FLOATING QUANTIFIERS AND ENGLISH VP-STRUCTURE

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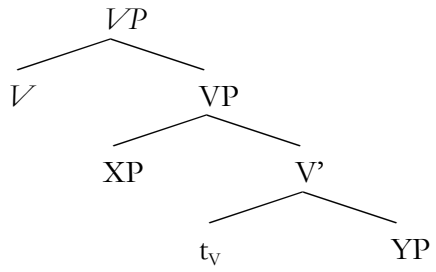
Abstract: In this paper we argue that English allows both traditional left-branching VPs and right-branching VP-shell structures (as first proposed in Larson 1988a, 1990). The choice between these depends on case theory and economy. Case theory triggers VP-shell formation whenever the verb is merged with a DP-object after it has been merged with some other category. The reason is that VP-shell formation allows verb and object to surface in adjacent positions, which is a prerequisite for case checking in English. Economy has the effect that in all other circumstances, VP-shell formation is blocked. We show that this proposal correctly regulates word order in transitive and ditransitive VPs, as well as in VPs that contain a particle. However, the main independent evidence we present comes from object-oriented floating quantifiers, whose distribution is limited to VP-shell structures. In developing this argument, we will propose an analysis of floating quantifiers as anaphoric adverbials. We will also compare this analysis with alternatives according to which floating quantifiers are stranded by movement.
Keywords: Floating quantifiers, VP-shells, case checking, NP-raising.

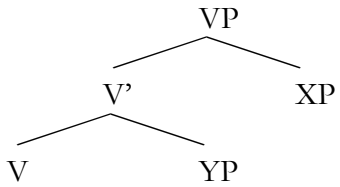
1. Introduction

Ever since the debate between Larson (1988a, 1990) and Jackendoff (1990b), the structure of the English VP has been a controversial issue. Larson claimed that if the verb is followed by two arguments, these are typically accommodated by the right-branching structure in (1a). But Jackendoff, arguing that Larson's arguments are inconclusive, suggested the more traditional left-branching structure in (1b).

(1) a.



b.



It is fair to say that the majority of researchers have opted for a Larsonian analysis, although sometimes a qualified version of it (see in particular Pesetsky 1995). The rejection of the traditional left-branching structure in fact turned out to be a prerequisite for certain subsequent developments in syntactic theory, such as Kayne's (1994) thesis of antisymmetry and Hale & Keyser's (1993, 2002) theory of argument structure. Neither proposal is compatible with (1b).

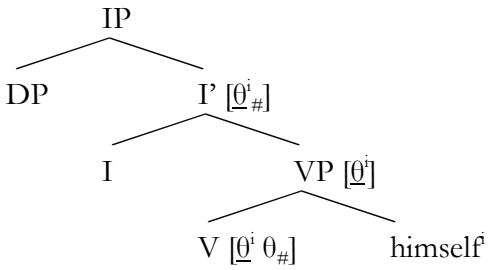
In this paper we argue that English allows both left-branching and right-branching VPs. Thus, we accept that the structure in (1a) exists, but we deny that this is the only possibility. We further argue that the distribution of the two structures is not arbitrary, but driven by case theory. More specifically, a VP-shell is generated only if the constituent in Spec-VP – XP in (1a) – is dependent on the verb for case. This is because

in the alternative left-branching structure the same order of merger will lead to a violation of case adjacency. In (1b), YP intervenes between XP and the verb.

The argument we present is based on the distribution of floating quantifiers. We analyse floating quantifiers as anaphoric adverbials that precede the verbal category to which they attach. The claim of anaphoricity goes back to Belletti (1982), although our implementation will diverge from hers in various ways. The claim of precedence was first made by Baltin (1978, 1982, 1995) and is shared with many other researchers (see, for example, Bobaljik 1995 and Doetjes 1997). The consequence of these assumptions is that an object-oriented floating quantifier can only appear if a VP shell is generated, as we will now explain.

Following Williams (1994), we take anaphors to be elements bound by an unassigned θ-role in a local c-commanding node. The DP that receives this θ-role functions as the semantic antecedent of the anaphor. So, an example like *John likes himself* can be represented as follows:

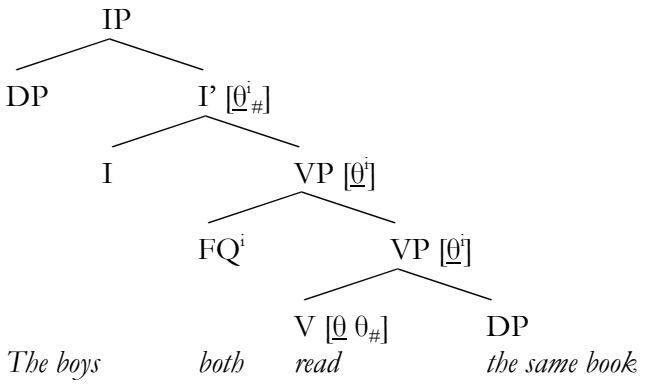
(2)



In this structure, anaphoric binding is indicated by co-superscripting. Θ-role assignment takes the form of θ-role percolation and subsequent assignment under sisterhood. Satisfied θ-roles are marked as such by the #-symbol. (This system of anaphoric and thematic dependencies is a variant of the one described in more detail in Neeleman & Van de Koot 2002).

If floating quantifiers are anaphoric, they must be licensed in the same manner as *himself* in (2). In an example like *The boys both read the same book*, the floating quantifier *both* is bound by the verb's external θ-role as it percolates up to the I'-node, where it is applied to the subject (see (3)). As in our earlier example, *both* is interpretively associated with the DP satisfying the θ-role that binds it.

