

Verbal Bracketing Paradoxes: A New Account

Abstract. Modified noun phrases like *heavy drinker* and *hard worker* show many of the same properties as bracketing paradoxes like *nuclear physicist*, but seem to differ from the latter examples in important ways. This paper argues that *hard worker*-type phrases should be analysed as bracketing paradoxes, where the syntactic structure is isomorphic to the PF structure, unlike *nuclear physicist*-type examples, where syntax and LF are isomorphic. I propose that *hard worker*-type paradoxes, or verbal bracketing paradoxes, result from a process of rebracketing at LF, which can be seen as a type of movement. This movement, and indeed all movement, is constrained by a principle of Information Preservation, which ensures that certain aspects of structural information are not destroyed during movement. The result is an analysis that accurately captures the facts about bracketing paradoxes of both types in English and Dutch.

1. Introduction

Conventionally, the term *bracketing paradox* refers to cases where the morphophonological bracketing of a word conflicts with its semantic bracketing (see e.g. Williams 1981; Pesetsky 1985; Hoeksema 1987). Traditionally, the term has been used to describe cases where the syntactic and semantic bracketings are isomorphic, and the morphophonological bracketing seems to differ from these. In this paper, I explore a logically possible alternative, where the syntactic structure is isomorphic to the morphophonological structure, and there is a mismatch with the semantics.

I will argue that many modified deverbal nouns (and some adjectives), such as *heavy drinker*, *hard worker* and *beautiful dancer* should also be analysed as the second type of bracketing paradox. I will present evidence that the *heavy drinker*-type of bracketing paradox (here referred to as *verbal bracketing paradoxes*) has some similarities to the traditional, *nuclear physicist* type, and so is deserving of the title of “bracketing paradox”. However, evidence from Dutch underscores

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key differences between the two classes, leading to the conclusion that they should not be given the same analysis. I will argue that an operation of rebracketing at LF can account for the behaviour of the second type of bracketing paradox, and that this operation has implications for our understanding of movement.

The paper is laid out as follows. In section 2, I discuss traditional bracketing paradoxes and sketch one analysis of the phenomenon. In section 3, I present data from English and Dutch to demonstrate that verbal bracketing paradoxes are a similar but separate class. Section 4 provides a novel analysis of verbal bracketing paradoxes, which relies on structural reorganisation between syntax and LF to account for the evidence. Section 5 discusses some predictions made by the theory presented in the previous section, providing support for it, while section 6 concludes.

2. Traditional Bracketing Paradoxes

As discussed in the previous section, bracketing paradoxes occur when there is a mismatch between the morphophonological and semantic bracketings of a particular word or phrase. In the older literature on traditional bracketing paradoxes (for example Pesetsky 1979, 1985; Williams 1981; Kiparsky 1983; Hoeksema 1987) many of these paradoxes are based on apparent violations of level-ordering, the idea that certain classes of affixes must always attach before certain others, and that all affixation must be done before compounding. The idea of level-ordering has had several rounds of reappraisal, but the examples above stand as instances of bracketing paradoxes regardless of the validity of that idea. Taking *transformational grammarian* as an example, if the structure is isomorphic to the syntax, *-ian* must attach to *transformational grammar*, creating a phonological word. However, this would mean that a phonological phrase is embedded within a phonological word, a violation of the Strict Layer Hypothesis (Selkirk, 1984) which states that larger phonological entities, such as feet, words and phrases, may only be composed of smaller entities, like segments and syllables. An entity may never be embedded within a smaller unit. Therefore, even without level-ordering, there is still a mismatch between syntax and PF and these words and phrases are still bracketing paradoxes.

Bracketing paradoxes are not restricted to English; Dutch also has bracketing paradoxes like these. In ordinary Dutch DPs, prenominal modifiers must appear with a declensional schwa in certain contexts, including in a definite DP:

- (1) a. de beroemd*(-e) gitarist
the famous(DECL) guitarist
- b. de productief*(-e) generativist
the productive(DECL) generativist

(Ackema and Neeleman, 2004:168)

This is the same for both intersective and non-intersective attributive adjectives:

- (2) a. de enkel*(-e) gitarist
the sole(DECL) guitarist
- b. de zogenaamd*(-e) winnaar
the so-called(DECL) winner

(Ad Neeleman, p.c.)

This declensional schwa is disallowed in certain other contexts, such as in indefinites and in adverbial (rather than adjectival) modification:

- (3) a. Klassiek*(-e) gitaar speelt alleen hij.¹
Classical(-DECL) guitar plays only he
'Only he plays classical guitar'
- b. Zijn onderzoek is transformationeel*(-e) generatief georiënteerd.
His research is transformational(-DECL) generative oriented

(Ad Neeleman, p.c.)

(Ackema and Neeleman, 2004:169)

However, even in definite DPs, phrases traditionally identified as bracketing paradoxes need not or cannot appear with the declensional schwa:²

¹I use a verb second construction here to avoid ambiguity about the constituency of *klassiek gitaar*, which is a DP. This construction comes with certain information structural restrictions, necessitating the use of *alleen*, 'only'.

²Some speakers seem to treat *de klassiek gitarist* as an LF bracketing paradox (for more on which, see below), meaning that they require a schwa in this example. Other speakers disallow the schwa completely, while still others treat it as optional, which again could involve reanalysis as an LF bracketing paradox. This variable behaviour does not occur with examples like *de transformationeel generativist* and may be due to a language change in process.

- (4) a. de klassiek(*-e) gitarist
the classical(-DECL) guitarist
- b. de transformationeel(*-e) generativist
the transformational(-DECL) generativist

(Ackema and Neeleman, 2004:170)

An analysis of bracketing paradoxes in English should also be able to account for the behaviour seen in Dutch, assuming they are two different instances of the same phenomenon.

Well into the 1980s, many syntacticians (for instance, Jackendoff 1975; Aronoff 1976; Di Sciullo and Williams 1987; Baker 1988) argued or assumed that morphosyntax manipulates terminal nodes containing or related to phonological forms. Under such an analysis, bracketing paradoxes could not result from a mismatch of phonological and syntactic forms, because the phonology was to a certain extent built into the syntax. Conversely, Beard (1988) argued for the separationist hypothesis, the idea that phonological forms are in fact absent in the syntax. Phonological spell-out was claimed to be regulated by post-syntactic rules that associate syntactic structures to appropriate phonological forms. This separation of phonological information from syntax is also found in the model of distributed morphology (see for instance Halle and Marantz 1993, 1994).

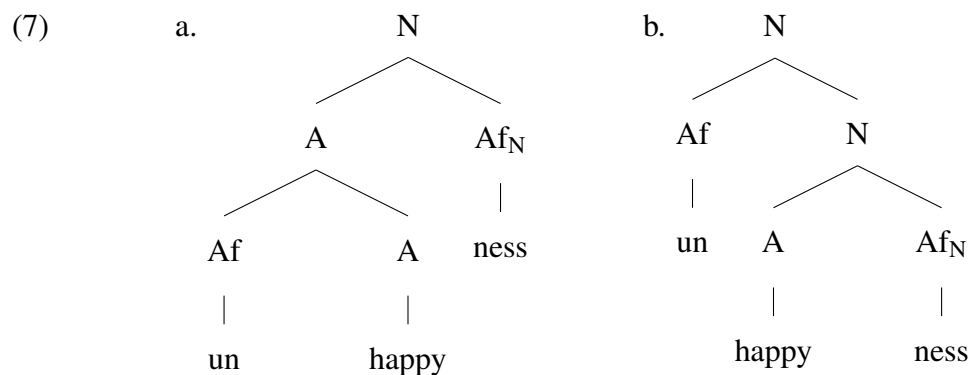
Sproat (1988) takes the separationist theory a step further and argues that the syntactic bracketing and the morphophonological bracketing of a word or phrase may differ from each other. This idea is widely accepted in prosody studies, and can be found in Chomsky and Halle 1968 (p.372), where they note that the syntactic structure of the phrase in (5) (their 124) differs from the prosodic structure, which is a conjunction of the three prosodic phrases, shown in (6).

(5) This is [the cat that caught [the rat that stole [the cheese]]]

(6) This is the cat — that caught the rat — that stole the cheese.

Syntactically, the structure involves embedded clauses, but prosodically the phrases are all sisters. Sproat (1988) uses the same principle, but on the level of words. For Sproat, the differences between the syntactic and phonological structure are constrained by a Mapping Principle, which

relies on the notions of sisterhood and precedence to translate syntactic structures to phonological ones by ensuring that only adjacent syntactic items may be considered PF sisters. Sproat's insight is that bracketing paradoxes are only paradoxes if we believe that words have a single structure; by assuming that their structure is bipartite, with different representations at different levels of the grammar, the paradox disappears. He argues that, as syntax and phonology deal with different aspects of word and sentence structure, they should not be expected to atomize their subjects in the same way. The following trees represent the structure of the word *unhappiness* in the syntax (a) and at PF (b), according to Sproat's separationist account.³

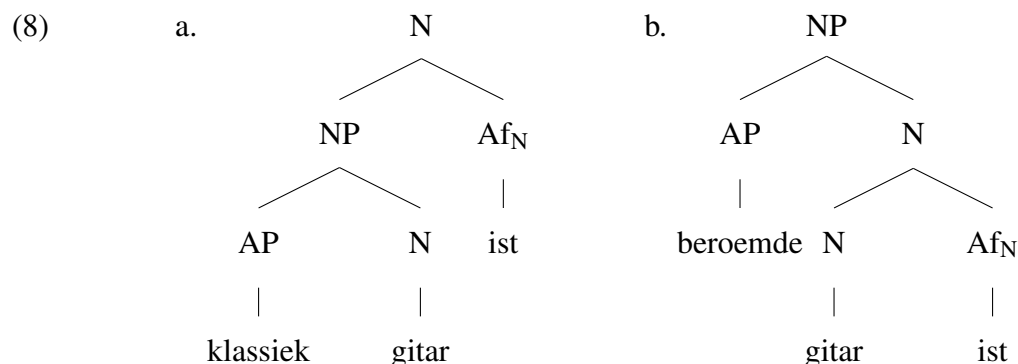


Sproat concludes that phonological and syntactic structures may differ to the extent that they can be reconciled using the Mapping Principle. Words may thus have two different representations in the syntax and at PF, and the paradox disappears.

