Syntactic Atomicity


Journal of Comparative Germanic Linguistics **6**: 93–128, 2002.

Syntactic Atomicity*

PETER ACKEMA[1] and AD NEELEMAN[2]
[1] *University of Nijmegen, Dutch Department, P.O. Box 9103, 6500 HD Nijmegen, The Netherlands;* [2] *Department of Phonetics and Linguistics, University College London, Gower Street, London WC1E 6BK, UK*

1. Lexical integrity

There are several phenomena suggesting that as far as the syntax is concerned complex words could as well have no internal structure. Thus, words are said to be syntactic atoms: the syntax has access to the properties of complete words but not to those of their individual parts. The three main phenomena in question are the following. First, parts of words are claimed not to undergo syntactic projection, with the consequence that at least nonlexicalized phrases cannot be embedded in words (Bresnan and Mchombo 1995, Jackendoff 1997). Second, parts of words seem not to be possible links in chains, ruling out movement into and out of words (Chomsky 1970, Di Sciullo and Williams 1987, Bresnan and Mchombo 1995). Third, words are said to be anaphoric islands: parts of words cannot be referential, with the consequence that binding or coreference cannot relate them to material external to the word (Postal 1969, Di Sciullo and Williams 1987). Other phenomena that have been argued to show the syntactic atomicity of words are the apparent absence of word-internal conjunction and gapping (Bresnan and Mchombo 1995).

Observations of this type are often seen as following from a condition as in (1).

(1) Lexical Integrity Principle
The internal structure of words is not accessible to the syntax.

Of course, the empirical scope of the Lexical Integrity Principle depends on the definition of 'word' adopted as relevant for it. For example, inflection is sometimes seen as the spell-out of syntactic features, not involving morphological structure (Anderson 1982, 1992). If so, it is not subject to (1).

* We would like to thank Jonathan Bobaljik and Marcel den Dikken for very useful comment on an earlier version of this introduction.

A principle like (1) seems to have a natural place in models of grammar that separate phrase formation and word formation. Strictly speaking, separation of morphology and syntax does not as such entail (1), but if word formation were syntactic, a principle like (1) is unexpected in the first place. Some authors are more ambitious in that they wish to derive (1) from the architecture of the grammar. Di Sciullo and Williams (1987, p. 54), for example, suggests that syntax is about word-less sentence forms and therefore by its very nature can have nothing to say about the internal structure of words. As they note, this comes close to a model of S-structure insertion, according to which words, whether complex or simplex, are inserted into syntactic terminals after all syntactic operations have applied (Den Besten 1976).

Thus, on these views lexical integrity is not a principle in itself but a necessary consequence of the architecture of grammar. There is also a non-architectural way of deriving effects of (1). It could be that independently motivated conditions on movement, binding, and projection are sufficient to rule out parts of words entering into any of these relations. For example, the theory of syntactic locality could be such that words are barriers and therefore disallow movement chains connecting their parts to word-external positions (Lieber 1992).

In sum, we can distinguish three types of approach to the phenomenon of lexical integrity. It can be regarded as an axiom, it can be derived from the architecture of the grammar, or it can be an epiphenomenon, caused by independent conditions on movement, binding, etc. Needless to say, which approach is correct is largely an empirical issue, as it depends on the extent to which the predictions made by (1) are borne out. This is the issue we will address in this introduction. However, first we will consider the notion of 'word' that is relevant for (1).

2. The notion of 'word'

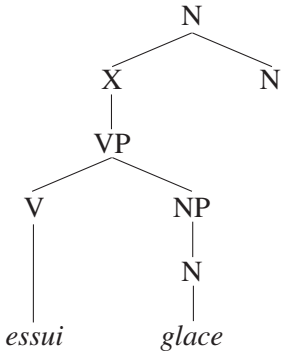
The definition of word is discussed in great detail by Di Sciullo and Williams (1987). They show that one traditional notion of word, namely that of lexical item, cannot be equated to the set of objects of which lexical integrity holds (see also Hoekstra, this volume). There are two observations supporting this conclusion. There is no need to store semantically transparent complex words in the lexicon, but such words nevertheless behave like syntactic atoms. Conversely, the lexicon contains syntactic idioms whose internal structure must be accessible to syntactic analysis (given that some idioms allow syntactic operations like passive).

Di Sciullo and Williams' alternative has already been mentioned: the definition of word relevant to lexical integrity is that of morphological object. There are two distinct rule systems, syntax and morphology, such that the output of the latter can be inserted in the former. However, since syntax deals with sentence forms, the internal structure of morphological objects is invisible to it. This position may seem to be in danger of circularity since one reason for saying that some object is morphological may be its syntactic opacity. In the majority of cases no circularity arises, however, because lexical integrity correlates with other properties typical of morphological objects. For example, the headedness of those objects of which lexical integrity holds can be systematically different from the headedness of those objects of which it does not hold (compare the general left-headedness of English syntax with the general right-headedness of its morphology).

There are complications, however. Di Sciullo and Williams mention the case of apparently nominalized VPs in French, such as *essui-glace* 'wipe window'. The internal structure of such nominalizations seems to be syntactic, while they are nonetheless subject to lexical integrity: no syntactic rule can insert or move a category in the structure. Di Sciullo and Williams (p. 82) assume "a nonmorphological word-creating rule of the periphery of the grammar" in order to accommodate examples of this type. This then necessitates a reconceptualization of syntactic atoms as anything that can be inserted in an X^0 position.

An alternative would be to say that not only may morphological objects function as syntactic atoms, but the reverse is possible as well. If there is no intrinsic ordering of the two rule systems, it is possible that a syntactic object such as a VP is used as a morphological atom, inserted in a morphological terminal. The word it occurs in can in turn be inserted in syntax. On this view, *essui-glace* could be a case of morphological zero derivation of a syntactic object (compare Lieber 1992):

(2)



If so, one can maintain that lexical integrity holds of morphological objects.

This general view is incompatible with the widely adopted idea that (some instances of) word formation is a result of syntactic head-to-head movement. This was argued by Baker (1988) to be the correct analysis for complex words in incorporating languages and subsequently by others for many or even all morphological processes. Strictly speaking, there can be no lexical integrity principle in a theory of this type since this principle precludes syntactic word formation in the first place. It is possible, however, to formulate constraints on complex X^0 categories, no matter how they are derived, that have the effect of at least partial opacity. Baker, for example, proposes a module of grammar that filters out an X^0 that dominates a trace. Surprisingly, perhaps, this view resembles the alternative ultimately adopted by Di Sciullo and Williams, namely that the objects that lexical integrity holds of are X^0 categories (see above). But Baker's view crucially differs from that of Di Sciullo and Williams in being incompatible with any categorical statement of syntactic atomicity of morphological objects.

Baker's view of word formation has been incorporated into Halle and Marantz's (1993) model of Distributed Morphology. Like Baker, Halle and Marantz assume that complex words are assembled through syntactic head-to-head movement. However, the output of this operation is fed into a morphological module that regulates the realization of X^0 categories by manipulation of features and rules that spell out combinations of features. Thus it is possible in Distributed Morphology to speak of morphological objects. Since the relevant notion of morphological object is postsyntactic, it follows that the syntax does not have access to it. However, since the internal structure of morphological objects is derived in syntax in the first instance, the effects of (1) do not fall out from this model. Just as in Baker's model, there can be no principle that renders complex X^0 categories syntactically opaque (although the model would allow the same type of filters that Baker assumes).

Note that the two main ideas of Distributed Morphology are mutually independent. The idea that there is a distinction between the morpho-syntactic feature structure of words and its phonological realization as stems and affixes is compatible with syntactic word formation as well as word formation in a separate morphological component. This implies that the idea that lexical integrity derives from the existence of a separate structure-building component for words can be combined with a model of grammar based on a strict separation of morphosyntax and morphophonology.

We will now discuss the main predictions that a principle of lexical integrity as in (1) makes and the extent to which these are borne out by the data.

3. Phrases embedded in words

It is often suggested that it follows from the hypothesis that the internal structure of words is not accessible to syntax that words cannot contain constituents generated by that component. (This conclusion is based on the implicit assumption that insertion of complete syntactic phrases as atoms in morphological terminals, as described in section 2, is impossible). So, Lexical Integrity predicts that phrases cannot occur internally to words. Indeed, structures of this type have been claimed to be ungrammatical by Roeper and Siegel 1978, Baker 1988, Anderson 1992, Bresnan and Mchombo 1995, Jackendoff 1997, and others. Relevant examples are given below:

(3) a.*[[girl with brown hair] y]
b.*[[drive a truck] er]
c.*a [[the boss] hat]
d.*[[cut into pieces] able]

On the other hand, there seem to be many counterexamples. As far as Germanic goes, the left-hand part of nominal compounds in particular can be phrasal (Botha 1981, Lieber 1983):

(4) a. [[white water] rafting]
b. [[white van] man]
c. [[red letter] day]
d. [[lost luggage] department]

Examples of phrasal compounding are often reconciled with Lexical Integrity by saying that they only involve phrases listed in the lexicon.[1] If such phrases no longer have internal syntactic structure, it would follow that they can occur internally to words. There are two problems with such a view.

The most obvious one is one of undergeneration: phrases which do not

[1] An alternative is to deny the phrasal status of the constituents involved. Thus, the examples in (4) could be analyzed as [[A N] N] compounds. As we proceed, it will become clear that this approach is untenable because of the elaborate syntactic structure that some of the involved phrases have. (5a), for example, involves *WH* movement and *do* support.

seem to be listed also frequently appear in compounds. For example, it seems unlikely that any of the phrases in (5) (from Bauer 1983, p. 164) is listed, as they are syntacticaly and semantically completely regular. In general, Bauer notes that 'examples of root compounds formed on phrasal bases abound' (see also Carroll 1979).