(3)

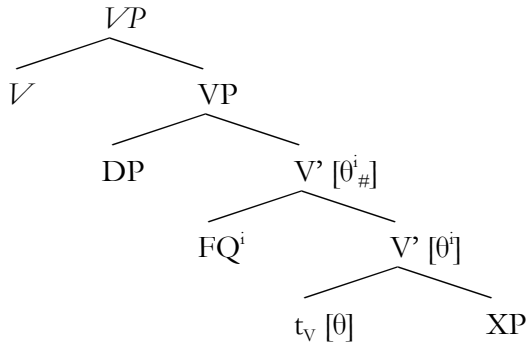


This analysis rules out the examples in (4). Despite being hierarchically identical to (3), (4a) is ungrammatical because *both* follows the category to which it is attached. (4b) is ruled out as interpretively the floating quantifier can only be bound by the verb's internal θ-role. But since this role is assigned before *both* is merged, it does not percolate to a node that c-commands the floating quantifier.[1]

(4) a. *[$_{IP}$ The boys [$_{VP}$ [$_{VP}$ read the same book] both]].
b. *[$_{IP}$ I [$_{VP}$ both [$_{VP}$ met the boys]]].

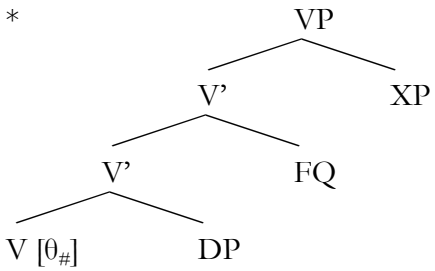
With this system in mind, consider the distribution of object-oriented floating quantifiers. These can be licensed in a Larsonian structure. In (5), FQ precedes the category it is attached to and can be bound by the θ-role assigned to the DP in spec-VP.

(5)



In contrast, an object-oriented floating quantifier cannot appear in a left-branching structure like (6). First of all, FQ does not precede V', but follows it. Moreover, the object's θ-role has been assigned before FQ is merged, and hence it will not percolate up to a node from which binding can take place.

(6) *



In other words, our assumptions about floating quantifiers allow these elements to be used as a test for the presence or absence of a VP shell. The bulk of this paper is devoted to showing that by this test a VP shell is generated if and only if it is required by case theory. Crucially, in a number of constructions, object-oriented floating quantifiers are ruled out because VP has a left-branching structure.

We are of course aware of other approaches to floating quantifiers, which would not give rise to the same conclusions (see Bobaljik 2003 for an overview of existing approaches). In particular, our argument collapses if floating quantifiers are stranded by NP-raising (see Sportiche 1988, Bošković 2004 and others), or if they are adverbs attached in the path from an NP-trace to its antecedent (see Doetjes 1997). A full evaluation of these proposals would take us too far afield, but we will show that they face some empirical shortcomings.

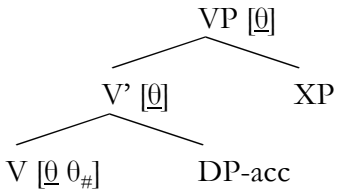
We begin, however, by working out the theory of VP shell formation in some more detail.

2. Case and VP-Shell Formation

The starting point of this section is the traditional view that in English accusative case is licensed under adjacency with a preceding verb. For the moment, we accept this view as descriptively adequate, and will postpone deriving case adjacency until later.

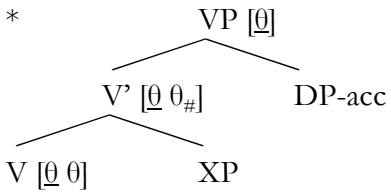
As argued by Neeleman and Weerman (1999), the structure of the English VP can be derived from case adjacency together with the order in which constituents are merged. If the first constituent to be merged with the verb is an accusative DP, while subsequent VP-internal constituents do not rely on the verb for case, a simple left-branching structure suffices. In (7), the accusative DP is adjacent to the verb, which allows its case to be licensed:

(7)



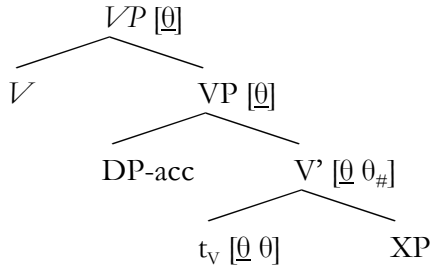
But if the order of merger is reversed, a simple left branching structure will prevent case licensing, as the accusative DP is no longer adjacent to the verb. (Note that the ungrammaticality of (8) cannot be attributed to θ-theory, since assignment of the verb's internal θ-role to spec-VP must be allowed elsewhere; see below.)

(8) *



This problem can be solved by generating the accusative DP to the left of V', and by moving the verb across it. In the structure thus derived, the accusative DP is right-adjacent to the verb, as required (from here on we use italics to distinguish VP-shells from the initial verbal projection):

(9)



Our proposal, then, is that a VP-shell is generated whenever an accusative DP is not the first phrase to merge with the verb. As a result, economy considerations dictate that VP-shell formation is blocked under the following circumstances: (i) when the VP contains only one constituent other than the verb, or (ii) when no constituent other than the one merged first carries accusative. This implies, amongst other things, that a verb that only selects a PP-complement will not project a VP-shell, even if the PP is followed by other material (some motivation for this will be provided as we proceed).

This case-based proposal has implications that differ from alternatives that take VP-shells to be motivated by θ-theory. The contrast with Larson's original proposal mainly involves ditransitive verbs. Larson assumes that the number of argument positions within VP is limited to two (namely the head's specifier and complement position). Therefore, intransitive and simple transitive verbs need not project a VP shell. VP-shell formation is required, however, if the verb projects a subject and two internal

arguments. (A very similar claim is made in Haider's work on VP shells; see Haider 2005 and references mentioned there.) Our analysis is different in that ditransitives will not project a VP shell unless the second argument merged with the verb depends on it for case.

The difference between our proposal and those of Hale and Keyser (1993) and Chomsky (1995) is more dramatic. These authors argue that the higher head in a VP-shell structure is a light verb introducing the external θ-role. Thus a double-object verb like *give* is decomposed into a verbal root meaning something like 'get' and a causative morpheme that heads vP. On this view any verb that has an external argument of the relevant semantic type must project a VP-shell structure. Such verbs include intransitives like *work* as well as simple transitives like *paint:*

(10) a. $[_{IP}$ John $[_{vP}$ worked-v $[_{VP}$ $t_V]]]$.
b. $[_{IP}$ John $[_{vP}$ painted-v $[_{VP}$ t_V the barn$]]]$.

