *the hat of John* and, if possible, to Dutch and German examples like (26) and (28) (*Moeders jurk, Karls Freund*). How exactly does this work in

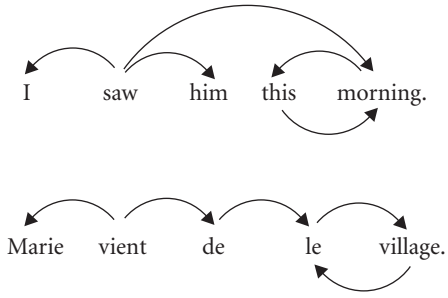

Figure 9.

English, where _'s is clearly a separate word rather than an inflection?

I assume that _'s is a determiner (Hudson 1990; Hudson 2000a; Hudson 2000b; Hudson 2000c; Camdzic and Hudson 2002; Hudson 2003a: 276; Hudson 2003b), so it and the following common noun must be mutually dependent. Furthermore, as I pointed out in Section 2.3, the preceding noun also depends on _'s as a special 'pre-complement'. The dependency structure for an example like *John's hat* is already quite rich, but none of the dependencies show the similarities between the possessor noun in this construction and in the other constructions listed earlier. This is easily remedied[16] by an extra dependency, labelled 'poss' (for 'possessor'[17]), from *hat* to *John*, which can be inserted automatically as part of the possessive determiner's stored construction. Figure 10 shows this pattern, together with the corresponding Dutch/German patterns where 'possessor' may combine with the 'det' dependency. The figure also shows the structure for *the hat of John*, where it will be seen that *of* is the poss; this apparently misguided analysis actually makes sense if we bear in mind that *of* is co-referential with *John*, so in this phrase, *of* actually means 'John'. This is the normal situation for 'empty' or 'grammatical' prepositions (Hudson 1990: 235), so it is correct to see the preposition as a kind of functional substitute for its noun complement.

This analysis applies to possessives marked by _'s, but it extends easily to possessive pronouns such as *my*. At first sight *my/mine* looks very different from *John's*, but their syntactic and semantic similarities call for a unified analysis which explains not only why *my* is like *John's*, but also why *me's* is not possible although other pronouns such as *everyone* can combine with _'s. One attractive analysis invokes the notion of 'fusion' which we applied to merged preposition + article sequences in Section 3.1, and which has played an important part in WG theory since its first introduction by Rosta (Rosta 1997). In this analysis, *my* is not a (syntactic) word but a (morphological) word-form, and corresponds in syntax to two separate words, *me's*. This analysis explains why *me* appears not to combine with _'s, and it also gives a syntactic analysis which corresponds

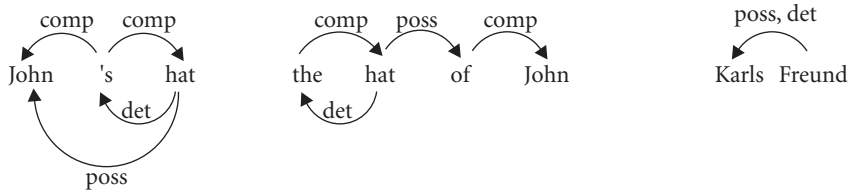

Figure 10.

much more closely to the semantics than a single-word analysis would. For one thing, *me* refers to the speaker, whereas the determiner _'s refers to whatever the possessed object happens to be; so in *my hat*, the underlying _'s refers, just as in *John's hat*, to the hat. In contrast, the single-word analysis is problematic in that the one word *my* has two referents at the same time. Another semantic advantage of the two-word fusion analysis is that the head of the NP is _'s, not *me*, which explains why *my* is treated semantically just like *John's* in terms of binding:

(131) John's mother congratulated herself/him/*himself.

(132) My mother congratulated herself/me/*myself.

John can be coreferential with *him* because they are not co-dependents of the same word — *John* depends on _'s and on *mother*, but not on *congratulated*, which is the word that *him* depends on. Conversely, coreference with *himself* is not possible because *himself* will only take a co-dependent as antecedent such as _'s (or *mother*) in (131). Exactly the same argument explains the pattern in (132) provided that we analyse *my* for syntactic purposes as *me's*.