(5) a. [[what do you think?] movement]
b. [[don't tell me what to do] look]
c. A blended historical-political [[only 90 miles from our shores] approach] to language
d. Mr. [[Purple People] Eater]

The second problem is one of overgeneration. If listed phrases do not have internal structure they should be possible bases of all kinds of word formation. In other words, examples of the type in (3) should improve if the embedded syntactic material is a listed phrase. They do not, however.

(6) a.*[[girl next door] y]
b.*[[jump the gun] er]
c.*a [[the life of the party] hat]
d.*[[cut short] able]

The claim that phrases cannot be embedded in words seems untenable then. There is a possible weaker position that may be used to save this aspect of the Lexical Integrity Principle. On the basis of the data discussed above, one could argue that phrases can occur in compounds but not in derivations. If it is further assumed that compounding is a syntactic, rather than a morphological process, (1) can be upheld.

There are some complications for this view as well. First, many languages have derivational affixes that productively attach to phrases. An example from English is the suffix *-ish*. Bauer (p. 70) gives the following example:

(7) I feel particularly [[sit around and do nothing] ish] today

The same pattern is found with Dutch *-achtig* '-like':

(8) een [[dames met schoothondjes] achtig] publiek
*a ladies with lap-dog-*DIM*-s like audience*
a kind of audience that contains many ladies that own small lap-dogs

Second, some bracketing paradoxes seem to be analyzed most straightforwardly as involving syntactic affixation. Although this claim is far from

undisputed, the fact that the examples in (9) have the meaning they do follows from the indicated structure. (For discussion, see Sproat 1985, Pesetsky 1985, Ackema and Neeleman 2002a. For accounts of such cases that circumvent the need for phrasal affixation, see Williams 1981 and Spencer 1988.)

(9) a. a [[classical guitar] ist]
b. a [[generative grammar] ian]

Third, quotations frequently occur as the basis for morphological derivation. Some Dutch examples are given below:

(10) a. een [[ban de bom] er]
a ban the bomb er

someone who adheres to the "ban the bomb" slogan

b. dat voortdurende [ge [waarom moet dat nou?]] van
that continuous GE why must that now of
hem
him

his continuous asking why that is necessary

Wiese (1996) in fact argues that all phrases embedded in words are quotes and that this is what reconciles them with lexical integrity. Some of the examples given above do not seem compatible with such a view. It is unlikely that the phrases in (5d), (7), and (8) are used as quotes.

Given the number of counterexamples, it seems impossible to maintain that there is a general ban on phrases occurring in words. So, in this instance a principle of lexical integrity as formulated in (1) seems to make the wrong predictions. In that case, of course, it is not immediately obvious how ungrammatical phrasal derivations and compounds differ from grammatical examples. For proposals on how to exclude some of the impossible cases, see Hoeksema (1988) and Ackema and Neeleman (2002a).

4. Movement and word formation

The Lexical Integrity Principle predicts that parts of word cannot be links in a syntactic movement chain. This implies that movement is ruled out in three cases. First, a part of a word cannot be moved out of that word. Second, movement internally to words is impossible (assuming movement is a syntactic operation). Third, complex words cannot be derived by

movement of one morpheme to another morpheme. We will discuss these predictions in turn.

4.1. *Movement out of words*

At first sight, it seems evident that movement out of words is impossible. For instance, the left-hand part of a compound cannot undergo topicalization or *WH*-movement. The Dutch examples in (11) illustrate this.

(11) a. Dit is een [pruimen boom]
this is a plum tree

b.*Wat is dit een [t boom]?
what is this a tree

c* Pruimen is dit een [t boom]!
plum is this a tree

Although these data are as predicted by (1), one may wonder whether the Lexical Integrity Principle is necessary to account for them. It could be that syntactic conditions on chain formation independently rule out the movements in (11b,c). For these particular cases this is not implausible: *pruimen* is a head, but the position it moves to, spec-CP, exclusively hosts phrases. If the antecedent is a phrase, whereas the trace is a head, this would violate Chain Uniformity (Chomsky 1995a). Notice that this line of argumentation depends on the assumption that the properties of phrases are systematically different from those of heads, in agreement with X-bar theory (Chomsky 1970) but as opposed to Bare Phrase Structure theory (Chomsky 1995b). Alternatively, one could assume a fundamental distinction between morphological and syntactic constituents, to which Chain Uniformity could be sensitive, but again this requires exactly the type of distinction between these components that Lexical Integrity is based on.

Chain Uniformity is not sufficient anyway to rule out all potential cases of movement out of words. It allows a head to be moved to a head position, and hence the nominal left-hand part of a compound could move to D in languages that have N-to-D movement:

(12) $[_{DP}\ [_{D}\ N]\ [_{NP}\ \ldots\ [_{N}\ t_{N}\ N]\ \ldots]]$

Structures of this type do not seem to be attested, however. Norwegian, for example, arguably has N-to-D movement, as the data in (13) (from Taraldsen 1990) show. However, such movement cannot target the left-hand part of a compound, witness (14).

(13) a. [$_{NP}$ hans [$_{N'}$ bøker om syntaks]]
his books about syntax

b. [$_{DP}$ [bøke]$_i$-ne [$_{NP}$ hans [$_{N'}$ t$_i$ om syntaks]]
books-the his about syntax

(14) a. [$_{NP}$ hans [syntaks bøker]]
his syntax books

b. [$_{DP}$ [syntaks bøke]$_i$-ne [$_{NP}$ hans t$_i$]]
syntax books-the his

c.*[$_{DP}$ [syntaks]$_i$-ne [$_{NP}$ hans [t$_i$ bøke]]]
syntax-the his books

One could argue that the ungrammaticality of (14c) (and perhaps of the earlier examples as well) is due to another syntactic condition, namely the Head Movement Constraint (Travis 1984). This condition says that head movement chains cannot skip head positions. In the case at hand, the head of the word, *bøke*, is a head that c-commands the trace of *syntaks* and is c-commanded by this moved noun.

Nevertheless, the Head Movement Constraint (or Relativized Minimality in general) is not sufficient either to block movement out of words. In the previous section we established that, contra the principle in (1), phrases can be embedded as the left-hand part of a nominal compound. The head movement constraint does not forbid moving an XP across a head. All the same, cases like (11b,c) do not improve if the moved left-hand part of the word is an NP rather than a noun:

(15) a. Leo is een [[oude munten] verzamelaar]
Leo is an old coins collector

b.*Wat is Leo een [t verzamelaar]?
what is Leo a collector

c.*Oude munten is Leo een [t verzamelaar]!
Old coins is Leo a collector

It is hard to think of an independently motivated syntactic principle that rules out examples like (15b,c). These data seem to require either a treatment in terms of a Lexical Integrity Principle or an architectural derivation of its effects (see Ackema and Neeleman 2002b for a suggestion).

Another potential case of movement out of a word that is not excluded by the Head Movement Constraint is excorporation of the head of a word. After all, a head cannot intervene in its own movement. However, in

Norwegian, it is impossible to move the head of a nominal compound to D:

(16) *$[_{DP}$ $[bøke]_i$-ne $[_{NP}$ hans [syntaks t_i]]]
books-the his syntax

Still, a case for excorporation of the head of the word might be based on the behavior of so-called separable compound verbs, as they occur in Dutch and German for example. As their name suggests, these share some properties with compounds and would hence seem to classify as words. For instance, the particle and the verb must be adjacent in embedded clauses whereas word order is otherwise quite free in the Dutch and German *Mittelfeld* (see (17a)). Another traditional argument for the wordhood of particle verbs is that they are input to derivational morphology (see (17b); note that this argument needs to be reassessed in light of data like those mentioned in the previous section).

(17) a. dat Isaac zijn tante gisteren op belde
that Isaac his aunt yesterday up rang
that Isaac phoned his aunt yesterday

a′.*dat Isaac zijn tante op gisteren belde

b. af-leid-baar, onder-duik-er, op-stel-ing
off-lead-able, under-dive-er, on-put-ing
derivable, person in hiding, line up

Nevertheless, in main clauses the verbal part of the particle-verb combination moves to C, stranding the particle, as in (18a). Similarly, verb and particle are optionally separated by the process that forms verb clusters in some sentences involving infinitival complementation, as in (18b).

(18) a. Isaac belde gisteren zijn tante op
Isaac rang yesterday his aunt up

a′.*Isaac opbelde gisteren zijn tante

b. Ik geloof dat Isaac almaar zijn tante op wil
I believe that Isaac constantly his aunt up wants
bellen
ring
I think that Isaac constantly wants to phone his aunt'

b′. Ik geloof dat Isaac almaar zijn tante wil
I believe that Isaac constantly his aunt wants
opbellen
ring

If these data show that excorporation of the head of a word is possible, it is curious that it appears to be an isolated case. The contrast with the Norwegian N-to-D facts would be rather unexpected; in general, we do not know of other cases in which such excorporation is allowed. Moreover, there is an alternative interpretation of the data in (17)–(18), namely that particle-verb combinations are complex predicates that have both a morphological and a syntactic incarnation (Groos 1989, Ackema and Neeleman 2001). We cannot discuss this in detail here, but there is direct evidence from Swedish for the co-existence of a morphological and a syntactic realization of particle-verb combinations. Swedish syntax is generally left-headed while Swedish morphology adheres to the Righthand Head Rule. This means that, if the particle and the verb are combined in syntax, the particle should follow the verb while the reverse order should obtain if particle and verb are combined in morphology. Indeed, both possibilities are attested. In particular, when the particle-verb combination is input to derivational morphology, it shows up with the order expected under a morphological realization. If not, it shows up with the order expected under a syntactic realization.[2]

(19)	up-stig-ning	‘ascent’ (of an aeroplane)
	bort-transporter-ing	‘sending away’
	av-trubb-ning	‘blunting’
	ut-hyra-re	‘letter’
	vilse-gång-en	‘lost’
(20)	stiga upp	‘rise’
	transportera bort	‘transport away’
	trubba av	‘blunt’
	hyra ut	‘hire out’
	gå vilse	‘get lost’

In conclusion, there do not seem to be convincing cases of movement out of a word. This is in line with the principle in (1).