If VP-shells are motivated by case adjacency and subject to economy, however, the projection of these verbs will not usually expand to a VP-shell structure:

(11) a. $[_{IP}$ John $[_{VP}$ worked$]]$.
b. $[_{IP}$ John $[_{VP}$ painted the barn$]]$.

In this respect, our proposal resembles the approach adopted in Larson 1988a.

There are two immediate advantages to the case-based theory of VP-shell formation, the first being that it explains why the process goes hand in hand with movement of the verb. After all, its very motivation is to create a structure in which the verb is left-adjacent to an accusative DP. On the thematic analysis of VP-shells it is not obvious why the main verb should move in overt syntax; a separate trigger must be posited.

The second advantage of the case-based theory is that it enables us to analyse the process as an instance of *self attachment*. It is often asserted that if an element α is attached to a node β by movement, it is β that projects. But there is no valid independent reason for ruling out projection of α, at least not ruling it out across the board (see Van Riemsdijk 1989, Ackema et al. 1993, Koeneman 2000, Bury 2003, among others). In fact, if a verb is attached to a top node of its own projection line and allowed to re-project, a structure is derived which matches that of VP-shells (see (9)). As has been argued in a number of recent publications, self attachment avoids the pitfalls of an adjunction analysis of head movement. For example, a moved verb c-commands its trace if it undergoes self attachment, but not if it is adjoined to a higher head.

VP-shell formation by self attachment is possible if case is taken to be triggering the process because case adjacency is merely concerned with the surface position of the verb vis-à-vis the object. It is also compatible with Larson's proposal. However, if the head of a VP-shell is a head distinct from the verbal root and responsible for external θ-role assignment, as argued by Hale & Keyser and Chomsky, self attachment cannot be used to analyse the necessary verb movement. VP-shell formation must instead rely on adjunction of the verb to the head of the VP-shell. Hence problems inherent in head-to-head adjunction cannot be avoided.

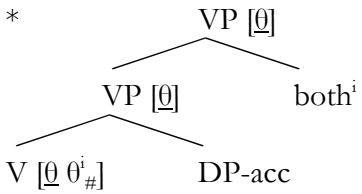
There are a number of further empirical pay-offs of the case-based theory of VP-shell formation, which will be explored as we proceed.

3. Floating Quantifiers

3.1 Monotransitives

As we have seen, a simple transitive verb usually does not project a VP-shell. We therefore predict that in sentences headed by such a verb, it should be impossible to associate a floating quantifier with the direct object. In order to see why, consider the following structure:

(12) *



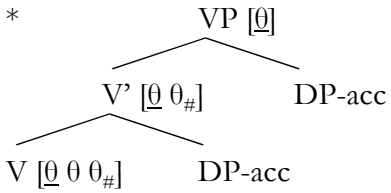
The structure in (12) violates both conditions that govern the distribution of floating quantifiers, namely that they precede the category they attach to, and be c-commanded by the θ-role that binds them. Indeed, examples like (13) are ungrammatical (see Maling 1976).[23]

(13) *I saw the boys both.

3.2 Nominal ditransitives

As opposed to direct objects in simple transitive constructions, indirect objects in double-object constructions are predicted to be possible associates of floating quantifiers. Ditransitive verbs select two case-marked DPs. If we adopt the null hypothesis that both cases are licensed by the verb, VP-shell formation will be obligatory. In a left-branching structure like (14), the case of the second DP cannot be licensed, since that DP is not adjacent to the verb.[4]

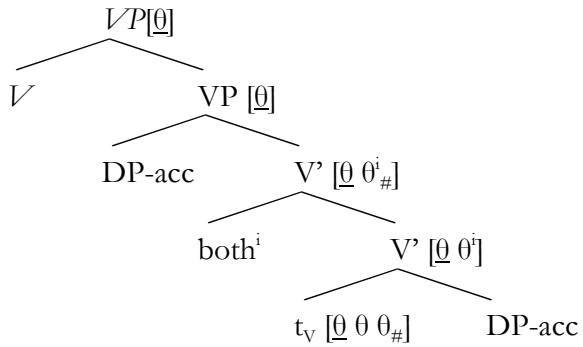
(14) *



Forming a VP-shell, however, enables both DPs to adhere to the case adjacency requirement: one is adjacent to the moved verb, the other to its trace.

Of course, the claim that ditransitive verbs project a VP-shell is uncontroversial. What is interesting from our current perspective is that this structure allows the indirect object to be associated with a floating quantifier:

(15)



In (15), the floating quantifier precedes V', and is bound by an unassigned θ-role in a c-commanding node. In other words, both requirements that hold of floating quantifiers are met. This explains the grammaticality of examples like (16), first discussed by Maling (1976).

(16) I gave the boys both a good talking to.

Of course, if the floating quantifier is right-adjoined to V', the resulting structure is ungrammatical:

(17) *[$_{IP}$ I [$_{VP}$ gave [$_{VP}$ the boys [$_{V'}$ [$_{V'}$ t_V a good talking to] both]]]].

Although VP-shell formation makes it possible to relate the indirect object to a floating quantifier, a construal with the direct object is still ruled out. A sentence like (18) is ungrammatical for the same reasons as (13): the floating quantifier neither precedes V', nor is it c-commanded by a suitable unassigned θ-role. The V' in (18) is isomorphic to the VP in (12).

(18) *[$_{IP}$ I [$_{VP}$ showed [$_{VP}$ Mary [$_{V'}$ [$_{V'}$ t_V the pictures] both]]]].