Returning to the Dutch data seen in (1)-(4), we can see that they fall out from an analysis like that sketched above. Recall that traditional bracketing paradoxes in Dutch cannot appear with the declensional schwa that is required on a normal adjective in a definite DP. Ackema and Neeleman (2004) propose that this is precisely because the *-ist* affix is attaching to the phrase in the bracketing paradoxes in (4). The declensional schwa cannot occur inside the phrase *klassiek gitaar* or *transformationeel generatief*, as shown in (3), and this fact is not changed by the addition of the affix. If the affix were actually attaching to *gitaar* or *generatief* before combining with the

³The tree in (a) does not satisfy the SLH. However, the SLH was proposed as a PF restriction, not an LF one (Selkirk, 1984). If (8a) represents the LF structure, as I will argue in section 5.2, it does not pose a problem for the SLH.

modifier, as in (8b), we would predict the appearance of the declensional schwa, contrary to fact. The following trees show the syntactic structure of a bracketing paradox (a) compared to a noun phrase modified by an intersective adjective (b).



These observations provide convincing evidence that the underlying structure of examples like (4) is not the same as the PF form, and also that these bracketing paradoxes have a different structure to truly non-intersective adjectives.

3. Motivating a Second Variety of Bracketing Paradox

Deverbal nouns in *-er*, as well as (at least some) other nominals derived from verbs, show similar, unexpected behaviour when combined with an adjective. In the resulting adjective-noun pairing, the adjective can optionally receive an adverbial reading and modify the verb within the noun. Some examples are in (9).⁴

⁴Cinque (2010) makes use of examples like *poor typist* and Italian *buon attaccante* (good soccer/football forward), as well as German *groß* (big), which may at first glance appear to be verbal bracketing paradoxes. However, adjectives of this type can be separated from the noun and retain their meaning (as shown in (i)) and may also modify monomorphemic nouns (ii). This leads me to believe that they are not in fact bracketing paradoxes of any type. I will leave them aside here.

- (i)
- a. This singer is very good.
 - b. That chef is terrible!
 - c. The DJ was excellent.
- (ii)
- a.
 - 1) a soft singer
 - 2) ??a soft chorister
 - b.
 - 1) a good singer
 - 2) a good chorister

- (9)
- a. heavy drinker
 - b. hard worker
 - c. beautiful dancer
 - d. close talker (as in Seinfeld S05E18–19)
 - e. high singer
 - f. clumsy cellist (who could be graceful in other aspects of life)
 - g. strong performance
 - h. quick assembly

These adjective-noun pairings can all be paraphrased with a combination of verb and adverb, as in (10).

- (10)
- a. one who drinks heavily
 - b. one who works hard
 - c. one who dances beautifully
 - d. one who talks closely (i.e. close to their interlocutor)
 - e. one who sings high (i.e. in a high voice)
 - f. one who plays the cello clumsily
 - g. something that is performed strongly (i.e. well)
 - h. an event of assembling that passed quickly

I argue that the examples in (9) are in fact bracketing paradoxes. These phrases are ambiguous: *heavy drinker*, for example, can mean either someone who drinks heavily or someone who is heavy and is a drinker. However, both meanings of these phrases are compositional, *pace* Larson (1995). *Heavy drinker*, would be bracketed as [[heavy drink] er] under the first reading and [heavy [drink-er]] under the second. This fact is reminiscent of the two different bracketings of traditional bracketing paradoxes. The meaning in all cases is predictable from the constituent parts. The morphophonological structure of each phrase is nonetheless invariant, meaning that at least one

reading is not isomorphic with this structure. I will argue below that, in examples like those in (9), the PF structure is isomorphic with the syntax and that both are represented by the [heavy [drink-er]] bracketing. In the paradoxical reading, the semantics allows an additional reading, represented by the [[heavy drink] er] bracketing. For now, it is sufficient to state that, due to the fact that at least one reading has a bracketing that does not correspond to the morphophonological bracketing, the label of “bracketing paradox” is justified.

There is another similarity between the examples in (9) and traditional bracketing paradoxes. Both types of bracketing paradox require adjacency between the adjective and the noun. Any intervener⁵ renders the paradoxical reading inaccessible, as *Cinque* (2010) discusses in relation to some of the examples in (9), and as is shown in the following examples.

- (11) a. nuclear physicist
b. hard worker
c. poor typist
d. heavy drinker
- (12) a. *the nuclear experimental physicist
b. *a hard office worker
c. *this poor unemployed typist (on relevant reading)
d. *that heavy bald drinker (on relevant reading)
- (13) a. *The physicist is nuclear.
b. *The worker is hard.
c. *The typist is poor. (on relevant reading)
d. *The drinker is heavy. (on relevant reading)

Verbal bracketing paradoxes allow modifiers of the adjective to intervene between A and N (14a), indicating that adjacency holds between the AP and the noun, rather than the two heads. It is dif-

⁵With one exception, to be discussed in section 5.

difficult to test whether the adjacency requirement is identical in traditional bracketing paradoxes, as these usually involve non-scalar adjectives, and so do not allow modifiers of the A (cf. **nuclear enough physicist*). There appears to be a correlation between traditional bracketing paradoxes using non-scalar adjectives (like *nuclear* above) and verbal bracketing paradoxes using scalar adjectives. This fact may explain why traditional bracketing paradoxes resist the kind of modification shown in (14). It is not clear to me whether this fact is a coincidence or something that needs to be explained.

- (14) a. **a nuclear enough physicist* (unless *nuclear* is used as a scalar adjective)
 b. a hard enough worker
 c. a poor enough typist
 d. a heavy enough drinker

There is evidence that the syntactic structure is relevant in these cases. Crucially, the paradoxical readings found in examples like (9) are not seen in similar pairings of adjectives and nouns that do not contain a verb (with the relevant readings indicated in parentheses):

- (15) a. **heavy drunk* (one who is heavily drunk)
 b. **hard clerk* (one who works hard as a clerk)
 c. **beautiful ballerina* (one who dances ballet beautifully)
 d. **close gossip* (one who gossips while talking close to their interlocutor)
 e. **high chorister* (one who sings high in a choir)
 f. **clumsy Impressionist* (one who paints or composes music in the Impressionist style clumsily)
 g. **strong opera* (a strong performance of an opera, or a strong opera composition)

This indicates that the presence of a syntactic verb is relevant, rather than, for instance, an agentive meaning. We will see that this is consistent with the idea that the examples in (9) are indeed

bracketing paradoxes.

Cinque (2010) groups these cases with traditional bracketing paradoxes under the heading “Direct Modification Adjectives”, which he claims explains their non-intersective reading. Larson (1995) also discusses examples like those in (9) (and especially (9a)) as cases of ambiguity in a class with the examples in (16).⁶

- (16) a. diligent president
 b. old friend
 c. intelligent student (Larson, 1995:1)

However, if we attempt to paraphrase these examples as we did in (9) - (10), we quickly hit a stumbling block:

- (17) a. *one who presides diligently (\neq diligent president)
 b. *one who friends oldly
 c. *one who studies intelligently (\neq intelligent student)

In other words, rebracketing the examples in (17) as we did with *heavy drinker* does not result in the correct meaning. Using the well-formedness of the paraphrases as a test for inclusion into the class of verbal bracketing paradoxes, we can see that Larson’s examples in (17) do not belong in this class.

Examples like those in (9) do not seem to be cases of traditional bracketing paradoxes either. Dutch appears to have a small number of verbal bracketing paradoxes, as well as a larger number of traditional bracketing paradoxes, but the two types behave differently. In section 2, I showed that traditional bracketing paradoxes lack an inflectional schwa which normal adjectives require in

⁶These examples do not seem to be bracketing paradoxes of either type. The (a) and (b) examples may be subsective adjectives, with a reading similar to that seen with *good*, i.e. “diligent for/as a president” and “old as a friend”. It is not clear to me that *intelligent student* is non-intersective (that is, I do not think someone who is intelligent as a student would differ much from someone who is intelligent and a student), but this appears to be either an intersective or a subsective reading, rather than a bracketing paradox of any kind. None of these examples appears to be truly non-intersective either.

definite noun phrases. This behaviour is consistent with a rebracketing analysis along the lines of [Sproat \(1988\)](#) and [Ackema and Neeleman \(2004\)](#). Verbal bracketing paradoxes, on the other hand, do require the inflectional schwa in the appropriate contexts:

- (18) a. de mooi*(-e) danser
the beautiful(-DECL) dancer

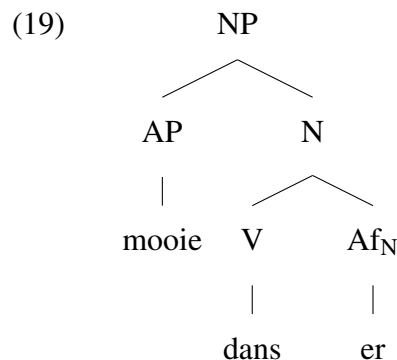
([Ackema and Neeleman, 2004:170](#))

- b. de hard*(-e) werker
the hard(-DECL) worker

(Ad Neeleman, p.c.)

This shows that the affix here is in fact attached to the verb, rather than the phrase as in traditional bracketing paradoxes, because the modifier behaves like any other prenominal modifier in a definite DP. In other words, the appearance of the schwa shows that the appropriate PF bracketing is the same as any other prenominal adjective + noun combination. Importantly, the appearance of the schwa cannot be explained by the modifier in (18) being an adverb, as the schwa is disallowed in adverbials, as seen in (3b). This behaviour is the opposite of traditional bracketing paradoxes, showing that the two cannot be of the same kind.

The evidence from Dutch suggests that verbal bracketing paradoxes are more similar in syntactic (or possibly PF) structure to adjective + noun combinations than they are to traditional bracketing paradoxes. Compare the tree below to those in (8).



Here, the structure resembles that of (8b), the NP modified by an attributive adjective, rather than (8a), which is a traditional bracketing paradox.