---

[2] This is a slight idealization: the morphological order in fact also occurs in participles, and it can occur in isolation when the combination of particle and verb has an unpredictable semantics or belongs to a particular formal register; see Ackema and Neeleman (2001) for some discussion.

4.2. *Movement internally to words*

The question whether movement internally to words would violate Lexical Integrity or not is more complicated than the issue discussed in section 4.1. The point is that the principle in (1) as such does not make any predictions as to whether this possibility can exist. This depends on whether or not the morphological module allows movement on a par with the syntactic module. Only if movement is an exclusively syntactic process should it be impossible internally to words. The situation, therefore, is as follows. If one finds movement internally to words, this does not provide an argument for or against (1). However, if one does not find it, this can be taken to support two conclusions: movement is a process that is specifically syntactic; and (1), or a derivation of it, holds.

It seems relatively uncontroversial to assume that, as far as overt movement is concerned, this does not occur internally to words (although it does occur internally to phrases embedded in words). In general, morpheme order is very rigid, and the kind of word order alternations usually accounted for in terms of movement do not occur in morphology.[3] Thus, we do not know of a morphological equivalent to *WH*-movement, raising, verb-second, topicalization, or movement for focus. One way of understanding these observation is to say that movement targets specifiers of functional heads and that words do not contain the relevant functional projections. If so, no argument for or against lexical integrity can be based on the absence of movement in words (although the account does of course beg the question why there are no equivalent morphological positions).

However, certain syntactic movements have been argued not to target a particular functional head position but rather a position characterized in different terms. Consider focus movement. In a language like Hungarian, focussed elements occur in a fixed position in the left periphery of the clause, arguably as a result of movement (cf. Horvath 1994, Kiss 1987). This appears to be related to the fact that this particular position is the position where main stress is placed by the Hungarian nuclear stress rule (see Szendrői 2001 and references mentioned there; Szendrői explicitly argues against a syntactic Focus Projection in Hungarian). An example is given in (21).

---

[3] The 'mobile' affixes of Afar and Huave as discussed in Fulmer (1991) and Noyer (1994), respectively, do not seem to require an analysis in terms of movement.

(21) a. Körbe járta a házat a fiú.
around walked-3sg/DEF the house-ACC the boy
The boy walked around the house.

b. A HÁZAT járta körbe a fiú.
the house-ACC walked-3sg/DEF around the boy
It was the house that the boy walked around.

In compounds, as in sentences, stress is leftmost in Hungarian. Hence, we might expect that if a morpheme is focussed, it is moved to the left periphery of the word. This is impossible, however. Consider (22).

(22) bor pince vagy sör pince
wine cellar or beer cellar

Hungarian compounds are right-headed. Thus, *bor pince* is a type of cellar rather than a type of wine, also when *bor* 'wine' is contrastively focussed. If there were movement to the stress position in words, as there is in sentences, we might expect it to be possible for the left-peripheral contrastively focussed element to be the head of the compound, moved to the left across the non-head. For the particular case of (22), that would deliver an interpretation such that *bor/sör pince* refers to a type of wine/beer. Such an interpretation is unavailable for (22), however.

There is also very little evidence for covert word-internal movement. In syntax the scope ambiguity between an indefinite and the negation in a case like (23) can perhaps be understood in terms of Quantifier Raising.

(23) John hasn't received a book he ordered yet.
reading 1: It is not the case that John has received any book he ordered yet.
reading 2: There is a book that John ordered and that he has not received yet.

In contrast, morphemes in words do not display scope ambiguities of this type. Consider the following Inuit data (from Bittner 1995). Here the antipassive affix is an indefinite argument (optionally doubled by an oblique NP 'a book' in syntax, which is usually analyzed as occupying an adjunct position; see Jelinek 1984, Baker 1996 for discussion of the syntax of polysynthetic languages). The scope relations between this argument and the negative affix are determined by their morphological c-command relation: if the antipassive affix is attached above negation, it takes scope over negation (as in (24a)) and vice versa (as in (24b)).

(24) (Last year Jaaku ordered five books. Yesterday, when I talked to his mother . . .)

a. suli atuakka-mik ataatsi-mik tassumunnga
yet *book-INST* *one-INST* *him-DAT*

tigu-sima-nngi-nira-i-vuq
get-PERF-NEG-say-APM-3SG

she said there is one book which he did not get yet

b. suli atuakka-mik ataatsi-mik tigu-si-sima-nngi-nirar-paa
yet *book-INST* *one-INST* *get-APM-PERF-NEG-say-3SG.3SG*

she said he did not get a single book yet

Crucially, (24b) cannot be interpreted with the indefinite taking scope over negation, suggesting that there is no Quantifier Raising internally to words. This conclusion holds even if it is assumed that both negation and the indefinite are systematically doubled in syntax (in many case as a zero element). Suppose, as before, that scope is encoded by c-command relations in both syntax and morphology. Suppose furthermore that if morphology and syntax specify conflicting scopal relations, the sentence is uninterpretable. The data in (24) then still show that Quantifier Raising is not available in morphology. If it were, the absent reading of (24b) could be derived by applying Quantifier Raising to the indefinite in both syntax and morphology.

There is one proposal that relies on LF raising in words, namely Pesetsky's (1985) analysis of bracketing paradoxes. Pesetsky argues that the two conflicting structures that seem to be necessary for a word like *unhappier* are present at different levels of representation and related by covert raising of an affix. In particular, the structure that satisfies the phonologcial requirement that *-er* be attached to a short adjective is present at surface structure while the structure that reflects the semantics of the word (where *-er* takes scope over *un-*) is derived at LF by raising of the comparative morpheme:

(25) a. [un [[happy] er]]
b. [[un [[happy] t_{er}]] er]

Although an ingenious solution, it has been pointed out by Hoeksema (1987), Di Sciullo and Williams (1987), and others that the properties Pesetsky has to ascribe to the movement in (25b) to prevent overgeneration are radically different from the properties of Quantifier Raising (or other types of movement) in syntax, which would make it a unique case.

In view of the fact that various other approaches to bracketing paradoxes exist (Kiparsky 1983, Sproat 1985, Spencer 1988, Den Dikken (this volume)), we conclude that the case for word-internal movement is unconvincing.

As noted, this means either that (1) must be assumed as a principle or that this particular effect should follow from the architecture of grammar or from independent principles restricting movement.

4.3. *Word formation through movement*

A final instance of movement that is incompatible with the lexical integrity principle in (1) is movement into a word. Therefore, lexical integrity is incompatible with word formation through syntactic head-to-head movement. Nevertheless, this type of movement has played an important role in syntactic theorizing. In this section we will consider three types of word formation for which a syntactic movement analysis has been proposed, involving compound structures, inflection, and derivation respectively.

4.3.1. *Incorporation*

Incorporation is the formation of a complex head by syntactic adjunction of one head to another. Baker (1988) proposed that incorporation plays an important role in processes of grammatical function changing. As a case in point, let us consider noun incorporation, which occurs in a variety of languages, many of them polysynthetic. The process is illustrated by the pair of Onondaga sentences in (26) (from Woodbury 1975).

(26) a. Pet wa?-ha-hwist-ahtu-?t-a?
Pat PAST-3MS-*money-lost*-CAUS-ASP

Pat lost money.

b. Pet wa?-ha-htu-?t-a? ne? o-hwist-a?
Pat PAST-3MS/3N-*lost*-CAUS-ASP *the* PRE-*money*-SUF

Pat lost the money.

In (26b), the verb takes a syntactic direct object. In (26a) the element that is associated with the internal role of the verb appears as an incorporated noun; no syntactic object is present in this case. Baker accounts for the relation between (26a) and (26b) by assuming that the underlying structure of (26a) is like that of (26b) and that the head of the direct object NP adjoins to the verb:

(27) $[_{VP}\ [_{V}\ \text{lost}]\ [_{NP}\ \text{money}]] \rightarrow [_{VP}\ [_{V}\ \text{money}_i\ [_{V}\ \text{lost}]]\ [_{NP}\ [_{N}\ t_i]]]]$

The question with respect to (1) is not whether syntactic head-to-head movement exists but whether the result of this process can be a morphological object. It appears plausible that head-to-head movement is involved in deriving syntactic complexes (clitic clusters, verb clusters in the Germanic OV-languages), but these do not behave like words in a number of respects (see below).

Noun incorporation structures, however, do involve what appear to be complex morphological objects, given that incorporated nouns can occur internally to inflectional affixes (see (26a)). Baker's motivation for analyzing the alternation in (26) in terms of head movement is based on three arguments. First, he assumes the Uniformity of Theta Assignment Hypothesis (UTAH), according to which identical thematic relationships between items are represented by identical structural relationships between those items at the level of D-structure. Given that the thematic relationship between the verb and the incorporated noun in (26b) is the same as that between the verb and the syntactic object in (26a), the incorporated noun must start out as (part of) such an object in order for this relationship to be established.

Second, it seems as if the movement of the noun can leave behind other material belonging to the hypothesized syntactic object. Such apparent stranding is attested in, for example, Southern Tiwa, as the pair of sentences in (28) shows (from Allen et al. 1984).

(28) a. Yede seuan-ide a-mũ-ban
that man-SUF 2SS-see-PAST
You saw that man.

b. Yede a-seuan-mũ-ban
that 2SS:A-man-see-PAST

The determiner *yede* occurs without an overt head noun in the object DP in (28b), which is accounted for by assuming this noun has moved to the verb.

Third, certain restrictions on noun incorporation can be reduced to independently motivated restrictions on movement if the process is analyzed as head-to-head movement. In particular, incorporated nouns can be related to stranded material in direct object position only, not to material in any other syntactic position (cf. Gerdts 1998 and references cited there). The reason is that only direct objects are transparent for extraction and c-commanded by the verb; subjects and adjuncts are islands, indirect objects are not c-commanded by the verb, and complements of prepositions are

not governed by the verb because there is a minimality barrier in the form of the preposition.