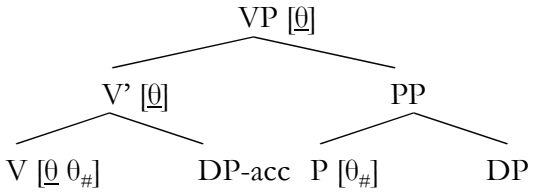
3.3 Prepositional ditransitives

It is generally assumed that the order in which the verb's internal arguments are merged in a double object construction is determined by the thematic hierarchy (see Grimshaw 1990 and Jackendoff 1990a). The example in (19) can be ruled out on these grounds alone, as the theme c-commands the goal, rather than the other way around.

(19) a. [$_{IP}$ John [$_{VP}$ gave [$_{VP}$ Mary [$_{V'}$ t_V the ball]]]].
b. *[$_{IP}$ John [$_{VP}$ gave [$_{VP}$ the ball [$_{V'}$ t_V Mary]]]].

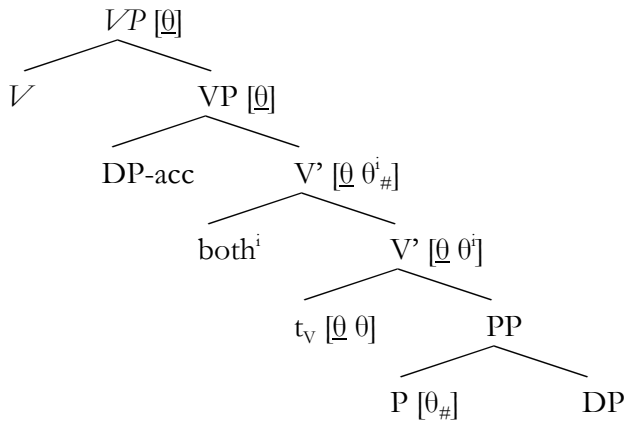
If a verb selects both a DP and a PP, the situation is more complex. The thematic hierarchy determines the order in which θ-roles of a predicate are assigned, but it has nothing to say about θ-roles assigned by different predicates. Hence, if the DP contained in a prepositional complement is θ-marked by the preposition rather than the verb, the order in which PP and DP are merged can vary.[5] As a result, an example like *John gave the ball to Mary* is structurally ambiguous. If the accusative DP is merged first, VP-shell formation is unnecessary:

(20)



However, if the accusative DP is merged after the PP, case adjacency demands that a VP-shell be generated. The resulting configuration allows a floating quantifier to be associated with the direct object:

(21)



The left-branching VP in (20) does not allow a floating quantifier to be linked to the DP-object, for obvious reasons: there is no verbal projection to which it can left adjoin and also be bound by the object's θ-role. We therefore expect that floating quantifiers can be accommodated within DP-PP structures, but only when the VP is right-branching.

Maling (1976) notes that examples like (22) are grammatical, but how can we prove that they cannot contain a left-branching VP?

(22) He introduced the boys both to someone famous.

One test that comes to mind is *do so* ellipsis. As is well-known, *so* must replace a constituent, precluding the ellipsis of a verb and a DP immediately following it in a VP-shell structure. This is what rules out (23a). (23b), however, is acceptable to a considerable percentage of native speakers, which suggests that DP-PP constructions can be left-branching. Its grammaticality can only be understood if the verb and the accusative DP form a constituent excluding the PP. The same conclusions hold of the VP-ellipsis structure in (23c). (We assume that speakers who reject (23b,c) also allow a left-branching structure for DP-PP constructions, but have more stringent conditions on what can be stranded under ellipsis.)

(23) a. *He was determined to [$_{VP}$ *show* [$_{VP}$ *the boys* [$_{V'}$ t_V a film]]],
and he did *so* Fahrenheit 9/11.

b. %He was determined to [$_{VP}$ [$_{V'}$ *show the film*] to someone famous]
and he did *so* to Salman Rushdie.

c. %He was determined to [$_{VP}$ [$_{V'}$ *show the film*] to someone famous],
so he did e_{VP} to Salman Rushdie.

So the more precise prediction we make is that the pattern of ellipsis in (23b,c) is not compatible with the presence of an object-oriented floating quantifier. The floating quantifier can only be licensed if a VP-shell is generated, while *do so* ellipsis requires a left-branching tree (that is, a tree without a VP-shell). This prediction seems to be correct: the examples in (24) are ungrammatical (for all speakers).

(24) a. *He wanted to show the films both to someone famous,
and he did so to Salman Rushdie.

b. *He wanted to show the films to someone famous,
so he did e_{VP} both to Salman Rushdie.

There is a second way in which we can demonstrate that a floating quantifier can only be associated with the object of a prepositional ditransitive verb if VP-shell formation takes

place. The argument is based on an observation by Baltin (1995), although our interpretation of it differs considerably from his. To begin with, consider the English construction in (25), which in our view involves the fronting of a verbal constituent.

(25) [$_{VP}$ Apply for money] though he may t_{VP}, it won't make a difference.

If (25) is derived by movement, it follows that (26a) is ungrammatical: on a VP-shell analysis of double object constructions, *give Mary* is not a constituent. The acceptability of (26b) confirms our claim that prepositional ditransitives may project a left-branching structure, as such a structure would allow fronting of *give the books*.

(26) a. *Give Mary though we may the books, it won't make a difference.
b. [$_{V'}$ Give the books] though we may [$_{VP}$ $t_{V'}$ to Mary], it won't make a difference.

The crucial prediction is that structures like (26b) should not allow floating quantifiers that are associated with the DP-object. This is because object-related floating quantifiers require VP-shell formation, which is at odds with the movement that derives (26b). Baltin observes that examples like (27) are indeed ungrammatical:

(27) a. *Give the books both though we may to Mary, it won't make a difference.
b. *Give the books though we may both to Mary, it won't make a difference.

Finally consider verbs that select two PP-complements. The theory proposed here predicts that the order of projection will be free, as both complements carry an overt marker. However, no matter what the order of projection is, a VP-shell will never be generated, because VP-shell formation is driven by the need to check accusative case against the verb. We therefore expect that neither complement can be associated with a floating quantifier, a prediction borne out by the data in (28).

(28) a. He argued with the men (*both) about someone famous.
b. He argued with the men about someone famous (*both).
c. He argued about the women (*both) with someone famous.
d. He argued about the women with someone famous (*both).