5.2 Determined numerals such as *a dozen*

Examples like *a dozen oranges*, where a numeral is 'determined' (i.e. has a determiner), present two challenges. First, there is the mismatch between the (apparent) singularity of *a dozen* and the plurality of *oranges* (and the whole phrase). This is easy to explain if *oranges* is the head of the NP, and this is indeed a plausible analysis in this case (though less so where *dozen* is followed by *of*, as in *dozens of oranges*).

The second challenge is much more interesting. It seems that *a* belongs, as det, to *oranges* as well as to *dozen*, because when there is a determiner that belongs to *oranges*, *a* disappears. In some cases the disappearance of *a* is unproblematic, for example:

(133) I bought the dozen oranges that we needed.

This is easy to explain if *a* and *the* alternate as det of *dozen*, and this is clearly the case for the next example, taken from the internet (via Google).

(134) … so from a schedule point of view, **that dozen units** of "real progress" that you made counts as a single unit of "schedule progress".

The only explanation for the choice of *that* rather than *those* is a det link to the singular noun *dozen*.

However, it is equally clear in the next example that the determiner *these* belongs to *oranges* as well as to *dozen*:

(135) Secondly, let me suggest what **these dozen outcasts** will do; get dirty!

(Google produced far more examples of this pattern than of *that dozen*). In the phrase *these dozen outcasts*, *these* must be the det of *outcasts*, because only this will explain its plurality. However it must also be the det of *dozen*, because this is a singular countable common noun and must have some kind of det; moreover, the single-determiner constraint means that *these* cannot combine with the usual det *a*.

(136) *I bought dozen oranges.

(137) *I bought these a dozen oranges.

How then should we analyse examples like *these dozen outcasts* in (135)? We have seen evidence that *these* is det for both *dozen* and *outcasts*, so presumably the normal mutual dependence of D and N applies here too and both *dozen* and *outcasts* depend on *these*. It is unclear whether there is also a dependency between *dozen* and *outcasts*, so for simplicity I shall disregard this possibility. Nevertheless, the overall structure is quite complex, as shown in Figure 11[18].

The demonstratives are not the only determiners that can occur in this pattern. The same may be true of almost any of them:

(138) Which dozen outcasts are you talking about?

(139) My hundred best tunes.

(140) Any thousand pounds unaccounted for is a thousand pounds lost.

5.3 Determined modifiers

The next problem arises because a noun may modify another noun (as in *party tie*) but may also have a determiner of its own. The example quoted in (129) was *this colour tie*, which is found on the internet in examples like the following:

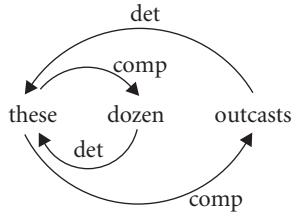

Figure 11.

(141) And the government has no more right to tell us when we can go to the bathroom, or tell me when I can wear **this color tie**, than it does to tell me how much suffering I have to undergo before I die.

Once again we find a single determiner, *this*, which seems to be linked by the det function to two different nouns. It certainly belongs semantically to *color*, because the whole NP means 'tie of this colour'; and internet examples like the following suggest a purely syntactic link as well:

(142) I have tried looking on the net but seem to be unable to come across anyone who carries **this size shoes**.

In *this size shoes*, the only reason for the choice of *this* rather than *these* is the singular noun *size*. In contrast, the next example shows the choice of *these*, suggesting that in this construction either agreement may be possible:

(143) Can **these size shoes** be bought in China?

In all these examples the determiner belongs at least semantically to the modifying noun, but in some cases it also belongs to it syntactically.

Returning to our first example, *this colour tie*, it is equally clear that the determiner belongs syntactically to the second noun, *tie*, because this is a singular countable common noun so it has a det which must be filled. Once again, then, we find a structure (shown in Figure 12) like the one for determined numerals in which the determiner is det for two different nouns at the same time.

Moreover, like the determined numerals, determined modifiers allow a wide and possibly unrestricted range of modifiers (*which colour tie, any colour tie*, etc.). The main difference between the two constructions is in their meaning: with modifiers, it is much clearer that the determiner belongs semantically to the non-head noun.

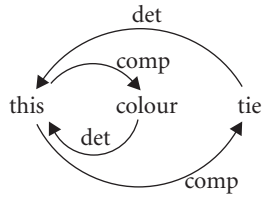

Figure 12.