These arguments are not entirely conclusive. The motivation usually given for a principle like UTAH is that it results in a more restrictive theory of syntax than principles that allow a looser relation between syntactic and thematic structures. This argument is problematic: in any modular theory the overall restrictiveness of the grammar is what is relevant, not that of individual components or individual mapping principles between two components. Whereas UTAH makes the mapping between thematic structure and syntax simpler, it leads to complications within syntax proper. Any two structures that are thematic paraphrases must have a common underlying source and be related by movement. This may require qualitative extensions of the theories of movement and phrase structure. Examples of pairs that are thematic paraphrases but for which it is not unproblematic to assume they are related by movement include the following: middles and their active counterparts (cf. Fagan 1988, Ackema and Schoorlemmer 1995), double object constructions and dative shift constructions (cf. Jackendoff 1990b), denominal verbs like *shelve* and verbs taking a nominal complement (cf. Jackendoff 1997), morphological causatives and their periphrastic counterparts (cf. Fodor 1970), structures with and without object scrambling (cf. Neeleman 1994 and Williams 2002), and English synthetic compounds like *truckdriver* and their syntactic counterparts *drive trucks* and *driver of trucks* (cf. Lieber 1983, Ackema and Neeleman 2001). We do not imply that it is clear on the basis of examples like this that UTAH must be rejected – but it is not a priori clear that it leads to a less complicated (more restrictive) grammar.

The stranding argument is undermined by data from Mithun (1984), as argued by Rosen (1989). The point is that empty-headed NPs occur freely in the relevant languages whether or not there is noun incorporation. Conversely, noun incorporation does not depend on the presence of an empty-headed NP. A direct object NP with a lexicalized head may occur in combination with an incorporated noun. In other words, the correlation that seems to follow from the assumption that Baker makes does not hold. Again, this does not settle the issue since, as Baker shows, further assumptions may reconcile the data with the movement theory. However, the force the argument has in its most straightforward form is lost.

Finally, the locality argument is not without its complications either. If there is no stranded material, an incorporated noun, although typically a Patient, can have a variety of other semantic roles not usually associated with direct object functions, like Instruments and Locations. It is even possible to incorporate an adjunct, but since adjuncts are islands, this

cannot be the result of syntactic movement. This is pointed out by Spencer (1995), who provides the following example from Chukchi:

(29) Mən-nəki-ure-qepl-uwicwen-mək
1PL.IMPER-night-long-ball-play-1PL
Let's play ball for a long time at night.

Note that there are two incorporated nouns, which makes it clear that one of them (presumably 'night') cannot possibly be the verb's first complement here. It does seem to be the case that empty-headed NPs can be referentially related to an incorporated noun only if they are in direct object position; the same is in fact true of full syntactic doubles (with a lexical head) of the incorporated noun. This generalization, however, can also be made to follow from independently motivated restrictions on thematic role assignment in analyses not assuming head movement (see Ackema 1999 for an account).

A general problem for deriving compounds by syntactic movement is that the distinction between compounds and syntactic complex predicates is blurred. Head movement may well create complex heads in syntax, but if anything like (1) is correct, these will display behavior different from complex morphological objects. Indeed, there seem to be two different types of complex X^0 categories, which is unexpected if they are uniformly derived by movement.

There are various phenomena that would seem to show a distinction between syntactic and morphological complex heads. Plausible candidates for syntactic complex heads are verb clusters in Dutch and other Germanic OV languages (see (30a)), particle-verb and resultative-verb combinations (see (30b,b′)), and verb-clitic combinations in Romance (see (30c)). It would take us too far afield to argue here that these structures are indeed complex syntactic heads, but for relevant discussion, see Evers (1975, 2001), Bierwisch (1990) and Van Riemsdijk (1998) (for verb clusters), Johnson (1991), Neeleman and Weerman (1993), and Ackema and Neeleman (2001) (for particles and resultatives), and Rizzi (1978), Borer (1984), and Jaeggli (1986) (for clitics).

(30) a. dat Cecilia de kraanvogels [$_V$ kan [$_V$ zien vliegen]]
that Cecilia the cranes can see fly
'that Cecilia can see the cranes fly'

b. dat Jan zijn moeder elke zondag [$_V$ op belt]
that John his mother every Sunday up calls
that John calls his mother every Sunday

b′. dat Jan de deur [$_V$ groen verft]
that John the door green paints

c. Il [$_V$ me [$_V$ les a]] donné
he me them has given
He has given them to me.

These complexes differ in various ways from complex morphological objects. We will discuss two differences here.

First, the regularities with respect to headedness that can be observed in complex words in a particular language do not extend to complex syntactic heads and vice versa. For example, Dutch morphology is right-headed whereas at least verb clusters, as in (30a), need not be. For particle verbs it can be argued that the position of the particle with respect to the verb is determined by the syntactic parameter dealing with the position of the head in VPs. Thus, in an OV language like Dutch, particle-verb constructions are right-headed. In VO-languages like English and Swedish, on the other hand, the verb precedes the particle (whereas English and Swedish morphology complies with the right-hand head rule). Finally, in languages in which objects can either precede or follow the verb, such as Middle Dutch (Gerritsen 1984, Weerman 1987), the same seems to be true of particles. Some examples are given in (31) (from Neeleman and Weerman 1992).

(31) a. dat wi hem gheestelic sellen [$_V$ na$_P$ volgen$_V$]
that we him spiritually will after follow
that we will follow him spiritually

b. Men ginc gene pesen [$_V$ trecken$_V$ in$_P$]
one went those ropes pull in
One began to pull in those ropes.

The headedness of Romance clitic-verb combinations, too, deviates from the headedness of complex words. Romance compounds are typically left-headed (see Selkirk 1982, Scalise 1984) whereas derivations are typically right-headed. In contrast, the position of the head in Italian verb-clitic combinations, for example, is dependent on an altogether different factor: they are usually right-headed when the verb is finite and left-headed when the verb does not carry tense or agreement:

(32) a. [$_V$ li$_D$ amo$_V$]
(I) them love

b. [$_V$ amar$_V$ li$_D$]
to.love them

This sort of alternation in the position of the head is alien to morphology.

Second, there is a restriction on syntactically complex X^0s that function as complex predicates, namely that their head may not itself be complex.[4] Thus, a particle-verb or resultative-verb combination cannot be headed by a complex predicate:

(33) a. dat Jan en Piet [samen werken]
that John and Pete together work
that John and Pete cooperate

b. dat Jan en Piet zich [kapot werken]
that John and Pete themselves to-pieces work
that John and Pete work themselves to death

c.*dat Jan en Piet zich [kapot
that John and Pete themselves to-pieces
[samen werken]]
together-work

(34) a. dat Jan en Piet het voorstel [uit werken]
that John and Pete the proposal out-work
that John and Pete develop the proposal

b.*dat Jan en Piet het voorstel [uit [samen werken]]
that John and Pete the proposal out-together-work

In contrast, complex verbs that are uncontroversially morphological may head a complex predicate. This holds for verbs derived by compounding, prefixation and suffixation:

(35) a. dat Jan [stijl danst]
that John style dances
that John is a ballroom dancer

---

[4] Romance verb-clitic combinations, though syntactic, do not involve complex predicate formation and hence are not subject to this complexity constraint.

a′. dat Jan zich [suf [stijl danst]]
that John himself drowsy style dances

b. dat Jan de foto's [ver groot]
that John the pictures en larges

b′. dat Jan de foto's [uit [ver groot]]
that John the pictures out en larges
that John completely enlarges the picture

c. dat Jan het gedicht [analyse eert]
that John the poem analysis izes
that John analyses the poem

c′. dat Jan het gedicht [stuk [analyse eert]]
that John the poem to-pieces analysis izes

The co-existence of syntactically and morphologically complex heads poses a challenge to the idea that the latter, like the former, should be derived by syntactic movement (contra (1)). We know of one account that derives the co-existence of morphological and syntactic complex X^0s while maintaining that both are derived by head-to-head movement. Rizzi and Roberts (1989) argue that head-to-head movement gives rise to a morphological complex in case the higher head selects for an incorporated element. If there is no selectional relation, we are dealing with a syntactic complex. In Roberts (1991), this difference is expressed structurally: heads that select for an incorporated element are X^{-1}s, which project an empty slot into which a head must move through substitution. Head-to-head movement that results in syntactic complexes is adjunction to X^0, rather than substitution.

In effect, this theory does assume a distinct morphological component, though as part of the syntax (compare Baker 1988, see section 2). In Roberts' proposal, the set of complex heads subject to the principles of morphology is defined as those in which the head selects the non-head. Moreover, these morphological objects are opaque to further syntactic operations. Roberts' theory therefore is in fact in agreement with (1), apart from the assumption that the non-head in a word is linked to a trace (see also Borer 1998 for discussion). However, it tries to derive some of the effects of (1), instead of assuming it as a principle of grammar.

4.3.2. *Inflection and syntactic affixation*

The question whether words can be formed by syntactic incorporation seems especially difficult to answer for the case of inflection. Ever since

Chomsky's (1957) analysis of *do*-support in English, the assumption that there is a distinct syntactic position for at least finite verbal inflection is widely accepted. If so, the morphological object that is an inflected verb must be derived by syntactic means, like movement of the affix to the verb or vice versa (Affix Hopping and V-to-I, respectively). In tandem with analyses of this type, it is frequently claimed that the notion of word as it pertains to (1) does not include inflected forms. This is known as the Weak Lexicalist Hypothesis (compare, for instance, Chomsky 1970), to be contrasted with the Strong Lexicalist Hypothesis that excludes syntactic formation of both inflected and derived words (see Lapointe 1980, Lieber 1980).