3.4 Monotransitives revisited

We concluded in section 3.1 that floating quantifiers cannot be associated with objects of monotransitives. This is not quite true, as adding an object-oriented secondary predicate rescues the sentence.

The analysis of secondary predication we adopt is based on the notion of θ-identification (see Higginbotham 1985). The external θ-role of the secondary predicate is identified with an unassigned θ-role of the verb. A subject-oriented depictive, for example, can be represented as below, where co-superscripting is used to indicate identification:

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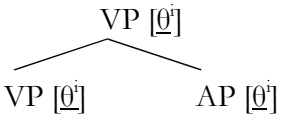
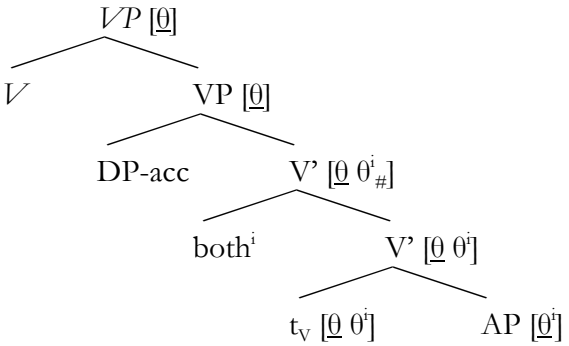


One advantage of this analysis is that the θ-criterion does not need to be adjusted to accommodate secondary predication. In an example like *John drank the milk warm* θ-role identification ensures that the object receives only one θ-role, albeit composed (for detailed discussion see Neeleman and Van de Koot 2002).

It follows from this view of secondary predicates that they must be c-commanded by the DP to which they are related (see also Williams 1980). This is simply because the mechanism of θ-role assignment introduced in section 1 guarantees that arguments c-command predicates. As a consequence, object-oriented secondary predicates must be merged with the verb prior to merger of the object, entailing VP-shell formation and hence the possibility of merger of an object-oriented floating quantifier. We illustrate this in (30) (for related discussion, see Vanden Wyngaerd 1989 and the references mentioned in connection to () below.)

(30)



(31a,c) instantiate the above structure, and as expected, these examples are grammatical. (31b,d) represent hierarchically identical structures, but here the floating quantifier follows the category to which it is attached. Hence, these examples are unacceptable.

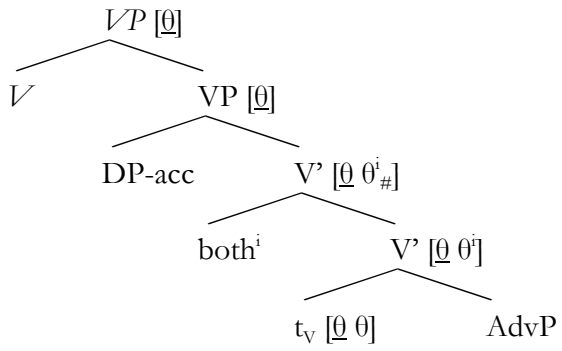
(31) a. [IP I [VP met [VP the boys [V' tV both rather drunk]]]].
b. *[IP I [VP met [VP the boys [V' [V' tV rather drunk] both]]].
c. [IP I [VP painted [VP the doors [V' tV both green]]]].
d. *[IP I [VP painted [VP the doors [V' [V' tV green] both]]].

Sentence-final adverbs can also rescue floating quantifiers related to the object of a monotransitive verb:[6]

(32) a. I recognised the boys both during the party.
b. I met the boys both unexpectedly.

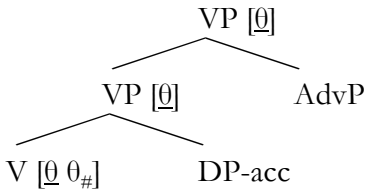
This is unsurprising, as a VP-shell must be projected if the adverb is merged before the accusative DP. The resulting structure can host a floating quantifier (see (33)). (The claim that non-selected material (or 'adjuncts') can be merged with the verb prior to arguments is defended for OV languages in Bayer & Kornfilt 1994, Neeleman 1994 and Neeleman & Reinhart 1997, among others. An extension of this claim to VO languages can be found in Neeleman & Weerman 1999; see also Larson 1988b and Chomsky 1995, section 4.7.5.)

(33)



Of course, the object can also be merged prior to the adverb, in which case a left-branching structure results. This should block inclusion of a floating quantifier:

(34)



What we predict, then, is that a structure hosting a floating quantifier is necessarily right-branching. As before, we can test this prediction using *do so* ellipsis, which we expect to be incompatible with the presence of a floating quantifier. Indeed, while (35a) is acceptable, (35b) is ungrammatical on the intended reading.[7] The same is true of the structure is (35c), which is an attempt at partial VP ellipsis in the right-branching structure forced by a floating quantifier.

(35) a. He wanted to [$_{VP}$ [$_{VP}$ *paint the boys*] in an impressive room],
and he decided to do *so* in the library.
b. *He wanted to *paint the boys both* in an impressive room,
and he decided to do *so* in the library.
c. *He wanted to *paint the boys* in an impressive room,
so he did e_{VP} both in the library.

Let us finally turn to monotransitives that select a PP-complement. Since there is no need to check accusative against the verb in the case of PP-complements, VP-shell formation will be blocked, disallowing the complement to be associated with a floating quantifier. This explains the following judgments (which hold when there is no pause preceding *both*; see footnote 6 above for why this is relevant):

(36) a. I looked at the movies (*both) during the party.
b. I ran into the boys (*both) unexpectedly.

3.5 Subjects

So far, we have only concerned ourselves with floating quantifiers associated with objects, as these are most relevant to our claims about VP-shell formation. In this section, we turn to subject-oriented floating quantifiers. Some initial observations are in line with our proposal. In transitive sentences, such floating quantifiers must precede the verb (see the discussion surrounding (3) and (4)):

(37) a. [$_{IP}$ The boys [$_{VP}$ both [$_{VP}$ read the same book]]].