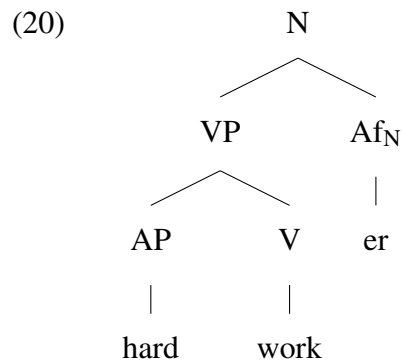
Verbal bracketing paradoxes seem to differ from traditional bracketing paradoxes in the behaviour of the inflectional schwa in Dutch. At the same time, they do not seem to be a standard case of non-intersective modification. The paradoxical reading only occurs when the noun is derived, and it is unavailable with semantically related but underived nouns, as shown in (15). Additionally, the meaning is predictable in a way that Cinque (2010) argues direct modification is not. In fact, the meaning can be derived from a reanalysis of the relationships between the morphemes in a phrase (we will see what such a reanalysis might look like in section 4). The facts presented in this section seem to indicate that the relevant examples are in fact bracketing paradoxes rather than unpredictable direct modification, but not bracketing paradoxes of the traditional kind. In the next section, I present a possible analysis of verbal bracketing paradoxes.

4. Rebracketing the Verbal Paradoxes

We have seen that verbal bracketing paradoxes have behaviour which both mirrors and differs from that of traditional bracketing paradoxes. The question then is whether we should attempt to account for the behaviour of verbal bracketing paradoxes in the same way as traditional bracketing paradoxes are accounted for. I will discuss two possible ways of analysing verbal paradoxes: as a mismatch between the syntax and PF, as Sproat does for traditional bracketing paradoxes, or as a mismatch between the syntax and LF. In the first of these cases, the meaning of a given word will represent the syntax, while in the second it is the morphophonological representation that will most closely resemble the underlying form. In other words, for Sproat (1988), the syntax and LF are isomorphic, but it is also conceivable that the syntax and PF will be in verbal bracketing paradoxes. I will show that a Sproat-style analysis is impossible for verbal bracketing paradoxes, and will instead adopt an approach in which the syntax is transformed at LF.

4.1 PF Rebracketing

An approach to verbal bracketing paradoxes along these lines would essentially mirror Sproat's. The adverb and verb would be sisters in the syntax, with *-er* combining with the verb phrase they form, as shown in (20).



This structure is related via a Mapping Principle to a structure in which the verb and the affix form a constituent (a word) and the modifier sits outside of it. However, here we hit a pitfall. In order to ensure that the adjective linearly precedes the verb (or the noun derived from it) at spell-out, we need a principle requiring adjectives to precede their nouns in English. This is unproblematic, as it is the usual case. The problem is that in the syntactic structure, the “adjective” is actually an adverb, as it modifies the verb. Adverbs may follow their verb in English. In fact, in all of the verbal bracketing paradoxes seen so far, the adverb *must* follow its verb:

(21) a. Mary works hard.

b. *Mary hard works.

(22) a. Sam drinks heavily.

b. *Sam heavily drinks.

(23) a. Martin sings high.

b. *Martin high sings.

(24) a. Alex dances beautifully.

- b. *Alex beautifully dances.

Affixes tend to attach to the head of the category that the affix combines with (see e.g. Williams 1981; Sadock 1991; Ackema and Neeleman 2004), but in these verb phrases the head is not the last element in the phrase. Affixing to a non-head-final structure is problematic. For example, synthetic compounds based on verb-particle combinations are notoriously problematic in English (Yip, 1978; Ackema and Neeleman, 2004). This leads to variation in agentive forms, like the following (Ackema and Neeleman's (56)).

- (25) a. passer by
b. come outer
c. cleaner upper (Ackema and Neeleman, 2004:161)

The same variation is not seen in complex words consisting of a preposition and a verb:

- (26) a. overactor
b. *over-er act
c. *over-er actor

These examples show that it is not easy to attach suffixes to non-head-final structures, but that head-final structures are unproblematic. In the case of the bracketing paradoxes, if the affix is attaching to the head-initial verb phrase, we might expect to see forms like the following:

- (27) a. *work harder
b. *worker hard
c. *worker harder

These forms are clearly unacceptable under the intended reading. It could be argued that the modifier appears to the left of the verb as a kind of rescue manoeuvre: a reordering based on

necessity. However, this behaviour is rarely if ever seen in verb-particle agentive forms:

- (28) a. *bypasser (meaning someone who passes by, not someone who bypasses)
 b. *outcomer
 c. *upcleaner

This fact indicates that reordering is not a possible escape mechanism. We are therefore led to the conclusion that PF simply cannot take a structure like [[work hard]er] as an input from the syntax, and that verbal bracketing paradoxes cannot be the result of PF rebracketing, as traditional bracketing paradoxes are, according to Sproat (1988).

Aside from the ordering problems at PF, there are differences between the traditional bracketing paradoxes described by Sproat and the verbal ones discussed above. If we were to use a uniform approach for the two cases, we would need to explain why and how the differences arise. The data from Dutch show that the two different types behave very differently with respect to the declensional schwa, as shown in (1), (4) and (18). These differences cannot be explained if the two types of bracketing paradox are given the same explanation, as would be the case under an analysis like Cinque's (2010) or Sproat's (1988) syntax-PF mismatch, but are expected if the mechanism behind each paradox is different. In other words, these differences would be expected if traditional bracketing paradoxes are mismatches between syntax and PF, while verbal bracketing paradoxes are mismatches between syntax and LF. This is the option I will argue for in the next subsection.

A third type of analysis would involve head movement. Under such an approach, the adverb might be understood to incorporate into the verb, rendering a bracketing such as [[_v heavy drink]er]. However, this analysis is unsatisfactory for three reasons. Firstly, as seen in section 3, Dutch verbal bracketing paradoxes look like they are syntactically composed of an adjective and a noun, because the modifier appears with adjectival morphology. However, if the modifier is an adverb that incorporates into the verb, we would not expect to see the declensional schwa. The head movement approach therefore makes the wrong prediction about the Dutch schwa. Secondly, there is no independent evidence of adjective incorporation in English, unlike in Greek (Rivero, 1992).

In Greek, examples like the following are found:

- (29) a. O Yánis mu thímise ksaná tin istoría tu.
The John me reminded again the story his
'John reminded me again of his story.'
- b. O Yánis mu ksanathímise tin istoría tu.
The John me again.reminded the story his
'John reminded me again of his story.' (lit. John again-reminded me of his story.)
(Rivero, 1992:308)
- (30) a. I María férete kaká stin adelfí tis.
The Mary behaves badly to.the sister hers
'Mary behaves badly to her sister.'
- b. I María kakoférete stin adelfí tis.
The Mary badly.behaves to.the sister hers
'Mary behaves badly to her sister.' (lit. Mary badly-behaves to her sister.) (Rivero, 1992:298–299)

However, English examples of adverb incorporation parallel to the bracketing paradoxes seen above are ungrammatical:

- (31) a. *He heavy drinks
b. *He hard works
...

Furthermore, the class of adverbs that undergo incorporation in Greek (and in Nahuatl, a language also discussed in Rivero 1992) is a superset of the adverbs that participate in English verbal bracketing paradoxes. In Greek and Nahuatl, a class of adverbs that Rivero calls *Aktionsart* adverbs,

which include examples like *again*, *often*, and *twice*, may undergo incorporation, as shown in (29), but they cannot appear in verbal bracketing paradoxes:⁷

- (32) a. *John is an again worker.
 b. *Mary is an often drinker.
 c. *Alex is a twice dancer.

Finally, as I will discuss further in section 5, verbal bracketing paradoxes only appear to occur with certain classes of (low) adverbs. A head movement analysis would not straightforwardly account for this restriction.

Overall, a head movement analysis does not appear to be an attractive option. In the next subsection, I will argue that an approach involving rebracketing the syntactic structure in the semantics, rather than in the phonology, can readily account for all of the relevant data.

4.2 LF Rebracketing

While Sproat (1988) develops a Mapping Principle to address the structural mismatch between syntactic and PF structures in traditional bracketing paradoxes, another possibility is that, in verbal bracketing paradoxes, there is a mismatch between syntax and LF. This possibility would require a principle to translate the underlying syntactic structure to LF, and which would account for the two different meanings of most verbal bracketing paradoxes.

Sproat's (1988) Mapping Principle, for mapping syntactic structures to PF representations, relies on both precedence and sisterhood. However, of these, only the sisterhood relation is generally accepted to be relevant at LF. For this reason, an approach that translates Sproat's Mapping Principle to LF directly is not very theoretically desirable. I will argue that the empirical facts of verbal bracketing paradoxes can be accounted for, and several other predictions made, by means of a rebracketing operation that applies to the syntactic structure at LF. This operation requires

⁷It is worth noting that these adverbs do not have direct adjectival counterparts, which may bear on why they are disallowed in verbal bracketing paradoxes. However, under an adverb incorporating into the verb would not ordinarily be expected to appear as an adjective, as the Greek examples show.

the preservation of certain types of information after rebracketing, and avoids any reference to precedence at LF.

Accounting for verbal bracketing paradoxes through rebracketing at LF has immediate advantages over its PF counterpart. I will show in section 4.2.4 how this analysis predicts the exact behaviours of the Dutch declensional schwa in traditional and verbal bracketing paradoxes. It also explains why the adjacency requirement between the derived noun and its modifying adjective holds of the AP in verbal bracket in paradoxes, and not the adjectival head. It accounts for why adjectives and not adverbs modify derived adjectives, under the assumption that adjectives and adverbs are underlyingly the same category. None of these phenomena is automatically accounted for under a Sproat-style approach to verbal bracketing paradoxes.

I propose that a syntactic tree like (19), where an adjective modifies a derived noun, can be adjusted at LF to produce a tree in which the adjective and verb form a constituent, which is itself sister to the affix. I will refer to this adjustment as “rebracketing”. However, rebracketing could potentially be a very powerful tool, and allowing terminal nodes to freely reassociate with each other at LF is clearly an undesirable outcome. In order to avoid any overgeneration, I propose that certain kinds of information about the syntactic structure must be preserved under LF rebracketing. In particular, information about headedness and c-command between non-heads⁸ must be maintained. These two ideas are formalized below, as the principle of Information Preservation.

(33) **INFORMATION PRESERVATION**

PRESERVATION OF HEADEDNESS: Do not destroy headedness relations.

PRESERVATION OF HIERARCHY: Do not destroy c-command relations between non-heads.