Empirically, the issue is not easily decided. At first sight, there is support for a movement analysis in the form of massive stranding of material in the VP when V-to-I occurs. Recall that this is exactly the kind of evidence that is used by Baker (1988) to motivate a head-movement analysis of noun incorporation:

(36) a. $[_{IP}$ Nous $[_{I}$ -ons] $[_{VP}$ souvent $[_{VP}$ fume une pipe]]] →
b. $[_{IP}$ Nous $[_{I}$ fumei $[_{I}$ -ons]] $[_{VP}$ souvent $[_{VP}$ t_i une pipe]]]

This presupposes, however, that the inflection is the head of the word it occurs in. A morphological analysis can handle these data by assuming the opposite, namely that inflection is not the head of a word (or at best a relativized head, in the sense of Di Sciullo and Williams 1987). If the verb is the head, it goes without syaing that its argument structure will be inherited by the morphological complex and that adverbs that modify the verb can also do so when it is inflected. More specifically, the stranding data in French fall out even if inflection is base-generated on the verb as long as it is assumed that the verb moves to some higher head position. That it only does so when it carries finite inflection may well be due to the features the inflection contributes, but this does not mean that these features must be generated in the higher head position.

The movement analysis seems to suffer from the opposite problem: when the verb does not visibly move to a higher position, it can still be inflected. More specifically, it has been argued that main verbs in English do not raise to I (Chomsky 1957, Emonds 1978, Pollock 1989). Nevertheless, they can of course be combined with finite inflection in the absence of auxiliaries:

(37) a. $[_{IP}$ Maigret $[_{I}$ -s] $[_{VP}$ often $[_{VP}$ smoke a pipe]]] →
b. $[_{IP}$ Maigret $[_{I}$] $[_{VP}$ often $[_{VP}$ smokes a pipe]]]

Various ways to reconcile this piece of data with the syntactic account of

inflection have been proposed. The oldest is the rule of Affix Hopping (Chomsky 1957), which is a transformation that in effect lowers the inflectional element onto the verb. Since work on possible transformations has led to the conclusion that lowering rules presumably are universally impossible, this analysis is no longer available.

One conclusion that can be drawn from this is that the actual combination of verb and inflectional affix is not achieved by movement in syntax after all. Indeed, Chomsky (1995a) proposes that inflectional affixes are attached to the verb in morphology. However, the features connected to such affixes must be 'checked' against identical features in an independent syntactic head position, the I position in structures like (36)–(37). This is done by overt movement of the inflected verb to I in French and by covert movement (or whatever replaces it) in English.

Although this solution would appear to be strongly lexicalist at first sight, it is actually not clear that it is compatible with (1). In particular, it is often assumed that there is a relation between the order in which different inflectional features are checked and the order in which the affixes carrying them are attached to the verb. When the verb moves up through the syntactic tree, features introduced by affixes closer to the verb stem are checked before features introduced by affixes in a more peripheral position. The effect is that the order of inflectional heads in the syntactic tree mirrors the order of the inflectional affixes on the verb. If this assumption is correct, the syntactic checking mechanism must have access to the internal structure of words – precisely the thing (1) says should be impossible. An alternative that seems to avoid this conclusion would be to assume there is a layered feature structure on the top node of the word (see also Den Dikken, this volume). This would imply that the syntax does not need to access the internal structure of words. However, since the layered feature structure must be related to the word's internal structure in a predictable manner for this to work properly, it is unclear to what extent it differs empirically from a theory that allows the checking mechanism to access this internal structure directly.

The motivation given for the special relation between the order of functional heads in syntax and the order of affixes in morphology is that it complies with Baker's (1985) Mirror Principle. Baker's evidence for this principle is based on what he terms grammatical function-changing processes. These are processes that change the syntactic valency of a verb and that often have a morphological reflex on the verb. Examples are passivization, applicativization, and causativization. Baker carefully shows that, when these process interact, their order of application is often reflected by the order of the affixes on the verb: a process that is expressed

by an affix closer to the verb stem is applied before a process that is expressed by more peripheral affix. Given that the Mirror Principle is in general well motivated, it does seem that checking approaches to inflectional morphology are not easily reconcilable with (1).[5]

Notice that the existence of Mirror Principle effects as such need not contradict (1). It does so under the syntactic conception of inflection, but the Mirror Principle is compatible with the morphological approach to inflection as well, at least under the assumption that inflected words have internal structure (contra Anderson 1982, Beard 1995, and others). The scopal relations of these affixes are the result, in that case, of their c-command relations internal to the word (see Grimshaw 1986, Alsina 1999, and Rice 2000 for more discussion).

The third way in which the fact that inflected verbs need not move in English can be reconciled with the idea that inflection heads its own projection makes use of the idea that the overt form inflectional affixes take need not directly reflect their syntactic position. If syntax does not contain any phonological information, and overt forms are connected to syntactic terminals by a set of spell-out principles, it is possible that mismatches arise in the number and position of the syntactic terminals and the number and position of the overt morphemes corresponding to these positions.[6] (Such a strict separation of morphosyntax and morphophonology has been a recurrent theme in morphological theorizing, see Pranka 1983, Sproat 1985, Halle and Marantz 1993 amongst others). The English data can then be handled by assuming that the spell-out principle allow for two distinct terminal nodes to be realized as one inflected form under certain circumstances. More in particular, V and I can be 'merged' in this way when adjacent where intervening adverbs must somehow not disrupt this adjacency (see Bobaljik 1995, 2002 for discussion).

The distinction between languages like French and English with respect to having overt movement of the inflected verb or not ((36) versus (37)) leads to another potential problem for (1). This is because the movement seems to be connected to the richness of the inflectional morphology in the language: if a language has rich agreement, then it also has overt V-to-I whereas languages with poor agreement tend not have this

---

[5] However, it is not clear whether saying that the Mirror Principle applies to the order of tense and agreement heads really has empirical content because agreement is semantically vacuous and hence does not take scope (see also Borer 1998 and Rice 2000).

[6] Such a view would appear to be necessary anyway to deal with the fact that inflection in the majority of languages does not take the form of distinct morphemes that correspond in one-to-one fashion with the different inflectional features (see Joseph and Smirniotopoulos 1993, Aronoff 1994, and Stump 1998 for discussion).

movement (Kosmeijer 1986, Platzack and Holmberg 1989, Roberts 1993). Rohrbacher (1999) assumes that there is a strict two-way correlation and provides the following analysis. Inflectional affixes that are part of a rich paradigm are generated in a syntactic I position and trigger movement as a result of the Stray Affix Filter. In contrast, affixes that are part of a weak paradigm are generated as part of the verb directly and hence do not trigger movement. Since verbs with rich inflection must be derived via syntactic movement, this goes against a strong interpretation of (1).

An alternative analysis is possible. One could argue that inflected verbs carry more or fewer inflectional features and that only verbs that carry a set of fully specified features (i.e., verbs that are not underspecified for person, number, or tense) have a property which makes V-to-I necessary. We cannot go into the issue of what kind of property this might be, but analyses of this type have been worked out; see for instance Koeneman (2000).

Another matter is to what extent there really is a strict correlation between V-to-I and rich agreement. In his contribution, Bobaljik argues that although rich agreement implies V-to-I, this movement is not necessarily accompanied by rich agreement. His account of this is based on the assumption, mentioned above, that the inflectional features that are present in the morphosyntactic structure are dissociated from the overt affixes that realize these features. As a consequence, features can be present which are not spelled out, but it is of course impossible to spell out a feature that is not present. In Bobaljik's account the features are represented by syntactic heads, which means that his analysis presupposes that (1) is incorrect, at least with respect to inflection. The alternative morphological analysis just sketched above can account for the one-way correlation in the same way, that is, by assuming separationism. However, Bobaljik relates the occurrence of more versus fewer syntactic heads not only with V-to-I and possible rich inflection but also with the grammaticality of transitive expletive constructions and the option of object shift. The morphological alternative would have to capture these correlations in a different way.

4.3.3. *Derivation and syntactic affixation*

At first sight, an analysis of derivational affixation in terms of syntactic head-to-head movement faces the problem that the basic type of evidence for incorporation analyses in general seems to be absent. Usually, there can be no stranded material in the syntactic phrases that the incorporated stem supposedly heads in the underlying structure, as the following examples indicate:

(38) a.*[parent$_i$ hood] [(of) [a [responsible [t_i [from Glasgow]]]]]
b.*[dance$_i$ er] [slowly [t_i [across the lawn]]]
c.*[wash$_i$ able] [carefully [t_i [by dipping repeatedly in hot water]]
d.*[en slave$_i$] [an [unhappy t_i [to the king]]]

Nevertheless, stranding seems to be better in certain cases of derivation. In particular, Fu, Roeper and Borer (2001) argue that it can be observed in English deverbal process nominalizations. The argument is based on contrasts in acceptability of the material that can accompany a derived process nominal and a simplex noun:

(39) a. *[Kim's version of the event thoroughly] was a big help
a′.?[Kim's explanation of the event thoroughly] was a big help
b. *[Kim's accident suddenly] disqualified her
b′.?[The occurrence of the accident suddenly] disqualified her

On the other hand, we may note that, in turn, (39a′,b′) are much worse than examples with a VP that is the complement of a nominal free morpheme:

(40) a. Kim's idea to explain the event thoroughly was a big mistake
b. Kim's claim that the accident occurred suddenly disqualified her

So, on the one hand the contrast between (39a,b) and (39a′,b′) supports the presence of a VP in process nominals and hence a syntactic derivation of such nominals while on the other hand the contrast between (39a′,b′) and (40) supports the absence of a VP and hence a morphological derivation.