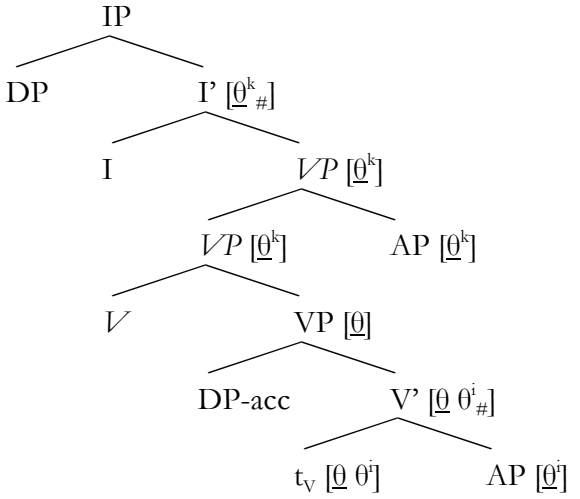
b. *[$_{IP}$ The boys [$_{VP}$ [$_{VP}$ read the same book] both]].

All remaining data can be captured once we acknowledge that elements contained in VP are usually object-oriented. For example, if two secondary predicates are present, one linked to a subject and the other to an object, the latter must precede the former (compare Williams' (1980) notion of thematically governed predication):

(38) a. *The boys ate the meat drunk raw.
b. The boys ate the meat raw drunk.
c. *The boys painted the barn drunk green.
d. The boys painted the barn green drunk.

These data follow if the lowest position normally available for subject-oriented predicates is as adjuncts to the VP, in contrast to object-oriented predicates, which must be the first elements merged with the verb if the object is to c-command them:

(39)



Should a subject-oriented predicate be able to appear within VP, it would be hard to rule out the word order in (38a,c). For example, the subject-oriented depictive might merge with the verb before the object-oriented depictive is merged:

(40) *[$_{IP}$ John [$_{V'P}$ ate [$_{VP}$ the meat [$_{V'}$ [$_{V'}$ t$_{v}$ drunk] raw]]]].

We think that the condition responsible for the data in (38) can be formulated as follows:

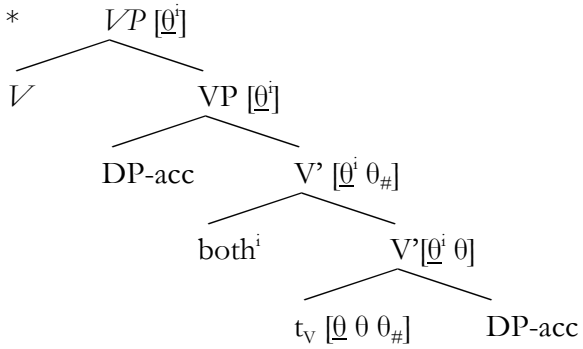
(41) Avoid applying operations involving the external θ-role prior to those involving internal θ-roles.

The strategy expressed by (41) is to try and finish work on the VP before work on higher projections is started. In the case at hand this implies that θ-identification involving the verb's external θ-role will be postponed, if possible, until all operations involving the verb's internal θ-roles are carried out. These operations include θ-identification with the internal role as well as application of the internal role. The effect is that a subject-oriented depictive is preferably merged at the VP-level, as in (39), and cannot be contained in the verb's initial projection, as in (40).[8]

Since floating quantifiers are bound by θ-roles, they are subject to the condition in (41). This implies that if they are to be bound by an external role, they will be merged

after all operations involving internal roles have taken place. Hence, like subject-oriented depictives, they must be attached at the VP-level, or higher. If a subject-oriented floating quantifier is attached internally to the verb's initial projection, as in the double-object construction in (42), its association with the external θ-role will precede assignment of at least one of the internal roles, and so (41) will be violated.[9]

(42) *



As expected, a subject-oriented floating quantifier cannot follow an indirect object:

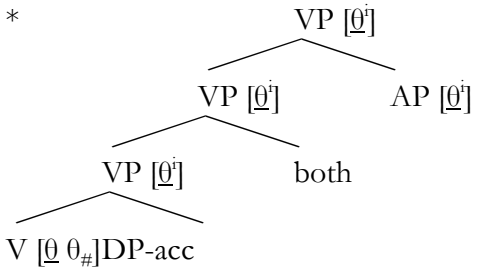
(43) *[IP The boys [VP gave [VP Mary [V' both [V' t_V a copy of Emma]]]]].

The condition in (41) is satisfied if the floating quantifier is attached pre-verbally, as in (44a). Its association with the verb's external θ-role takes place subsequent to assignment of all internal roles. There are two additional structures which share this order of operations, but are ruled out for independent reasons. In (44b) the floating quantifier is left-adjoined to VP, which results in a case-adjacency violation. In (44c) case adjacency is respected, but the floating quantifier follows the category to which it is attached.

(44) a. [IP the boys [VP both [VP gave [VP Mary t_V a copy of Emma]]]].
b. *[IP the boys [VP gave [VP both [VP Mary t_V a copy of Emma]]]].
c. *[IP the boys [VP gave [VP [VP Mary t_V a copy of Emma] both]]].

Recall that object-oriented floating quantifiers cannot occur sentence-finally, but can be rescued by the addition of predicative or adverbial material, as was demonstrated in (31) and (32) respectively. Taking on board the condition in (41) allows us to explain why sentence-final subject-oriented floating quantifiers cannot be rescued in the same manner. To begin with, consider structures to which a subject-oriented secondary predicate is added. If we strictly adhere to (41), both the secondary predicate and the floating-quantifier must be attached at the VP-level or higher. But placing the floating quantifier in the right periphery of the sentence then necessarily leads to a violation of the ordering restriction on such elements:

(45) *



Structures like (45) are indeed ungrammatical:

(46) *[$_{IP}$ The boys [$_{VP}$ [$_{VP}$ [$_{VP}$ read the book] both] rather drunk]].