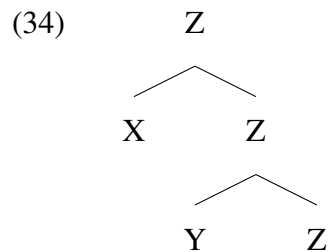
The principle of information preservation captures the intuition that rebracketing should not be a free-for-all; the output structure should be identifiably related to the input. Key information about the syntactic structure — that is, headedness and scope between non-heads — is retained.

⁸In what follows, I will use the term *non-head* to refer to anything that is either an adjunct or an argument of the head.

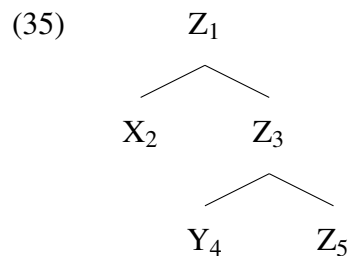
The principle also has the effect that only the lowest two non-heads can be rebracketed, and that only hierarchically adjacent non-heads may be rebracketed. I will first examine the details of the proposed analysis before demonstrating each of these results in turn.

4.2.1

Imagine a tree like that in (34), where Z is the head.

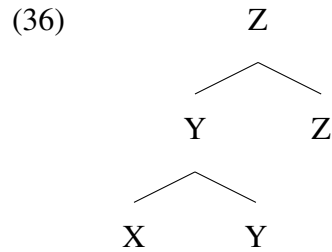


For the sake of clarity, I will give each node in the tree a unique identifier. I will refer to the nodes by their identifiers, although this has no linguistic import.

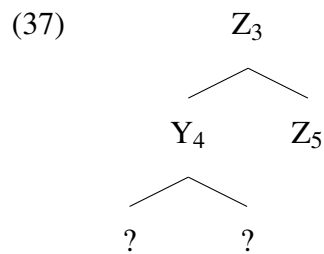


Preservation of Headedness will ensure that, no matter what transformations or rebracketings this tree undergoes, Z₅ will remain the head. Similarly, Preservation of Hierarchy means that the c-command relationship between X₂ and Y₄ cannot be destroyed. However, we are free to introduce new c-command relationships between non-heads as long as we do not destroy existing ones.

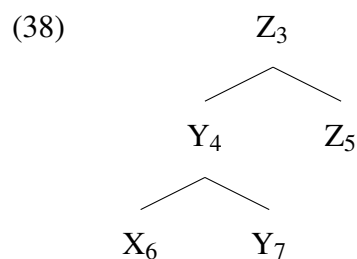
Given these requirements, the tree in (36) is a valid rebracketing of (35).



But how do we translate (34) into (36)? Simply, we require that any node that survives the rebracketing must retain its syntactic labelling. The head in (35) is unchanged, due to Preservation of Headedness, so the lower Z (the head of the structure in (36)) must be Z_5 . The sister of the head also survives rebracketing, so the higher Y must be Y_4 . The mother of the head also survives, so the higher Z is Z_3 :



Now let us suppose that the rebracketing operation removes the link between Z_1 and X_2 in (35), so X_2 is "free" in the sense that it has no mother or sister. A new relationship, that of sisterhood, is created between the two non-heads (X_2 and Y_4), which necessitates a new position for Y, in addition to its location as sister of the head. We can call the new locations of X_2 and Y_4 " X_6 " and " Y_7 " respectively, as below.

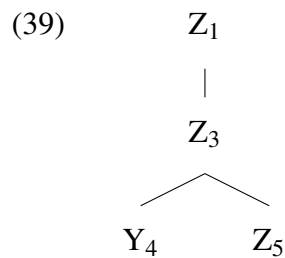


Z is the head, Y its dependent non-head and X the dependent non-head of Y. The non-head X

still c-commands the other non-head Y as in the original structure. No other c-command relations between non-heads existed, and none have been destroyed, so Preservation of Hierarchy is satisfied. Z remains the head, so Preservation of Headedness is satisfied. A new c-command relationship, from Y to X, has been created, but neither tenet of Information Preservation prevents this. The tree in (38) is therefore a valid rebracketing of that in (34).

Two questions remain: how does X_2 come to be below Y_4 ? and, what happened to Z_1 ? I will address the second question first.

Once the link between Z_1 and X_2 is severed, there is a unary branch between Z_1 and Z_3 :



If this unary branch is left at the end of the rebracketing, either it can remain or it can be cleaned up through a simple rule.⁹ The choice makes no difference to the analysis presented here, so I leave it up to the reader to choose which is preferable to her.

As for the first question, I am again agnostic as to the answer. Two options exist: position 2 is destroyed completely and the content occupying it is placed under node Y_4 (as X_6), or node 2 is delinked from 1 and the same node is relinked to 4 as its daughter. I do not see any way of distinguishing between the two empirically, and so will again leave the choice to the reader.

As can be seen from the preceding material, this LF rebracketing procedure relies only on the two tenets of Information Preservation, those of Preservation of Hierarchy and Preservation of Headedness. After rebracketing, all key information in the tree is retained, with the only exception being the information that is the target of the rebracketing itself.

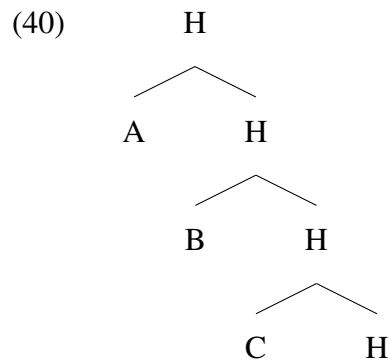
In the next subsection, I will show that this rebracketing procedure is sufficiently constrained, despite its simplicity.

⁹Something along the lines of "if you have a unary branch, unify the two nodes at either end of it" would do.

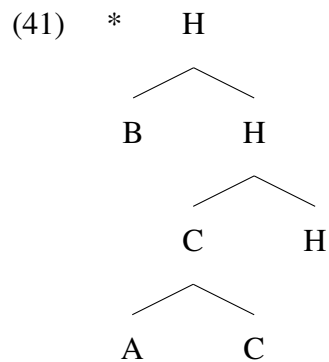
4.2.2

The rebracketing procedure proposed above has the result that only two hierarchically adjacent non-heads may be rebracketed, and that only the bottom two non-heads can be rebracketed.

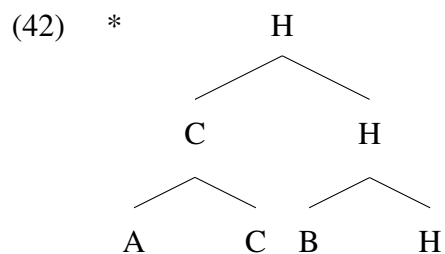
Consider the tree in (40), where H is the head and A-C non-heads.



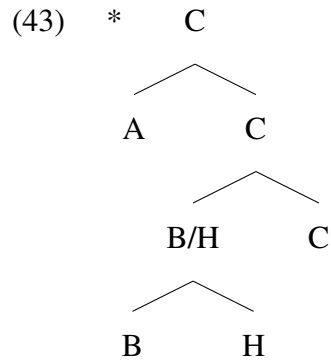
A c-commands B and C, B c-commands C and C does not c-command any other non-head. Any attempt to rebracket this tree so that A and C are sisters will fail. Here, H remains the head, but A no longer c-commands B, which is a violation of Preservation of Hierarchy:



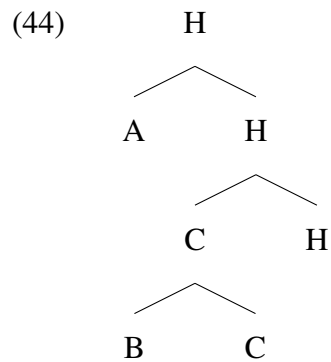
Similarly, in the following tree, B no longer c-commands C.



In (43), Preservation of Headedness is violated, no matter which of B or H is the head of that constituent.

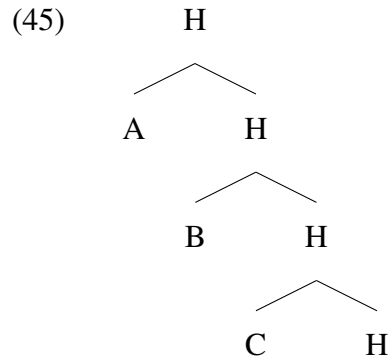


The only option for rebracketing the tree in (40) is to make two adjacent non-heads sisters (in particular, for reasons to be discussed below, the lowest two, B and C):

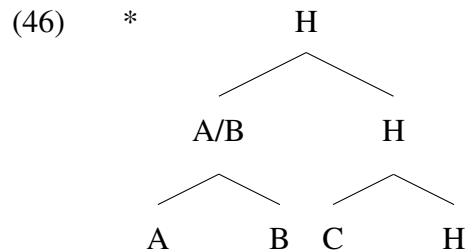


In this structure, H is still the head, A c-commands both B and C, B c-commands C and a new c-command relationship, between C and B has been created.

Information Preservation also has the result that only the lowest two non-heads can be rebracketed with respect to each other. Taking the same structure as in (40), repeated in (45), as our starting point, any attempt to create a sisterhood relationship between A and B will fail.

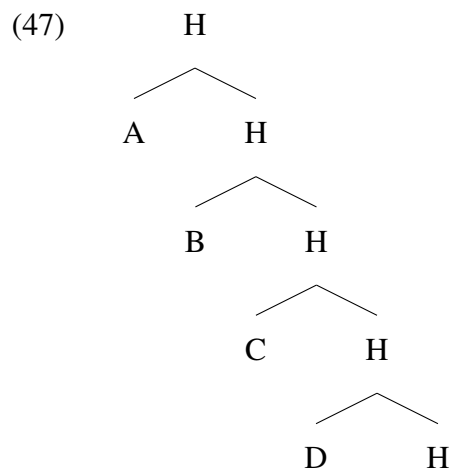


In the resulting structure, either A or B will no longer c-command C, depending on which is the head.

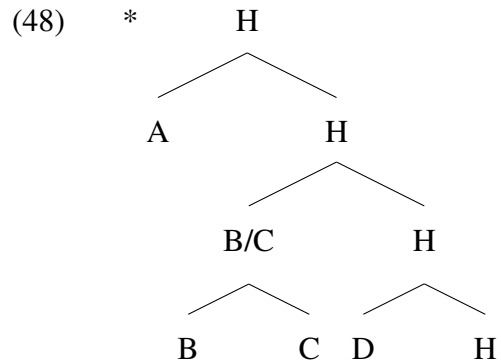


Preservation of Hierarchy is therefore violated. Again, only the structure in (44) is a viable rebracketing.