There are two ways to resolve this paradox. On a syntactic account, one would have to develop an explanation of the degraded status of (39a′,b′). For example, one might try to argue that an adverbial must be related to the event role of the verb in order to be interpreted and that this is infelicitous if the event role is not itself bound by tense. (Note that Fu et al. indeed argue that the verbal projection in process nominals does not extend to TP). Alternatively, on a morphological account, one might try to argue that combining a noun with an adverb is marginally acceptable if the nominal head receives the kind of interpretation usually associated with verbs. Some support for this comes from the fact that the phenomenon can in fact also be observed with underived nouns and derived nouns that do not have a verbal base. For example, in (41a) *Nobel prize* is interpreted as 'receiving the Nobel prize', while in (41b) *bankruptcy* is interpreted as 'being declared bankrupt'. The status of such examples is comparable to

the parallel cases in (41a′,b′) which involve derived nominals with a verbal base.

(41) a. ?[The physicist's Nobel prize so clearly undeservedly] surprised the academic world
a′.?[The physicist's promotion so clearly undeservedly] surprised the academic world

b. ?[John's bankruptcy so suddenly] dismayed us
b′.?[John's application for a loan so suddenly] dismayed us

Fu et al. give a second argument for an underlying VP in process nominals, based on *do so* anaphora, which we will not discuss here. It leads to the same kind of arguments about the correctness of (1).

In his contribution, Den Dikken proposes a way of reconciling Lexical Integrity with the assumption that a full VP is present in process nominalizations and certain other derivations. The account is an extension of the checking approach to inflection discussed in the previous section. The complex derived word itself is formed externally to the syntax. However, in order for it to be licensed, the features of the derivational affix must be checked against an appropriate syntactic head position. For example, in the case of a deverbal process nominal, the complex noun, which is assembled in morphology, is inserted as the head of a VP in syntax. Its nominal features are checked by raising it to a functional nominal head that takes VPs as its complement.

Like the checking approach to inflection, this analysis faces an issue related to the Mirror Principle. In the normal case, the order in which features are checked correlates with the order of attachment of the affixes that introduce these features. For example, the functional projection in which the features of *-ity* are checked must dominate the one in which the features of *-able* are checked if a structure headed by *approach-abil-ity* is to be nominal. The reverse is true of structures headed by, for instance, *object-ion-able*. Therefore, the features of the complex word must be structured, and this structure must be accessible to the syntactic checking mechanism. Interestingly, Den Dikken proposes that certain bracketing paradoxes can be dealt with by reversing the usual order of checking (from the outside in, rather than from the inside out). As noted with regard to inflection, if syntax has access to a layered feature bundle, whose layering is in turn determined in a predictable way by the morphological structure of the word, this seems empirically equivalent to the syntax having indirect access to that structure – a situation which the strict lexical integrity principle says should be impossible.

In conclusion, for many cases of derivation there is no particular reason to assume that they are formed by syntactic incorporation, given that the evidence for a syntactic projection that hosts the stem selected by the affix is absent (see (38)). However, there are also derivations that provide a stronger case for syntactic word formation.[7]

5. Anaphoric Islandhood

5.1. *Reference of parts of words*

Another phenomenon that is traditionally ascribed to a principle like (1) is the anaphoric islandhood of words (Postal 1969): parts of words cannot be assigned an independent referent in the domain of discourse. For example, (42) is infelicitous since the lefthand part of the compound must be construed as referring to a particular kitchen, which is impossible.

(42) #I still have to paint the kitchen$_i$ door, but there's no hurry since it$_i$ is in a terrible mess anyway

If reference is determined (at least partially) by the syntax, or by the mapping between syntax and semantics, the impossibility of (42) indeed is an expected effect of (1). It appears reasonable to assume that reference is determined by syntax-semantics mapping principles since, at least in Germanic, a noun can be referential only when combined with a determiner. Bare NPs are not referential but predicative.

However, things are not quite so straightforward. In section 3 it was shown that phrases can occur as the lefthand part of compounds. Hence, we might expect a referential DP to occur in this position as well, contrary to fact. Compounds with a DP as left-hand part are ungrammatical:

(43) *a the-record-of-the-year award, *a the-old-boys network

This seems to be good news for (1). If (1) rules out reference below the word level, then it follows that, even though phrases can occur in compounds, referential DPs cannot.

The problem, however, is that it is not entirely clear what is cause and

---

[7] Another such case might be that of mixed categories, like the English gerund. This structure seems to contain a verbal projection contained in a nominal one. Indeed, classical analyses of the construction assume some sort of syntactic affixation (Jackendoff 1977, Abney 1987). However, there is a multitude of alternative analyses, many of which do not involve syntactic incorporation (Reuland 1988, Pullum 1991, Yoon 1996, Bresnan 1997, Malouf 1998, Lapointe 1999, amongst others). It would take us too far afield to discuss these here.

effect in (43). Hoeksema (1988) argues that there is a general ban on closed class items as the head of the left-hand part of compounds. If correct, the ungrammaticality of (43) is not caused by the referentiality of the relevant DPs but by their being headed by a determiner. Since determiners are necessary to make a phrase referential, the impossibility of having a referential part of a word would be a consequence of having sublexical DPs rather than vice versa.

One way in which a decision between the two approaches could be made is by showing that parts of words can be referential as long as they do not rely on the presence of a determiner to be interpreted in this way. There are three potential examples of this.

First, even in the Germanic languages, there are nouns that have referential force when not combined with a determiner, namely proper names. It seems that these do retain their referentiality when embedded in words. In particular, they can be coreferential with a constituent outside the word, in contrast with regular nouns as in (42). Two examples are given in (44) (see Ward et al. 1991 for more data).

(44) a. Despite being a famous Mozart$_i$ interpreter, Maria did not actually like his$_i$ Coronation Mass
b. Most Mussolini$_i$ admirers failed to realize he$_i$ was mainly interested in power

Di Sciullo and Williams (1987), arguing that the syntactic atomicity of words extends to referentiality, deny the relevance of examples like (44). Their claim is that proper names in words are not, in fact, referential. They cite the example in (45) as evidence.

(45) He is a Nixon-admirer in every sense, except that he does not admire Nixon

However, this argument is not conclusive as there is a syntactic variant of (45) which appears to be equally acceptable:

(46) John is an admirer of Nixon in every sense, except that he does not admire Nixon.

What seems to be going on here is that we can talk about the extent to which John is like an admirer of Nixon (or a Nixon admirer) and in that discussion one can remark that he shares all properties with the average admirer of Nixon except that he does not admire Nixon. This does not imply that Nixon in either example does not refer to Nixon.

The second type of example comes from incorporating languages. These typically lack a determiner system, which implies that bare nouns can be

referential in syntax (see Baker 1996). This possibility carries over to incorporated nouns, which have also been argued to have referential properties not shared by nouns in compounds in the Germanic languages. Ackema (1999) argues that the only property that distinguishes noun incorporation from Germanic-style N-V compounding is the possible referentiality of bare nouns, contra an interpretation of (1) as universally causing words to be referential islands. There are two ways to reconcile these data with this interpretation of (1). Either one can argue that the relevant complexes are derived in syntax and hence accessible to rules assigning reference. This is what Baker (1988, 1996) argues (see section 4.3.1). Alternatively, one could argue that the apparent referentiality of incorporated nouns is not genuine; for relevant discussion see Mithun (1984, 1986), Sadock (1986), and Gerdts (1998).

Hoekstra's contribution introduces a third potential example of sub-word referentiality. Hoekstra discusses the case of genitive compounds in Frisian. These have certain word-like properties, but at the same time their left-hand part must be interpreted as definite/specific. For example Hoekstra notes that in *kokensflier* 'kitchen-S floor' we must be talking about the floor of a particular (contextually salient) kitchen; this expression cannot be used to refer to floors of kitchens in general. At first sight, this appears to be at odds with the referential islandhood of words, hence with (the relevant view of) (1). Hoekstra's analysis can be seen as an attempt to reconcile the Frisian data with a universal ban on referential parts of words. He argues that the genitive compounds are in fact phrases, not morphological objects in the sense that is relevant for (1). Their word-like properties follow from their being lexicalized as a construction. (This may be compared with other 'constructional idiom' type analyses of structures that seem to span the syntax-morphology divide, like Booij's 2002 analysis of particle verbs.)

Although the evidence is hence far from clear, if it is the case that words can under some circumstances contain referential parts, we are led to the conclusion that the ungrammaticality of examples like (43) is due to Hoeksema's ban on closed class items as the head of the left-hand part of a compound. Of course, that in turn raises the question of what causes this ban – if not (1).

5.2. *Binding into words*

In syntax, two constituents can be coreferential not only by accident but also because one constituent binds the other. (That binding and coreference are indeed two fundamentally distinct processes has been shown in

some detail in Reinhart 1983, 1986, amongst others). If binding is, at least partly, a syntactic process, and if (1) holds, it should be impossible to establish a binding relation between a syntactic constituent and a part of a word. Thus, a part of a word should not be able to function as antecedent for a syntactic anaphor, nor should a syntactic constituent be able to function as an antecedent for a sub-word anaphor.

The first of these two predictions is clearly correct:

(47) a.*The Bartók$_i$ interpreter wants himself$_i$ to be played more often
b.*All Haitink$_i$ admirers expected himself$_i$ to show up at the concert

However, as pointed out by Lieber (1992), there is an indepedent explanation for these data in the form of the well-known c-command condition on anaphoric binding. It can be argued that parts of words cannot c-command out of the X^0 domain and hence cannot function as antecedents in binding relations. (This argument is based on a 'first dominating node' definition of c-command; things get more complicated when a 'first dominating category' definition à la May 1985 and Chomsky 1986 is adopted).