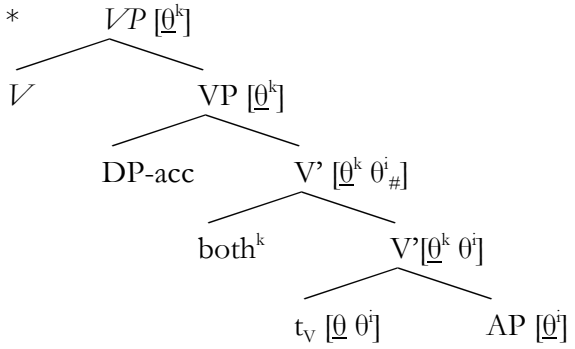
Note that an intonational break between the object and the quantifier seems to improve examples like (46). We would argue that in such cases the quantifier is not an anaphoric adverbial at all, but an argument. Support that this kind of structure exists independently comes from examples like (47), where a comma intonation is obligatory (see Doetjes 1997 for related discussion).

(47) The boys read the book, both of them rather drunk.

Hence, here and below the judgments given are for structure without a comma intonation.

If a secondary predicate is object-oriented, the c-command condition on predication forces it to merge with the verb prior to merger of the object. This carries with it the implication that a subject-oriented floating quantifier can only appear in between the object and the secondary predicate if it is itself contained within the verb's maximal projection, in violation of (41):

(48) *



The examples in (49) show that object-oriented secondary predicates indeed cannot rescue subject-oriented floating quantifiers in the right periphery of the sentence.

(49) a. *[$_{IP}$ The boys [$_{VP}$ drank [$_{VP}$ the milk [$_{V'}$ both [$_{V'}$ t_V warm]]]]].
b. *[$_{IP}$ The boys [$_{VP}$ painted [$_{VP}$ the barn [$_{V'}$ both [$_{V'}$ t_V green]]]]].

This line of argumentation applies to sentence-final adverbials as well. If the adverbial is attached at the VP-level or higher, a floating quantifier following the verb must have been right-adjoined (see (50a)). If the adverbial is merged early, so that case adjacency forces VP-shell formation, a floating quantifier following the verb will necessarily violate (41).

(50) a. *[$_{IP}$ The boys [$_{VP}$ [$_{VP}$ [$_{VP}$ read the book] both] in the library]].
b. *[$_{IP}$ The boys [$_{VP}$ read [$_{VP}$ the book [$_{V'}$ both [$_{V'}$ t_V in the library]]]]].

The condition in (41) also allows us to refine our account of object-oriented floating quantifiers. Although these can be rescued by the addition of a resultative or object-oriented depictive, it does not help to add a subject-oriented depictive. This is because (41) demands such elements to be attached at the VP-level or above, which in turn means that their presence will not trigger VP-shell formation. The example in (51) must therefore have a left-branching VP, as indicated, with the floating quantifier illegally following its VP host:

(51) *[$_{IP}$ John [$_{VP}$ [$_{VP}$ [$_{VP}$ composed his symphonies] both] drunk]].

The analysis extends to other examples involving subject-oriented predicates:[10]

(52) *[$_{IP}$ John [$_{VP}$ [$_{V'}$ [$_{V'}$ struck the boys] both] as stupid]].

3.6 Interim Summary

The results of this section are summarised in the table below. (In this table, floating quantifiers and their associated DPs are underlined. Lack of underlining indicates that the judgment given holds irrespective of the interpretation of the floating quantifier. Finally, secondary predication is marked in bold face.) The main conclusion we can draw from this table is that the possibility of having an object-oriented floating quantifier correlates perfectly with the presence or absence of a VP-shell (as predicted by the theory of case-driven verb movement outlined in section 2).

(53)

Monotransitives	*Nominal ditransitives*	*Prepositional ditransitives*
DP FQ V DP *DP V DP FQ	DP FQ V DP DP *DP V FQ DP DP DP V DP FQ DP *DP V DP FQ DP *DP V DP DP FQ	DP FQ V DP PP *DP V FQ DP PP DP V DP FQ PP[1] *DP V DP FQ PP *DP V DP PP FQ
Subject-oriented depictives	*Object-oriented depictives*	*Adverbials*
DP FQ V DP **AP** ***DP** V FQ DP **AP** ***DP** V DP FQ **AP** ***DP** V DP FQ **AP** ***DP** V DP **AP** FQ	DP FQ V **DP AP** *DP V FQ **DP AP** DP V **DP** FQ **AP** *DP V **DP** FQ **AP** *DP V **DP AP** FQ	DP FQ V DP AdvP *DP V FQ DP AdvP DP V DP FQ AdvP[1] *DP V DP FQ AdvP *DP V DP AdvP FQ
[1] only acceptable under VP shell formation		

4. Prosodic Case Checking

So far, we have assumed that accusative case checking in English requires adjacency. As we will show in this section, case adjacency can be derived from a prosodic notion of checking domains. This reinterpretation of case adjacency offers a ready analysis of the distribution of floating quantifiers in particle constructions.

4.1 A PF Account of Case Adjacency

The PF interface maps syntactic structure onto a prosodic representation. We propose, following Neeleman & Weerman (1999) and Neeleman (2002), that case adjacency can be explained in terms of this mapping.[11] The proposal rests on the assumption that accusative case checking in English is conditioned by prosodic phrase boundaries (or φ-boundaries):

(54) A syntactic head α may check the case of syntactic phrase β if and only if the phonological realisation of α and β are contained in the same prosodic phrase.

This condition on checking is not meant to be universal; UG also allows checking in syntactically conditioned environments, but this does not give rise to adjacency.

Selkirk (1986) and others have argued that in VO-languages the right edge of a syntactic phrase coincides with the right edge of a prosodic phrase. This generalisation is captured by the alignment principle below.

(55) Align (Right, φ) (Right, XP)

The effects of this principle are demonstrated by the example in (56a), which is mapped onto the prosodic structure in (56b), where braces indicate φ-boundaries.

(56) a. [[A friend of [Mary's]] [has [given [a book] [to [Sue]]]]].
b. {A friend of Mary's} {has given a book} {to Sue}.