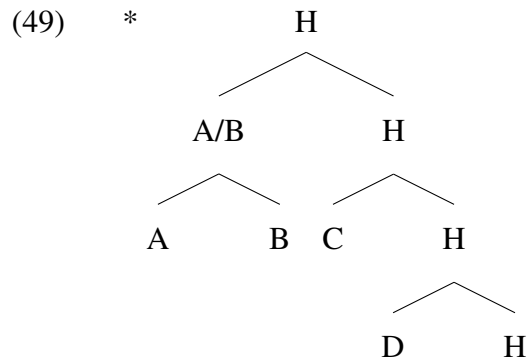
This fact is not a peculiarity of trees with three non-heads. When trying to rebracket the non-heads of any larger structure, for example that in (47), we find the same result.



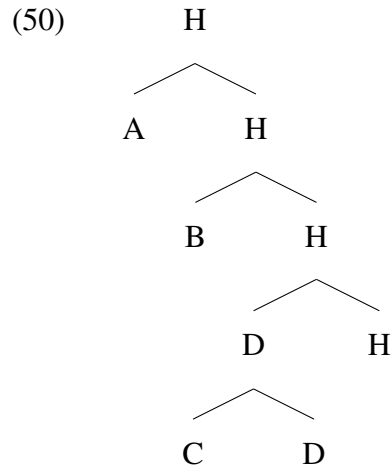
We know from (46) that rebracketing B and C as sisters will violate Preservation of Hierarchy, because either B or C will no longer c-command D, depending on which is head of their constituent:



Similarly, rebracketing A and B as sisters will not succeed either, for the same reason.



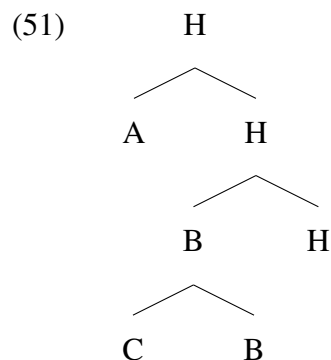
Finally, rebracketing A and C as sisters is ruled out for the reasons discussed in (48)–(52). The only option that satisfies both Preservation of Hierarchy and Preservation of Headedness is to rebracket C and D as sisters:



Here the head remains unchanged; A c-commands B, C and D; B c-commands C and D; C c-commands D and D newly c-commands C. This result obtains with this and any larger structure: irrespective of the number of non-heads, only the bottom-most two may be rebracketed together without destroying c-command relations and violating Preservation of Hierarchy.

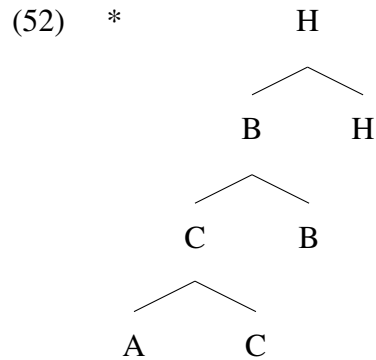
The result that only the bottom-most two non-heads may become sisters after rebracketing means that the process rules out creating a non-constituent with the interpretation as though it were a constituent. This is a desirable consequence, as such an innovation would seriously undermine compositionality. It also appears that examples of a non-constituent being interpreted as a constituent do not exist.

Rebracketing must also be shallow; it cannot be infinitely deeply embedded. Take the tree in (51).



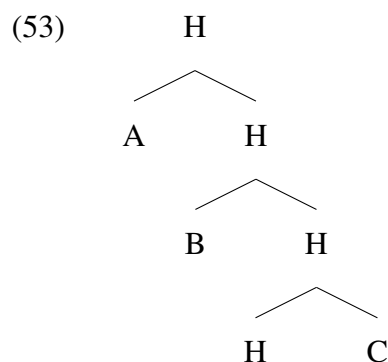
Here, H is the head and A–C non-heads. Any attempt to rebracket A with either B or C will fail,

because Preservation of Hierarchy will be violated. As an example, we will try to rebracket the tree so that A and C are sisters:

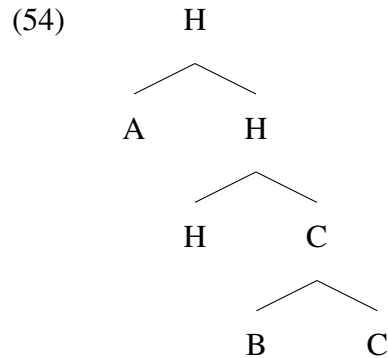


The result is that A no longer c-commands B, a violation of Preservation of Hierarchy, and the structure is not a valid rebracketing of (51). This result means that any reordering of elements in the structure is actually very shallow, and rebracketing is only possible between two structurally adjacent constituents.

One further question is what occurs when non-head material surrounds the head, as in (53). How does rebracketing proceed here?

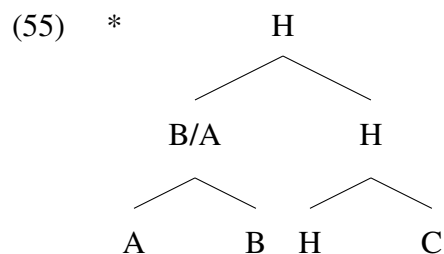


As we have seen above, only the lowest two non-heads may rebracket when they are both on the same side of the head (see (46), (48)). We therefore expect B and C to be able to rebracket, and this structure does not violate either tenet of Information Preservation.



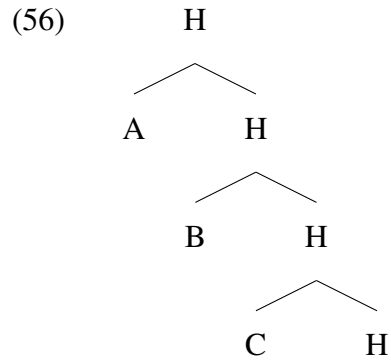
However, I am currently unaware of how to test this crucial prediction. For the time being, I will have to proceed under the assumption that this is a licit rebracketing.

The structure in (53) raises a further question - can A and B rebracket to form a constituent? From the evidence seen so far, it would be possible that there is a linear constraint on rebracketing rather than a structural one. However, in order not to violate Information Preservation, A and B should not be able to rebracket, as either B or A would no longer c-command C, depending on which became the head of their constituent (cf. (44) and the trees in the previous subsection):

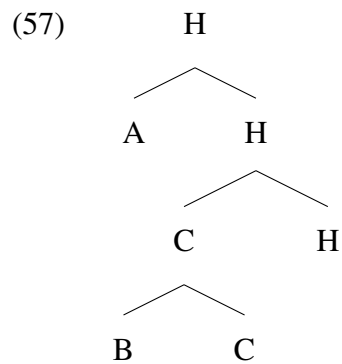


The theory therefore predicts that, where a head takes a complement to its right and two modifiers to its left, the two modifiers should not be able to rebracket to form a constituent. However, where a head only takes two modifiers to its left (and nothing on its right) those modifiers should be able to restructure. If this prediction, which I must leave to future research, is borne out then a structural, rather than linear, approach to LF rebracketing would prevail.

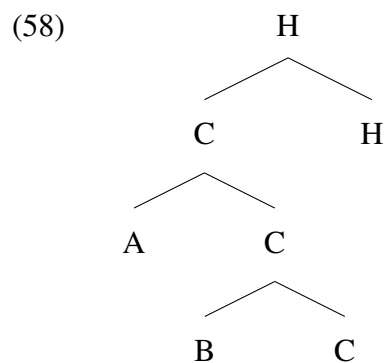
The final case to discuss is the possibility of applying rebracketing cyclically. This operation would take a structure like(56):



And rebracket B with C, as in (57). A still c-commands B and C, B c-commands C and H is still the head, so Information Preservation is not violated.



Rebracketing could then apply again, to render A and the higher instance of C sisters:



Here A still c-commands B and C, as it did in both previous structures, B still c-commands C and H is still the head. Again, Information Preservation is not violated.

The question then is whether this is a desirable outcome. Cyclic rebracketing seems to involve

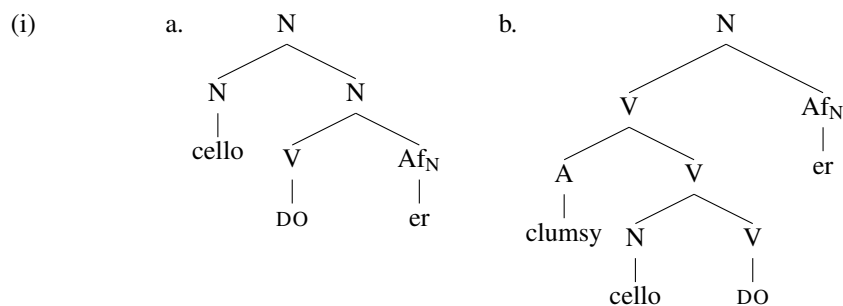
both inputs and outputs that are problematic. Cases where two adverbs of the relevant type can modify the same verb seem to be vanishingly rare, if they exist at all, so it is difficult to construct inputs of an appropriate type. Additionally, verbal compounding does not seem to be recursive in English, but the output of cyclic rebracketing would be very similar to a recursive verbal compound. It therefore seems feasible to rule out the cyclic application of rebracketing, perhaps by stipulating that rebracketing can only manipulate terminal nodes.

However, it is also possible that cyclic rebracketing does exist, but is seen only rarely. This possibility does not seem too far-fetched — rebracketing itself does not seem to be a particularly widespread phenomenon, so one would expect cyclic rebracketing to be even less common. Concrete examples of cyclic rebracketing seem difficult to come by, but not beyond the realm of possibility.¹⁰ For this reason, I leave the question of its existence to future research.