The question of whether there are sub-word anaphors that can be bound by syntactic antecedents has been answered in the affirmative.[8] The sublexical anaphor usually mentioned in this connection is *self* in examples like the following (see for instance Sproat 1985 and Lieber 1992):

(48) a. John$_i$ is a self$_i$-admirer
b. [This tape]$_i$ will self$_i$-destruct in fifteen seconds

If anaphoric elements are bound by DPs, the conclusion that there is a relation between a syntactic element and a part of a word is unavoidable. However, quite independently of the issue at hand, it has been argued that anaphors take thematic roles, rather than the DPs to which these roles can be assigned, for antecedents (Williams 1989, Jackendoff 1990a). If correct, an alternative account for data as in (48) suggests itself. In both (48a) and (48b), *self* is attached to a predicative category and hence can

---

[8] In earlier work, we have argued that there is binding in examples like (ia). We now think that this claim was mistaken in view of examples like (ib), which cannot possibly involve binding by an antecedent in the matrix clause. Although there is a sublexical anaphor in (i), it is presumably bound by the implicit subject of *admire*, whichever form this takes.

(i) a. Harry heeft een [[bewondering voor zichzelf] achtig] gevoel
Harry has a admiration-for-himself-like feeling

b. Zo'n [[bewondering voor zichzelf] achtig] gevoel maakt niemand sympathieker
*Such-a admiration-for-himself-like feeling makes noone sympathetic-*COMPAR.

be bound by a θ-role that is available within the morphological representation.Since this θ-role is eventually associated with a DP in the syntactic representation, we get the effect that the interpretation of *self* is related to the interpretation of this DP, but this is not established by a direct relation.

That this may be the correct approach is suggested by the absence of cases in which a morphological anaphor is associated with a DP that is not an argument of the category to which the anaphor attaches. A short survey of English and Dutch dictionaries shows that words starting with *self* or *zelf* 'self' fall into various categories, but in all cases the interpretation of *self* is linked to a θ-role of the predicate to which it is attached. Consider, in this respect, an example like (49).

(49) When he attended group therapy, John usually experienced self-hate

In this example, *self* is necessarily associated with the external argument of *hate*. The argument may be understood as identical to the external argument of *feel* (in which case John felt that he hated himself), but this is not necessary (in which case John may have felt that members of the group hated themselves). What is impossible is for *self* to be associated with John if the external argument of *hate* refers to other people. So, (49) cannot mean that John usually felt that members of the therapy group hated him.

We conclude that, with respect to binding, the predicted effects of (1) are attested: there is no binding into or out of words. As in the other relevant empirical domains, it remains to be seen whether this means that it is necessary to assume something like (1) as a principle of UG or whether its effects can be derived.

6. Summary

In the table below, we summarize our findings concerning whether the effects predicted by (1) are attested or not. By necessity, the table to some extent reflects our own assessment of the data.

Lexical Integrity predicts that . . .	Correct	Incorrect
Phrases cannot be embedded in words		√
Parts of words cannot be moved out of the word	√	
Parts of words cannot be moved internally to the word	√	
Words cannot be formed by head-to-head movement	?	?
Parts of words cannot be referential	√ (?)	
Binding across words boundaries is impossible	√ (?)	

It would appear that (1) makes a number of interesting predictions that are borne out although not all effects that have been said to follow from it hold. There is a challenge, then, to derive the effects of (1) where they are correct while at the same time allowing for the apparent exceptions to it.

References

Abney, Stephen: 1987, *The English Noun Phrase in its Sentential Aspect*, PhD dissertation, MIT.

Ackema, Peter: 1999, *Issues in Morphosyntax*, John Benjamins, Amsterdam.

Ackema, Peter and Ad Neeleman: 2001, 'Competition between Syntax and Morphology', in G. Legendre, J. Grimshaw, and S. Vikner (eds.), *Optimality-Theoretic Syntax*, MIT Press, Cambridge, pp. 29–60.

Ackema, Peter and Ad Neeleman: 2002a, 'Morphological Selection and Representational Modularity', in G. Booij and J. van Marle (eds.), *Yearbook of Morphology 2001*, Kluwer, Dordrecht, pp. 1–51.

Ackema, Peter and Ad Neeleman: 2002b, 'Interfaces in Word Formation', ms., University of Nijmegen and University College, London. To be published by OUP.

Ackema, Peter and Maaike Schoorlemmer: 1995, 'Middles and Nonmovement', *Linguistic Inquiry* **26**, 173–197.

Allen, Bernard, Donna Gardiner, and Donald Frantz: 1984, 'Noun Incorporation in Southern Tiwa', *International Journal of American Linguistics* **50**, 292–311.

Alsina, Alex: 1999, 'Where's the Mirror Principle?', *Linguistic Review* **15**, 1–42.

Anderson, Stephen: 1982, 'Where's Morphology?', *Linguistic Inquiry* **13**, 571–612.

Anderson, Stephen: 1992, *A-Morphous Morphology*, Cambridge University Press, Cambridge.

Aronoff, Mark: 1994, *Morphology by Itself*, MIT Press, Cambridge.

Baker, Mark: 1985, 'The Mirror Principle and Morphosyntactic Explanation', *Linguistic Inquiry* **16**, 373–416.

Baker, Mark: 1988, *Incorporation*, Chicago University Press, Chicago.

Baker, Mark: 1996, *The Polysynthesis Parameter*, Oxford University Press, Oxford.

Bauer, Laurie: 1983, *English Word-Formation*, Cambridge University Press, Cambridge.

Beard, Robert: 1995, *Lexeme-Morpheme Base Morphology*, SUNY Press, Albany.

Bierwisch, Manfred: 1990, 'Verb Cluster Formation as a Morphological Process, in G. Booij and J. van Marle (eds.), *Yearbook of Morphology 1990*, Foris, Dordrecht, pp. 173–199.

Bittner, Maria: 1995, 'Quantification in Eskimo', in E. Bach, E. Jelinek, A. Kratzer, and B. Partee (eds.), *Quantification in Natural Languages*, Kluwer, Dordrecht, pp. 59–80.

Bobaljik, Jonathan: 1995, 'What does Adjacency Do?', *MIT Working Papers in Linguistics* **22**, 1–32.

Bobaljik, Jonathan: 2002, 'A-Chains at the PF Interface', *Natural Language and Linguistic Theory* **20**, 197–267.

Booij, Geert: 2002, 'Separable Complex Verbs in Dutch: A Case of Periphrastic Word Formation. In N. Dehé, R. Jackendoff, A. McIntyre, and S. Urban (eds.), *Verb-Particle Explorations*, Mouton de Gruyter, Berlin. pp. 21–41.

Borer, Hagit: 1984, *Parametric Syntax*, Foris, Dordrecht.

Borer, Hagit: 1998, 'Morphology and Syntax', in A. Spencer and A. Zwicky (eds.), *The Handbook of Morphology*, Blackwell, Oxford, pp. 151–190.

Botha, Rudolf: 1981, 'A Base Rule Theory of Afrikaans Synthetic Compounding', in M. Moortgat, T. Hoekstra, and H. van der Hulst (eds.), *The Scope of Lexical Rules*, Foris, Dordrecht, pp. 1–77.

Bresnan, Joan: 1997, 'Mixed Categories as Head Sharing Constructions', in M. Butt and T. Holloway King (eds.), *Proceedings of the LFG97 Conference*, CSLI Publications, Stanford.

Bresnan, Joan and Sam Mchombo: 1995, 'The Lexical Integrity Principle: Evidence from Bantu', *Natural Language and Linguistic Theory* **13**, 181–254.
Carroll, John: 1979, 'Complex Compounds: Phrasal Embedding in Lexical Structures', *Linguistics* **17**, 863–877.
Chomsky, Noam: 1957, *Syntactic Structures*, Mouton, The Hague.
Chomsky, Noam: 1970, 'Remarks on Nominalization', in R. Jacobs and P. Rosenbaum (eds.), *Readings in Transformational Grammar*, Ginn and Co., Waltham, MA, pp. 184–221.
Chomsky, Noam: 1986, *Barriers*, MIT Press, Cambridge.
Chomsky, Noam: 1995a, *The Minimalist Program*, MIT Press, Cambridge.
Chomsky, Noam: 1995b, 'Bare Phrase Structure', in G. Webelhuth (ed.), *Government and Binding Theory and the Minimalist Program*, Blackwell, Oxford, pp. 385–439.
Den Besten, Hans: 1976, 'Surface Lexicalization and Trace Theory', in H. van Riemsdijk (ed.), *Green Ideas Blown Up*, University of Amsterdam, Amsterdam, pp. 4–28.
Di Sciullo, Anna Maria and Edwin Williams: 1987, *On the Definition of Word*, MIT Press, Cambridge.
Emonds, Joseph: 1978, 'The Verbal Complex V′-V in French', *Linguistic Inquiry* **9**, 49–77.
Evers, Arnold: 1975, *The Transformational Cycle in Dutch and German*, PhD dissertation, Utrecht University.
Evers, Arnold: 2001, 'Verbal Clusters and Cluster Creepers', ms. Utrecht University.
Fagan, Sarah: 1988, 'The English Middle', *Linguistic Inquiry* **19**, 181–203.
Fodor, Jerry: 1970, 'Three Reasons for Not deriving "Kill" from "Cause to Die"', *Linguistic Inquiry* **1**, 429–438.
Fu, Jingqi, Thomas Roeper, and Hagit Borer: 2001, 'The VP within Process Nominals: Evidence from Adverbs and the VP Anaphor *Do-So*', *Natural Language and Linguistic Theory* **19**, 549–582.
Fulmer, Sharon: 1991, 'Dual-Position Affixes in Afar: An Argument for Phonologically Driven Morphology', *Proceedings of West Coast Conference on Formal Linguistics* **9**, 189–203.
Gerdts, Donna: 1998, 'Incorporation', in A. Spencer and A. Zwicky (eds.), *The Handbook of Morphology*, Blackwell, Oxford. pp. 84–100.
Gerritsen, Marinel: 1984, 'Divergent Word Order Development in Germanic Languages: A Description and a Tentative Explanation', in J. Fisiak (ed.), *Historical Syntax*, Mouton, Berlin, pp. 107–137.
Grimshaw, Jane: 1986, 'A Morphosyntactic Explanation for the Mirror Principle', *Linguistic Inquiry* **17**, 745–749.
Groos, Anneke: 1989, 'Particle-Verbs and Adjunction', in H. Bennis and A. van Kemenade (eds.), *Linguistics in the Netherlands 1989*, pp. 51–60.
Halle, Morris and Alec Marantz: 1993, 'Distributed Morphology and the Pieces of Inflection', in K. Hale and S. J. Keyser (eds.), *The View from Building 20*, MIT Press, Cambridge, pp. 111–176.
Hoeksema, Jack: 1987, 'Relating Word Structure and Logical Form', *Linguistic Inquiry* **18**, 119–126.
Hoeksema, Jack: 1988, 'Head-Types in Morpho-Syntax', in G. Booij and J. Van Marle (eds.), *Yearbook of Morphology 1988*, Foris, Dordrecht, pp. 123–138.
Horvath, Julia: 1994, 'Structural Focus, Structural Case, and the Notion of Feature Assignment', in K. É. Kiss (ed.), *Discourse Configurational Languages*, Oxford University Press, Oxford, pp. 28–64.
Jackendoff, Ray: 1977, *X-bar Syntax*, MIT Press, Cambridge.
Jackendoff, Ray: 1990a, *Semantic Structures*, MIT Press, Cambridge.
Jackendoff, Ray: 1990b, 'On Larson's Treatment of the Double-Object Construction', *Linguistic Inquiry* **21**, 427–455.
Jackendoff, Ray: 1997, *The Architecture of the Language Faculty*, MIT Press, Cambridge.
Jaeggli, Osvaldo: 1986, 'Three Issues in the Theory of Clitics: Case, Doubled NPs and Extraction', in H. Borer (ed.), *The Syntax of Pronominal Clitics (Syntax and Semantics 19)*, Academic Press, New York, pp. 15–42.