5.4 The *these kind of dogs* construction

The last special pattern that I shall consider is found in examples like (130), *a sort of tie*. As in the previous patterns there is a single determiner (*a*) which is det for two separate nouns (for reasons that we shall see below), but in this case we have the further complication of the preposition *of*. The name '*these kind of dogs* construction' indicates that agreement is at least as free as for determined modifiers (Huddleston and Pullum 2002: 352). The following examples illustrate the range of possibilities found on the internet:

(144) The research group examines how work communities can be helped to meet collaboratively **this kind of challenges**.

(145) What initiatives exists today that try to tackle **these kind of challenges**?

This uncertainty in agreement is exactly what we might expect if the determiner belongs to both of the conflicting nouns, so we can assume the same double-det analysis as in the previous constructions. This analysis is confirmed by the fact that in singular examples such as *this kind of challenge* or *this sort of tie*, both the common nouns are singular and countable so they both need a det.

What about the preposition *of*? Semantically, *a sort of* modifies *tie*, so we might expect it to depend on *tie*; but *of* seems to reverse this dependency by taking *tie* as its complement. We might try to escape this conclusion by treating *sort of* as a single indivisible (and possibly unclassifiable) word, and this analysis may be correct in some contexts — for example, when *sort of* modifies a verb:

(146) He just sort of fell down.

However this analysis will not do when it modifies a noun because it does not explain the agreement conflict in (144), where *kind* is clearly a singular noun. If the supposed single word *kind-of* is a common noun, why can't it be used on its own, as in *I found a kind of*? Nor does this explanation apply easily to the word *type*, which can be used in the same way within NP but cannot modify verbs. Assuming, then, that *sort of* is a genuine example of the noun *sort* followed by the preposition *of*, it is reasonable to assume the usual dependency structure that we find in straightforward examples like *book of jokes*. Figure 13 shows how this can be integrated with the other dependencies in this complicated construction.

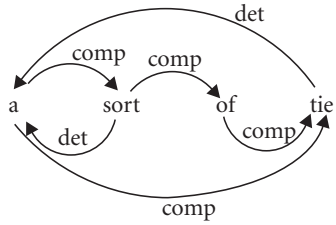

Figure 13.

6. Conclusion

The main conclusion is that Van Langendonck was right: D does depend on N. Fortunately the converse is also true, so D and N depend on each other. This means that either of them could be the head of the NP, and indeed we found evidence that in some cases the head is N while in others it is D.

This conclusion supports the WG claim that mutual dependency is possible — a claim which has so far been supported in only one or two other areas of grammar, so confirmation is welcome. Mutual dependency is a fundamental challenge to most syntactic theories, because most theories exclude it as a matter of principle. This is true not only of more conservative versions of dependency grammar, but also of X-bar theory where dependency corresponds to domination so mutual dependency is impossible.

The discussion in the last section showed the need for a number of other kinds of complication in NP structure including multiple dependency (where one word depends on several other words) and loops (the indirect mutual dependency found in *a sort of tie*, where *tie* depends on *of* which ultimately depends on *tie*). However, these complications can be accommodated into syntactic theory without leading to a total free-for-all in which anything goes and we have to abandon hope of finding any constraints on possible grammatical structures. First, every dependency has to be sanctioned by some stored pattern in the grammar, and indeed every dependency that we have considered is easily sanctioned by a very local construction pattern. Even the *these-kind-of-dogs* construction has no link which extends over more than three other links. And second, every structure has to obey the Adjacency Principle (and its later manifestations) by having a structure which allows the tangle-free set of arrows that are drawn above the words in WG diagrams. This is true of all the structures that we have considered; indeed, the more complex the dependencies, the easier it is to satisfy this requirement. The existence of mutual dependencies,

multiple dependencies and loops therefore confirms the need for a theory with the flexibility offered by WG, and gives strong support to the WG claim that sentence structure, just like the whole of language structure, is a network (Hudson 1984: 1; Hudson 2000c; Hudson forthc).

Notes

1. I acknowledge very helpful comments on an earlier draft from an anonymous referee and also from Tim Osborne, And Rosta and Mariangela Spinillo.

2. Implicit in the argument will be the assumption that the phrase is a noun phrase even if its head is D, because D is a kind of N; more precisely, determiners are pronouns that take common nouns as their complement, and pronouns are a kind of noun. The details of this argument are not at issue here, and are laid out in Hudson (1990: 268–276). I discuss them briefly in Section 1.