4.2.3

I have described a process whereby a syntactic structure can be rebracketed at LF to change the original structure's constituency and therefore adjust the meaning of the phrase. One may wonder if this rebracketing is a new tool to be added to the grammar, or whether it is something that already exists. The answer is that rebracketing is an instance of movement, but movement without

¹⁰I believe agentive *-ist* is a possible case of cyclic rebracketing. Given the meaning of agentives in *-ist* and the fact that the suffix almost always attaches to a noun, it is tempting to break *-ist* down, semantically and syntactically, into a null verb and agentive *-er*. This approach would explain the meaning of words derived using this affix, because a verb and an agentive ending would both be present syntactically. It would also explain why *-ist* rarely attaches to verbs (Dressman, 1985; Panther and Thornburg, 2002): under normal circumstances, there is no need for it to do so, as agentive *-er* is able to attach directly to verbs, and the result would be synonymy between the two suffixes. If *-ist* is the spell out of a null verb and *-er*, and if those two items form a syntactic constituent, then the structure in (ia) could be rebracketed cyclically to produce (ib), as described above.



a trace. Under this analysis, the picture that emerges is the following: Information Preservation is a condition on movement. Where movement according to these conditions is ruled out (in particular, where a category must move beyond a c-commanding non-head), a trace may be used, subject to requirements on chain formation. I will unpack this story below.

Ordinarily, movement leaves a trace which must be a link in a well-formed chain. The requirements for chain formation as described in Rizzi, 2001 are below.

- (59) (A_1, \dots, A_n) is a chain iff, for $1 \leq i \leq n$
- (i) $A_i = A_{i+1}$
 - (ii) A_i c-commands A_{i+1}
 - (iii) A_{i+1} is in a Minimal Configuration with A_i
- (60) Y is in a Minimal Configuration with X iff there is no Z such that
- (i) Z is of the same structural type as X, and
 - (ii) Z intervenes between X and Y

In order for a chain to be well formed, the moved category must c-command and be in a Minimal Configuration with its trace (or copy).¹¹ This ensures that the restrictions in (33) are followed, under the assumption that the trace can satisfy them: the base position of the moved category still exists, and is occupied by a trace which is identical to the moved item, so no c-command or headedness relations are destroyed.

That the base position and the surface positions of movement are syntactically related is widely accepted, but it is not clear why this should be so. I would argue that it is Preservation of Information that requires this relationship, in the form of a trace. If Preservation of Information is a requirement on all movement, then the leaving of a trace is what allows movements other than the kinds discussed in the preceding sections. Without a trace, at least Preservation of Hierarchy would be violated, but if the trace can satisfy that condition then the movement is licit. Information

¹¹Whether movement leaves behind a trace of the moved category or a copy of it is orthogonal to this discussion. I use the term trace for convenience.

Preservation may in fact explain why traces are necessary in most movement operations.

This idea would mean that movement is not a unified operation, but rather comes in two parts: the procedure of movement, and regulation of the connection between the moved category and the trace (cf. Nunes 2001). However, rather than the movement operation itself being completely unconstrained (as in Nunes 2001; Hornstein 2001), I suggest that all movement must at least adhere to the principles of Information Preservation as in (33), and that Information Preservation is therefore a requirement on the movement operation rather than the relationship between the moved category and the trace. This will ensure that, even without a trace, movement is sufficiently constrained, while having little effect on any movement that leaves a trace.

I have discussed at length the types of movement allowed and disallowed by rebracketing, or, in other words, the types of downward movement that can occur without a trace. This downward movement must obey the principles of Preservation of Headedness and Preservation of Hierarchy, which means that only the lowest two non-heads may rebracket to become sisters. Put differently, Information Preservation requires that, without a trace, downward movement is allowed only where the second-lowest non-heads moves to become the sister of the lowest non-head. This type of movement also results in a change of interpretation, because the original position of the moved category no longer exists.

Downward movement with a trace is disallowed due to the requirements of chain formation, namely c-command.

Any upward movement that crosses a constituent and does not leave a trace will necessarily violate Preservation of Hierarchy, because the crossed constituent will no longer c-command the moved item, and that c-command relation will be destroyed. Upward movement that crosses any constituent must therefore leave a trace, and the requirements of Information Preservation will automatically be fulfilled because of this.

The final case, that of upward movement that does not cross a constituent, does not seem problematic. This type of movement would require that the moved category be moved directly above itself, which would not generate any new structural relationships. If this type of movement

exists at all, it would presumably not violate Information Preservation, but I do not see how this could be tested, as it would be impossible to differentiate from structures where no movement has taken place.

The proposal outlined above has certain similarities to [Pesetsky 1985](#) and [Nunes 2001](#). [Pesetsky \(1985\)](#) also deals with bracketing paradoxes, and makes use of LF movement to explain how the structure of the paradoxes can differ at S-structure and D-structure. However, the present proposal does not run into the pitfalls of Pesetsky's, as outlined in [Hoeksema 1987](#), in that it does not rely on treating affixes as operators akin to quantifiers, it does not require that resulting phrases be ambiguous,¹² and it does not require that operations at LF are sensitive to precedence, as Pesetsky's (1985) proposal does.

As mentioned above, [Nunes 2001](#) also splits Move into several independent operations, just as I argue for separating movement from requirements on traces. However, [Nunes \(2001\)](#) does not constrain the movement operation in any way in order to allow sideward movement. I propose that the tenets of Information Preservation are restrictions on the movement operation (separate from requirements on trace binding), and that they restrict when movement can take place without leaving a trace. In this way, my proposal allows for downward movement without a trace, also described as rebracketing, without opening a Pandora's box of possible movement configurations.

While the idea of downward movement may at first blush seem undesirable, I have shown that, as long as that movement adheres to the tenets of Information Preservation, downward movement can be sufficiently constrained. By splitting the operation that binds traces from a movement operation restricted by Information Preservation, downward movement will be permitted in all and only the structures required to explain verbal bracketing paradoxes in terms of LF-rebracketing, and upward movement will not be affected.

¹²Indeed, if either the rebracketed or the non-rebracketed structure is ruled out for independent reasons, I predict that the resulting phrase should be unambiguous.

4.2.4

I have shown that with only the assumptions that the head of a structure must not be changed and that the c-command relationships between non-heads must not be destroyed, a viable rebracketing process between syntax and LF appears. This process allows only rebracketing of hierarchically adjacent non-heads, and only of the bottom-most two non-heads. This process is sufficiently constrained so as not to overgenerate new sisterhood relations, and captures the intuition that rebracketing must preserve as much information as possible.

This process would be able to explain all of the examples in (9).

- (61)
- a. [heavy [drinker] \Rightarrow [[heavy drink]er]
 - b. [hard [worker] \Rightarrow [[hard work]er]
 - c. [beautiful [dancer]] \Rightarrow [[beautiful dance]er]
 - d. [close [talker] \Rightarrow [[close talk]er]
 - e. [high [singer] \Rightarrow [[high sing]er]
 - f. [clumsy [cellist]] \Rightarrow [[clumsy cello]ist] (or, as per footnote 10, [clumsy [cello [DO er]]] \Rightarrow [[clumsy [cello DO]] er])
 - g. [strong [performance]] \Rightarrow [[strong perform]ance]
 - h. [quick [assembly]] \Rightarrow [[quick assemble]y]

The LF rebracketing has a number of advantages over its PF counterpart applied to the same data. Firstly, notice that this analysis does not run into the ordering problems encountered under PF rebracketing, under the assumption that adjectives and adverbs are underlyingly the same category (an assumption to which I return shortly).

Furthermore, the adjacency requirement discussed in section 3 between the adjective and agentive noun would be explained. Given a string like (62a), the only possible rebracketing would be (62b). Similarly (63a) and (63b).

- (62)
- a. [bald [heavy [drinker]]] \Rightarrow

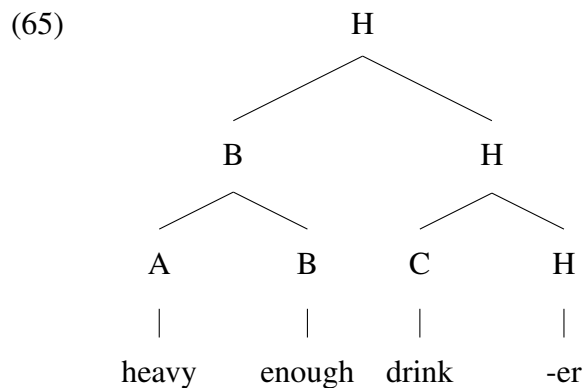
- b. [bald [[heavy drink]er]
- (63) a. [heavy [bald [drinker]]] \Rightarrow
 b. [heavy [bald drink] er]

As demonstrated above, the first and second adjectives may not be reordered with respect to each other in the process of rebracketing because such reordering would destroy the c-command relation between the first non-head (*bald* in (62)) and the second (*heavy* in (62)). Therefore, after rebracketing, the verb may form a constituent only with the second adjective and not with the first. So we see in (62) that, because *heavy* is adjacent to the verb, after rebracketing it forms a constituent with that verb and may modify it. The same is true of (63), but modifying *drink* with *bald(ly)* results in a meaningless output, so no change in meaning is observed here.

Recall that the adjacency requirement discussed above is not strict linear adjacency between morphemes. It seems that it is the AP that is required to be adjacent to the verb, rather than the adjective itself.

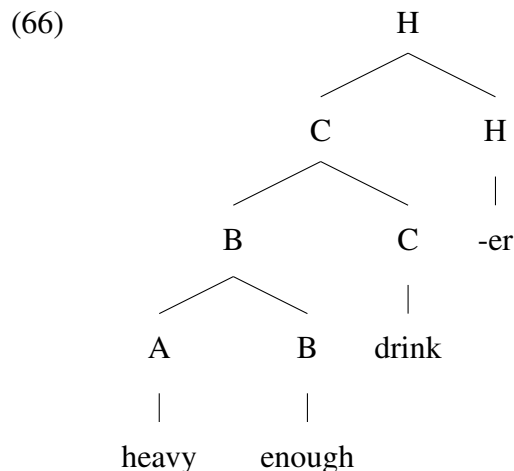
- (64) a. [[heavy enough] [drinker]] \Rightarrow
 b. [[[heavy enough] drink]er]

The proposal above accounts for this as follows.