Jelinek, Eloise: 1984, 'Empty Categories, Case, and Configurationality', *Natural Language and Linguistic Theory* **2**, 39–76.
Johnson, Kyle: 1991, 'Object Positions', *Natural Language and Linguistic Theory* **9**, 577–636.
Joseph, Brian and Jane Smirniotopoulos: 1993, 'The Morphosyntax of the Modern Greek Verb as Morphology and Not Syntax', *Linguistic Inquiry* **24**, 388–398.
Kiparsky, Paul: 1983, 'Word Formation and the Lexicon', in F. Ingemann (ed.), *Proceedings of the 1982 Mid-America Linguistics Conference*, University of Kansas, Lawrence, pp. 3–29.
Kiss, Katalin É: 1987, *Configurationality in Hungarian*, Reidel, Dordrecht.
Koeneman, Olaf: 2000, *The Flexible Nature of Verb Movement*, PhD dissertation, Utrecht University.
Kosmeijer, Wim: 1986, 'The Status of the Finite Inflection in Icelandic and Swedish', *Working Papers in Scandinavian Syntax* **26**, 1–41.
Lapointe, Stephen: 1980, *A Theory of Grammatical Agreement*, PhD dissertation, University of Massachusetts at Amherst.
Lapointe, Stephen: 1999, 'Dual Lexical Categories vs. Phrasal Conversion in the Analysis of Gerund Phrases', in: P. de Lacy and A Nowak (eds.), *University of Massachusetts Occasional Papers in Linguistics* **24**, GLSA, Amherst.
Lieber, Rochelle: 1980, *On the Organization of the Lexicon*, PhD dissertation, MIT.
Lieber, Rochelle: 1983, 'Argument Linking and Compounds in English', *Linguistic Inquiry* **14**, 251–285.
Lieber, Rochelle: 1992, *Deconstructing Morphology*, Chicago University Press, Chicago.
Malouf, Robert: 1998, *Mixed Categories in the Hierarchical Lexicon*, PhD dissertation. Stanford University.
May, Robert: 1985, *Logical Form*, MIT Press, Cambridge.
Mithun, Marianne: 1984, 'The Evolution of Noun Incorporation', *Language* **60**, 847–894.
Mithun, Marianne: 1986, 'On the Nature of Noun Incorporation', *Language* **62**, 32–37.
Neeleman, Ad: 1994, *Complex Predicates*, PhD dissertation, Utrecht University.
Neeleman, Ad and Fred Weerman: 1992, 'Case Theory and the Diachrony of Complex Predicates in Dutch', *Folia Linguistica Historica* **13**, 189–217.
Neeleman, Ad and Fred Weerman: 1993, 'The Balance between Syntax and Morphology: Dutch Particles and Resultatives', *Natural Language and Linguistic Theory* **11**, 433–475.
Noyer, Rolf: 1994, 'Mobile Affixes in Huave: Optimality and Morphological Well-formedness', *Proceedings of West Coast Conference on Formal Linguistics* **12**, 67–82.
Pesetsky, David: 1985, 'Morphology and Logical Form', *Linguistic Inquiry* **16**, 193–246.
Platzack, Christer and Anders Holmberg: 1989, 'The Role of AGR and Finiteness', *Working Papers in Scandinavian Syntax* **44**, 101–117.
Pollock, Jean-Yves: 1989, 'Verb Movement, Universal Grammar, and the Structure of IP', *Linguistic Inquiry* **20**, 365–424.
Postal, Paul: 1969, 'Anaphoric Islands', *Papers from the Fifth Annual Meeting of the Chicago Linguistic Society*, pp. 205–239.
Pranka, Paula: 1983, *Syntax and Word Formation*, PhD dissertation, MIT.
Pullum, Geoffrey: 1991, 'English Nominal Gerund Phrases as Noun Phrases with Verb Phrase Heads', *Linguistics* **29**, 763–799.
Reinhart, Tanya: 1983, *Anaphora and Semantic Interpretation*, Croom Helm, London.
Reinhart, Tanya: 1986, 'Center and Periphery in the Grammar of Anaphora', in B. Lust (ed.), *Studies in the Acquisition of Anaphora*, Reidel, Dordrecht. pp. 123–150.
Reuland, Eric: 1988, 'Relating Morphological and Syntactic Structure', in M.Everaert, A. Evers, R. Huybregts, and M. Trommelen (eds.), *Morphology and Modularity*, Foris, Dordrecht, pp 303–337.
Rice, Keren: 2000, *Morpheme Order and Semantic Scope: Word Formation in the Athapaskan Verb*, Cambridge University Press, Cambridge.
Rizzi, Luigi: 1978, 'A Restructuring Rule in Italian Syntax', in S. J. Keyser (ed.), *Recent Transformational Studies in European Languages*, MIT Press, Cambridge, pp. 113–158.
Rizzi, Luigi and Ian Roberts: 1989, 'Complex Inversion in French', *Probus* **1**, 1–30.

Roberts, Ian: 1991, 'Excorporation and Minimality', *Linguistic Inquiry* **22**, 209–218.
Roberts, Ian: 1993, *Verbs and Diachronic Syntax*, Kluwer, Dordrecht.
Roeper, Thomas and Muffy Siegel: 1978, 'A Lexical Transformation for Verbal Compounds', *Linguistic Inquiry* **9**, 199–260.
Rohrbacher, Bernhard: 1999, *Morphology-Driven Syntax*, John Benjamins, Amsterdam.
Rosen, Sara Thomas: 1989, 'Two Types of Noun Incorporation: A Lexical Analysis', *Language* **65**, 294–317.
Sadock, Jerrold: 1986, 'Some Notes on Noun Incorporation', *Language* **62**, 19–31.
Scalise, Sergio: 1984, *Generative Morphology*, Foris, Dordrecht.
Selkirk, Elizabeth: 1982, *The Syntax of Words*, MIT Press, Cambridge.
Spencer, Andrew: 1988, 'Bracketing Paradoxes and the English Lexicon', *Language* **64**, 663–682.
Spencer, Andrew: 1995, 'Incorporation in Chukchi', *Language* **71**, 439–489.
Sproat, Richard: 1985, *On Deriving the Lexicon*, PhD dissertation, MIT.
Stump, Gregory: 1998, 'Inflection', in A. Spencer and A. Zwicky (eds.), *The Handbook of Morphology*, Blackwell, Oxford, pp 13–43.
Szendrői, Kriszta: 2001, *Focus and the Syntax-Phonology Interface*, PhD dissertation, UCL.
Taraldsen, Tarald: 1990, 'D-Projections in Norwegian', in J. Mascaró and M. Nespor (eds.), *Grammar in Progress*, Foris, Dordrecht. pp. 419–431.
Travis, Lisa: 1984) Parameters and the Effects of Word Order Variation. PhD dissertation, MIT.
Van Riemsdijk, Henk: 1998, 'Head Movement and Adjacency', *Natural Language and Linguistic Theory* **16**, 633–678.
Ward, Gregory, Richard Sproat, and Gail McKoon: 1991, 'A Pragmatic Analysis of So-Called Anaphoric Islands', *Language* **67**, 439–474.
Weerman, Fred: 1987, 'The Changefrom OV to VO as a Possible Change', in F. Beukema and P. Coopmans (eds.), *Linguistics in the Netherlands 1987*, Foris, Dordrecht, pp. 223–232.
Wiese, Richard: 1996, 'Phrasal Compounds and the Theory of Word-Syntax', *Linguistic Inquiry* **27**, 183–193.
Williams, Edwin: 1981, 'On the Notions "Lexically Related" and "Head of a Word"', *Linguistic Inquiry* **12**, 245–274.
Williams, Edwin: 1989, 'The Anaphoric of Theta-Roles', *Linguistic Inquiry* **20**, 425–456.
Williams, Edwin: 2002, *Representation Theory*, ms. Princeton University.
Woodbury, Hanny: 1975, *Noun Incorporation in Onondaga*, PhD dissertation, Yale University.
Yoon, James: 1996, 'Nominal Gerund Phrases in English as Phrasal Zero Derivations', *Linguistics* **34**, 329–56.