3. The most general published discussion is still Hudson (1990), but the ideas there have since been modified and developed in a number of published articles such as Hudson (2000a) and Hudson (2003a). The WG website at www.phon.ucl.ac.uk/home/dick/wg.htm has links to other materials, including a recently updated 'Encyclopedia of English grammar and Word Grammar' and an introduction to WG for postgraduate students.

4. Notice that these rules do not say, or even imply, that every pronoun behaves like a determiner. Clearly, if a noun needs a pronoun, it needs one whose valency makes it compatible with a noun.

5. Unfortunately the relative-clause facts undermine WG analyses of *that* clauses, where I claimed that the word *that* was in fact a relative pronoun rather than a mere subordinator or 'complementiser' (as in *I know that he left*). The fact is that **the manner that he did it* is just as bad as **the manner he did it*, in contrast with *the way (that) he did it*. If *that* was a relative pronoun, it (rather than the antecedent noun) would be the adjunct of *did*, so the difference between *way* and *manner* should be irrelevant.

6. The N-head analysis is not completely without problems. One, which And Rosta has pointed out, involves the relative order of D and pre-modifiers of N. Normally, complements stand nearer to the head word than adjuncts do, so it is odd that D, a complement of N, has to stand further from N than a modifying adjective (as in *one fine day*). This is a serious problem, but it may be legitimate to question the generality of the adjunct-complement order; for example, a verb's subject, which is like a complement in this respect, may be separated from the verb by various kinds of adjuncts such as *never*.

7. In the WG analysis, the possessive marker *_'s* is a separate word, rather than an inflection. There is a great deal of well-known evidence in favour of this analysis (which I summarise in Hudson 1995). However this does not mean that *_'s* is an ordinary word; on the contrary, it is clearly a clitic, a syntactic word which is realised morphologically as a mere affix (Hudson 2001).

8. This generalisation has established exceptions, of course. For example, certain preposition + N combinations have no D even though the N is countable — *on foot, by car, in bed*. The existence of limited exceptions like this does not invalidate the generalisation.

9. The dependency det and the word-class determiner are the exact equivalents of the function 'determiner' and the word-class 'determinative' in Huddleston and Pullum (2002:354). In both analyses, the strict distinction between function and word-class allows desirable flexibility such as the option of treating genitive nouns as det, without having to classify them as (in my terminology) determiners.

10. It was And Rosta who drew my attention to the relevance of extraposition.

11. I have not mentioned a number of other arguments that point in the same direction because these are less overwhelming. For example, Van Langendonck claims that question-words are always dependents, and argues from this that D must depend on D because a question-word can be D (e.g. *which book*) but not N. Although this is generally true, there are phrases in which a question-word seems to be head (e.g. *which of them, where(abouts) in London, how on earth*) so the test is inconclusive.

12. I owe the Welsh data to Bob Morris Jones, who tells me that fusion applies mainly after locative prepositions and in northern dialects; and the Gaelic data to Tom Pullman.

13. On this question I received help from a number of colleagues, especially Mark Jones, Karen Corrigan, Joan Beal, Maggie Tallerman and Judith Broadbent. For more details on the reduction of *the* (but not of *to*) and an extensive bibliography, see Jones (2002).

14. Order concord is the term (and concept) used in the Encyclopedia of English Grammar and Word Grammar at www.phon.ucl.ac.uk/home/dick/enc-gen.htm.

15. According to Osborne (2003), Eroms (2000) suggests that both D and N are equal-status heads; I have unfortunately not been able to consult this work, but I assume that Eroms agrees that D and N are mutually dependent. However as I shall explain below, my analysis is different from Eroms's in that I recognise only one of them as the head of the NP.

16. The referee wondered whether it might be possible to take *of* as the head of *(the) hat of John*, producing an exact structural parallel to *John's hat*. Unfortunately, this analysis would generate a host of unwanted consequences, not least being the fact that the phrase would count as a PP rather than an NP.

17. Like all other labels, this is arbitrary and ultimately redundant, so its well-known inadequacies do not matter; for example, we can call *John* the 'possessor' of *failure* in *John's failure* even though failure is not the kind of thing that anyone can possess.

18. As And Rosta has pointed out to me, it is possible that the structure of *these dozen outcasts* is even more complicated than Figure 11, with *outcasts* depending as complement on *dozen* in the same way that *outcasts* would depend on *two* in *two outcasts*. More seriously, it is unclear exactly why *outcasts* cannot precede *dozen*, as in **these outcasts dozen*.

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