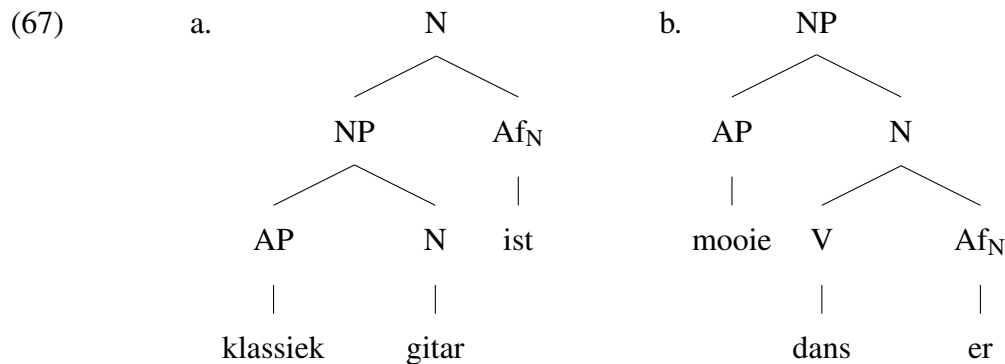


Here, H is the head, which is modified by C and B. B is itself modified by A. Rebracketing B with

C will violate neither Preservation of Headedness, because H is still the head, nor Preservation of Hierarchy, because B still c-commands C:



LF rebracketing also explains the behaviour of the declensional schwa in Dutch verbal bracketing paradoxes. We have seen that in traditional bracketing paradoxes in Dutch, the schwa is disallowed due to the fact that in the syntax the adjective attaches to the noun before the affix does. However, if the analysis of verbal bracketing paradoxes above is correct, the syntactic structure of verbal bracketing paradoxes (in Dutch and English) is one in which the affix attaches to the verb, and this derived noun is modified by the adjective. In other words, verbal bracketing paradoxes look like any other adjectivally modified noun in the syntax, and at PF. The syntactic structures of a traditional bracketing paradox (a) and a verbal bracketing paradox (b) are shown in (67).



In the case of traditional bracketing paradoxes, post-syntactic adjustments are made to meet PF

well-formedness conditions, but the syntactic structure remains unchanged at LF. However, the syntactic structure of verbal bracketing paradoxes is what is pronounced, as adjustments to the structure are made at LF, accounting for the change in meaning. The different behaviours of the declensional schwa in traditional and verbal bracketing paradoxes are therefore predicted by LF rebracketing.

Given the above analysis, there may in fact be an explanation for both types of bracketing paradox as to why certain phrases undergo PF rebracketing and others undergo LF. We have seen that verbal bracketing paradoxes cannot be analyzed at PF, due to restrictions on the placement of the adverb and affixation to non-heads. This may suggest that LF rebracketing can only occur when PF rebracketing is impossible. In other words, speakers prefer a transparent mapping between syntax and LF over a transparent mapping between syntax and PF, if they are forced to choose. It may also be a first step towards determining why certain words (and languages) undergo one type of analysis and not the other. English is subject to the Right-Hand Head Rule (Williams, 1981) and, in the relevant cases, the verb precedes the adverb. We have seen that this combination of attributes means that PF rebracketing is impossible in verbal bracketing paradoxes. Head final languages on the other hand, where the word order of verb and adverb are reversed compared to the English examples above, may be able to rebracket at PF where English cannot. Bracketing paradoxes of the verbal type appear to be vanishingly rare, if they exist at all, in German (Klaus Abels, p.c.), and are restricted to a handful of examples in Dutch (Ad Neeleman, p.c.), so this prediction may be borne out. However, as German appears also to avoid traditional bracketing paradoxes (Williams, 2013, Klaus Abels, p.c.), the validity of this claim remains undetermined. I leave further investigation to future research.

Inherent in the analysis of verbal bracketing paradoxes above has been the idea that adverbs and adjectives are the same category in the syntax. This is not a new idea (see e.g. Emonds 1976; Baker 2003). It would mean that the *-ly* adverbial marker in English does not carry any semantic or syntactic information, but is licensed in the non-nominal context. In other words, *-ly* does not carry the adverb semantics, but merely indicates it. In some dialects, *-ly* rarely occurs in a post-verbal

context. These dialects often use adjectival forms of words like *good*, which have suppletive adverbial forms, rather than the adverbs in the same context. In all dialects *-ly* is disallowed or unnecessary in certain cases, including some we have seen above. (Here % indicates a dialectal difference.)

- (68) a. Sarah sings high(?-ly).
b. Ashley works hard(*-ly).
c. Josh runs quick%(-ly).
d. Donna knits well/%good.

Indeed, in Davidsonian semantics, adverbs are treated as predicates of events (see e.g. [Davidson 1967](#); [Barbiers 1995](#); [Larson 2004](#)). This insight is maintained in neo-Davidsonian approaches ([Parsons, 1990](#); [Schein, 1993](#)). Under this type of analysis, *John left quickly* would be rendered along the lines of (69), ignoring tense (the (a) example represents a classical Davidsonian approach, while the (b) is a neo-Davidsonian formulation).

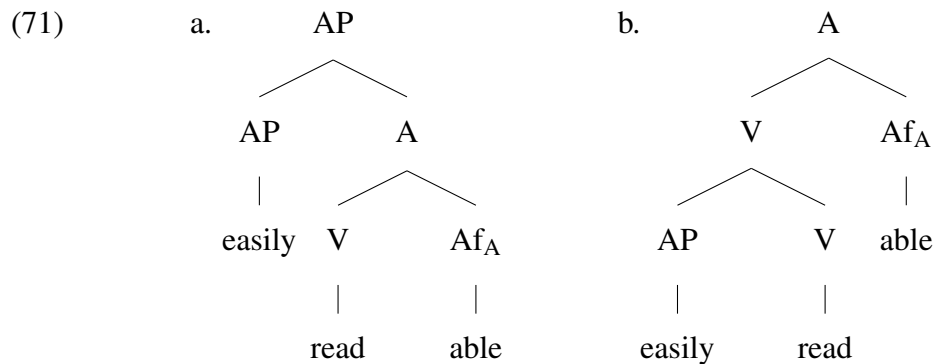
- (69) a. $\exists e$ [leave(j) & quick(e,C)]
b. $\exists e$ [leaving(e) & Agent(e,j) & quick(e,C)]
(“There is an event of leaving of John and the event is quick (for such an action)”)

A unified “A” category would also explain why deverbal adjectives, which appear at least in some cases to be subject to the verbal bracketing paradox phenomenon, are modified by an adverb and not an adjective:

- (70) a. easily readable (=something that may be read easily)
b. instantly destructive (=something that destroys instantly, like an atomic bomb)
c. *easy readable
d. *instant destructive

Here, the rebracketing would proceed at LF as demonstrated above with *-er*, but A would be spelled out as an adverb, because it is modifying an adjective and therefore must appear in adjectival form. The same reasoning would explain the ungrammaticality of **heavily drinker*, because A is here modifying a noun and so must appear as an adjective.

The structure of examples like (70) would be identical to that in (71), as shown below. Again, the (a) example gives the syntactic structure and the (b) example the LF rebracketing.



This analysis is consistent with the idea that inflectional morphology is a reflex of syntactic structure and not of semantics. This is true of the Dutch schwa seen above: when a modifier is syntactically a (prenominal) adjective, the schwa appears and when it is anything else it does not. Similarly, when an A in English modifies a noun it appears without *-ly* in and when it is associated with anything else it appears with *-ly* (in dialects that include this suffix). Seen under this light, *-ly* is just a marker of being in a non-nominal environment, in the same way that markers of being in a nominal environment exist, such as linkers.

It is important to note that the meaning derived from the rebracketing process is entirely predictable and compositional, and can in fact be used as a kind of test to decide whether the rebracketing has taken place. In every case, a Y X-er is a person or thing that Xes Yly. The meaning is read off the rebracketed structure, while the pronunciation (and especially the fact that Y is spelled out as an adjective and to the left of the noun) is read off the syntactic/morphophonological structure. Observe also that the selectional requirements of affixes are still respected under this approach, even at LF. Assuming that the adjective-verb constituent projects a V category, the selectional

requirement for *-er* to attach to a category V would be satisfied.

It seems that the paradoxical reading only happens when an alternative compositional analysis is available. In other words, where any compositional analysis is available, it is always a possible analysis. In the verbal bracketing paradoxes, there are two possible compositional semantic analyses: one that is isomorphic with the syntactic structure and another involving rebracketing. This principle may be a learning principle: children must be able to analyze the smallest consistencies in the linguistic input, in order to learn patterns like rules with limited productivity and inflectional paradigms. Therefore, once they have analyzed words like *dancer* and *worker* into their constituent parts, they can then rebracket phrases like *hard worker* giving an alternative compositional meaning.

In this section I have examined the properties of bracketing paradoxes, and proposed an analysis of verbal bracketing paradoxes involving rebracketing at LF. In the next section, I discuss two further predictions that this analysis makes.

5. Some Predictions of the Theory of LF rebracketing

Given the LF rebracketing analysis detailed above, two further predictions present themselves. In the input to LF, the syntax has built a word consisting of the verb and the suffix, and this is modified by A. At LF, these relationships are rebracketed so that the verb and its modifier are essentially inside a word bounded by the suffix. The traditional assumption (as in Williams 1981) is that functional structure, such as tense and aspect, is disallowed inside a word or compound. Inside the derived noun, we would therefore expect to find no (or very little) functional structure. This would predict that only very low adverbs, those that can combine with a bare V inside the VP, may appear in verbal bracketing paradoxes. This prediction appears to be borne out.

Only very low adverbs are felicitous in bracketing paradoxes (for details on classes of adverbs, see Cinque 1999). Specifically, only manner adverbs appear to exist in this configuration, as seen in all of the examples above. Time and aspect adverbs, among other classes, are absolutely infe-

licitous.^{13, 14}

- (72)
- a. *Julie is a usual worker. (intended: Julie usually works.)
 - b. *Saul is a tomorrow worker. (intended: Saul is working tomorrow, or perhaps less concretely, Saul always claims he will start work tomorrow.)
 - c. *Hattie is an often worker. (intended: Hattie often works.)
 - d. *Thom is a customary worker (intended: Thom customarily works.)

The low adverbs that can appear in bracketing paradoxes seem to be exactly the ones that appear postverbally. If the postverbal adverbial (or A) position can only host manner adverbs, these observations are explained.

Tense, aspect and other functional material cannot appear inside VP, and are disallowed inside a derived word. Adjectives relating to this material cannot take part in bracketing paradoxes, which is consistent with the proposed analysis.

Given that verbal bracketing paradoxes appear to be an LF phenomenon, we might expect certain trademarks of LF to apply to these cases. I will argue that, for some speakers, a kind of very local reconstruction is allowed under certain conditions, in line with this hypothesis.

All speakers accept phrases in which the modifier and derived category are adjacent, as well as those in which the AP and derived category are adjacent, even if a modifier within the AP intervenes between the adjective and derived category.

- (73)
- a. a [_A beautiful] dancer
 - b. a [_{AP} very heavy] drinker
 - c. a [_{AP} hard enough] worker

However, a subset of speakers also accepts cases in which maximally one (low¹⁵) adjective inter-

¹³There is one exception I'm aware of, in the title of John le Carré's *The Constant Gardener*. However to my native speaker's ear, this sounds like a deliberate push at the boundary of acceptable interpretation. I will leave it aside here.

¹⁴This observation is also made in Cinque 2010 (chap.3, n.8), although not in so many words.

¹⁵According to most adjective hierarchies, nationality or provenance adjectives are the lowest category. Intervention by a higher adjective category is significantly degraded:

venes between the verbal modifier and derived category:

(74) %a very heavy French drug-user¹⁶

To these speakers, (74) can refer to a French person who uses drugs heavily.

At first sight, these facts call in to question the applicability of a rebracketing approach. How could we form a constituent out of non-adjacent categories? However, all is not lost.

It is crucial to note that the meaning of *very heavy* is exactly what we would expect were it to appear next to the noun. This fact may be explained if the adjective is moved to its surface position rather than being base generated there (for example, for focus reasons), and the meaning is reconstructed at its original position.

There is some evidence that the modifier should be focused in this example. Those speakers who allow phrases like the one in (73), tend to prefer a pronunciation with stress on *very heavy*, with a reading where, out of a set of French drug-users, we are talking about one who uses drugs heavily. This is also in line with well-known examples of exceptions to adjective ordering restrictions. In these cases, the expected order of adjectives, $A_1 > A_2 > N$ can be reversed if A_1 and N form a class salient in the discourse, and A_2 is used to pick out a subset of that class. An example of this is in (75).

(75) a. Out of all of these big cars, I would buy the YELLOW big car.

Here, just as in (74), stress is placed on the earlier modifier, and the sense of native speakers is that that modifier picks out a subset of individuals identified by the combination of the later modifier and the noun. (74) therefore appears to be an example of a standard exception to adjective ordering restrictions, one that is often argued to involved movement to a focus position.

Focus movement reconstructs for scope. In (76), only narrow scope is present: it is not true

(i) ?*a very heavy bald/happy/round drinker

¹⁶Modifying *heavy* in examples like this seems to make them significantly more acceptable. For more on this, see below.

that for every professor there is a student who said that John kissed that professor. The same holds true of (77)—quantifier scope is still computed on the base position, not the surface position.

(76) A student said that John kissed every professor.

(a > every; *every > a)

(77) EVERY PROFESSOR a student said that John kissed, not every TA.

(a > every; *every > a)

Under focus, *heavy* in (74) receives the same non-intersective reading as when it is adjacent to the noun. This suggests that the adjective has moved to a focus position higher in the phrase, but is interpreted in its base position. If the trace of this focus movement may be involved in the LF rebracketing procedure as described in section 4.2, then this phenomenon is accounted for. These facts provide evidence to support the idea that verbal bracketing paradoxes are due to an adjustment of the structure at LF.¹⁷

I have argued that sentences like (74) and their associated meanings are the result of reconstruction after focus movement. An obvious question that arises is why such reconstruction does not appear to happen in other cases of adjectival focus movement. As mentioned above, focus movement is the standard analysis of a certain class of exceptions to adjective ordering restrictions. Why then can the examples in (78) refer to different objects?

(78) a. a fake gold coin

¹⁷It is not clear how far the adjective involved in rebracketing may move. It is clear that it may cross nationality adjectives, which are generally taken to be the lowest in the hierarchy of adjectives (Sproat and Shih, 1991; Cinque, 2010). Cinque 2010 provides the example in (i), attributed to Megan Rae (p.124, n.11, emphasis mine).

- (i) Speaker A: I'm only an occasional smoker.
Speaker B: But you are a *fairly heavy occasional smoker*.

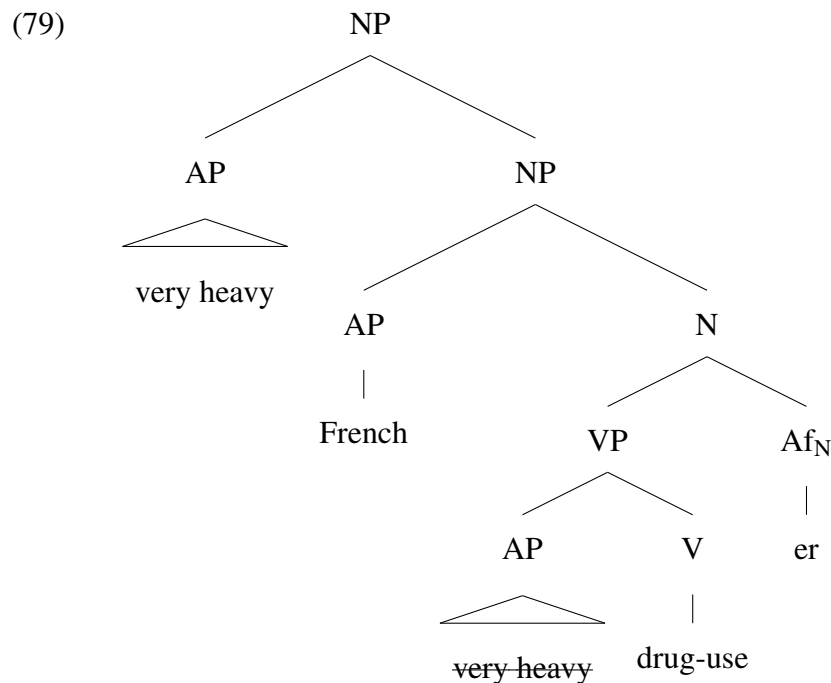
However, moving across two adjectives is markedly degraded:

- (ii) *the very heavy stubborn French drinker (under relevant reading)

- b. a gold fake coin

I will argue that the movement on which reconstruction relies is only allowed when there is motivation for both the surface and trace positions. In (78), this motivation is lacking.

In the case of the bracketing paradoxes, the interpretation of the low modifier (*heavy*, *hard* etc.) requires that modifier to be adjacent to the verb, but its scope requires a high position. That is, in order to get the interpretation in (74) that, out of all the French drug-users, we are referring to the one who uses drugs heavily, *heavy* must be above *French*, while in order to get the *heavy drug-user* reading, *heavy* must be below *French*.



In the bracketing paradox, there is a requirement for both positions, meaning that movement takes place and the moved object can reconstruct in the trace position, leading to the reading found in (74). We predict that if there is no rebracketing, there is no motivation for the trace position, and reconstruction should therefore not occur.

Let us turn to the examples in (78). In (78a), it is possible that the coin is not even gold in colour (or material), while in (78b), the coin is in fact gold, but it is nonetheless a fake. However,

in the following example, even when *fake* is stressed, or focused, the authenticity of the coin's gold-ness is still doubtful, meaning that *fake* is not reconstructing under *gold*.

(80) a FAKE gold coin

Why is reconstruction not possible here, when it appears to be possible with bracketing paradoxes? In (80), there is a base-generated order for the two modifiers that directly gives the meaning that would be derived through reconstruction. (78a) has the structure as in (81a), while (78b) has that of (81b).

- (81) a. a [fake [gold [coin]]]
b. a [gold [fake [coin]]]

(80), under a movement analysis, would require the structure in (82).

(82) a [FAKE [gold [fake [coin]]]]

If the upper copy in (82) reconstructed in the position of the lower copy, the result would be the same as in (81b). Given that focus can occur in situ, this movement and reconstruction would violate the principle of economy. In other words, in (80), a motivation for the surface position of *fake* exists, which is the scopal relationship between the two modifiers. However, there is no motivation for any lower trace position, given that focus can happen in situ. Therefore, there is no requirement for movement and no possibility for reconstruction to take place. Economy considerations would disallow the expensive, movement- and reconstruction-based derivation for these phrases, unless required by scope considerations, as in cases like (74).

A final difference between examples like (74) and (78), is that the adjective in (74) is modified, and seems to be degraded when it is not. Panayidou (2013) argues that unmodified adjectives are bare As, and appear lower in the tree than modified adjectives, which are full APs. Full APs have to be higher in the structure than bare As, so it is not possible to have *French* precede *very heavy*

in (74). While I agree with the broad observation that modified adjectives appear higher in the structure than unmodified ones, I do not agree with the base generation mechanism that Panayidou (2013) makes use of. It seems to me that the complexity of a modified adjective (in this case *very heavy*) favours leftward movement, although exactly why syntactically more complex APs are more acceptable to the left of less complex ones is not clear to me or to Panayidou (2013).

Given the preceding discussion, the two predictions discussed in this section seem to support the LF rebracketing analysis of verbal bracketing paradoxes presented in section 4.2. This analysis also avoids the pitfalls of a PF rebracketing applied to verbal bracketing paradoxes, such as Sproat's (1988) Mapping Principle.

6. Conclusion

I have argued that examples like *heavy drinker* form a class of bracketing paradoxes that is separate to that exemplified by *nuclear physicist*. I have called the former "verbal bracketing paradoxes". Verbal bracketing paradoxes appear similar to traditional bracketing paradoxes in that they give rise to a mismatch between the (morpho)phonology and semantics, under at least one reading. They also share several other characteristics, including a requirement for adjacency between modifier and head. However, the evidence from Dutch shows that the syntactic structure of verbal and traditional bracketing paradoxes is different. For this reason, I proposed an analysis for verbal bracketing paradoxes that relies on a very restricted type of downward movement without a trace, governed by the principle of Information Preservation. This analysis makes several predictions, which I have shown to be borne out.

The analysis also proposes a change in the way in which we view movement. It opens up the possibility of movement without a trace, provided certain types of information are not affected by the movement. While this may seem a radical change, the extent to which it allows new movement types is actually very limited. However, the movement types it does allow capture the specific characteristics of verbal bracketing paradoxes while still retaining a restrictive theory of movement.

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