If an adverbial intervenes between a verb and an object in English, a prosodic structure results in which the case of the object cannot be checked. In (57a,a'), *read* and *the book* are not part of the same φ and therefore (54) is violated. This problem does not arise if the adverbial appears to the right of the object, as in (57b,b'), or if it precedes the verb, as in (57c,c'):

(57) a. [[John] [[read [slowly]] [the book]]].
a'. *{John} {read slowly} {the book}.
b. [[John] [[read [the book]] [slowly]]].
b'. {John} {read the book} {slowly}.
c. [[John] [[slowly] [read [the book]]]].
c'. {John} {slowly} {read the book}.

Adverbials can separate a verb from a prepositional complement, because such complements do not depend on the verb for case:

(58) a. [[John] [[spoke [softly]] [to the children]]].
a'. *{John} {spoke softly} {to the children}.
b. [[John] [[spoke [to the children]] [softly]]].
b'. {John} {spoke to the children} {softly}.

Of course, (57) and (58) are the kind of data that originally motivated the adjacency condition on case assignment.

As before, the problem with (57) can be solved by creating a structure with identical hierarchical properties, but a different linearisation, namely a VP-shell. In (59) the verb and the object are in the same prosodic domain, enabling them to enter into a checking relation.

(59) a. John $[_{V'}$ read $[_{VP}$ $[_{DP}$ the book] $[_{V'}$ t_V $[_{AdvP}$ slowly]]]].
b. {John} {read the book} {t_V slowly}.

These are the bare outlines of the prosodic analysis of case adjacency. Many important questions cannot be addressed here for reasons of space. One issue we should briefly mention, however, is that we assume that there are various stages in the mapping between syntax and phonology. The prosodic structures given above hold at early stages of this mapping; later stages allow for adjustments of the initial prosodic structure. Such adjustments often display sensitivity to such notions as weight distribution, speech rate, and so on, which are irrelevant to case adjacency. See Kaisse 1985, Ghini 1993 and Monachesi 2005 for models of prosodic phrasing that come close to what we suggest

here. A further consequence of case theory being constrained by the initial prosodic structure is that traces can still play a role in the checking procedure.[12] They are absent in subsequent prosodic representations. For a more detailed description of relevant aspects of the syntax-phonology interface, see Ackema & Neeleman 2004.

4.2 Monotransitive particle verbs

The above allows us to extend the analysis of English VP-shell formation in terms of case adjacency to verb-particle constructions. There is convincing evidence that a verb and a particle form a complex head in syntax (see Booij 1990, Johnson 1991, Roeper & Keyser 1992, Neeleman & Weerman 1993, and others). It can be argued that, as a consequence, particles project optionally. If so, both structures in (60) are available prior to merger of the object.

(60) a. $[_{V}$ V Prt]
b. $[_{V}$ V PrtP]

The word order alternation typical of English particle constructions can be explained as a result of the co-existence of these structures. An object merged with (60a) can be licensed straightforwardly. If the particle does not project, verb and object will be part of the same φ, with the effect that case checking is possible. This explains the grammaticality of (61), an apparent violation of case adjacency.

(61) a. John $[_{VP}$ $[_{V}$ looked up$_{Prt}$] the information].
b. {John} {looked up the information}.

An object merged with (60b) cannot be licensed if it appears to the right of the verb. Since the particle projects, it will trigger φ-closure, so that object and verb are no longer in the same checking domain (cf. (62)).

(62) a. *John $[_{VP}$ $[_{V}$ looked up$_{PrtP}$] the information].
b. *{John} {looked up} {the information}.

The object is therefore merged in a position preceding the verb, after which the verb is moved leftward, giving rise to a VP shell. As a result of this movement, the object can be licensed, since in the prosodic structure assigned to (63) the verb and the object are in the same checking domain:[13,14]

(63) a. John $[_{VP}$ looked $[_{VP}$ the information $[_{V}$ t$_{V}$ up$_{PrtP}$]]].
b. {John} {looked the information} {t$_{V}$ up$_{PrtP}$}.

In the examples discussed so far, the particle does not have to project, since it does not take specifiers or complements. If such elements *are* present, however, projection is necessary and hence VP-shell formation must take place. If it did not, the object's case could not be checked. This explains the distribution of the modifier *right* in (64) (see Den Dikken 1995 and references mentioned there for discussion of these data).

(64) a. *John $[_{VP}$ $[_{V}$ looked $[_{PrtP}$ right up]] the information].
a'. *{John} {looked right up} {the information}.

b. John [$_{VP}$ looked [$_{VP}$ the information [$_{V}$ t_V [$_{PrtP}$ right up]]]].
b'. {John} {looked the information} {t_V right up}.

Given this analysis particle constructions will only contain a VP-shell when the particle follows the object. This in turn implies that object-oriented floating quantifiers are only licensed when this word order obtains, and moreover, that they will have to precede the particle. The following data bear this out:

(65) a. *John [$_{VP}$ [$_{VP}$ [$_{V}$ took out] the boys] both] for their birthdays].
b. *John [$_{VP}$ took [$_{VP}$ [$_{VP}$ the boys [$_{V'}$ [$_{V}$ t_v out] both]] for their birthdays]].
c. John [$_{VP}$ took [$_{VP}$ [$_{VP}$ the boys [$_{V'}$ both [$_{V}$ t_v out]]] for their birthdays]]

An assumption implicit in our account of (65) is that particles are obligatorily stranded by verb movement. If (65) involved movement of the verb-particle combination into a VP-shell, its ungrammaticality would remain unexplained. We therefore follow Chomsky (1995) in adopting the constraint in (66), which states that if some principle can be satisfied through movement of either α or β, and α is contained in β, then movement of β is blocked.

(66) Move as little material as required for convergence.

In a complex predicate, the two verbal segments have identical tense and agreement features. Head movement could therefore shift either segment in principle, but is forced by (66) to target the lower one. Indeed, particles are systematically stranded under V-to-C, as illustrated by the following Dutch example. (A similar observation can be made for Icelandic verb movement.)

(67) a. Ik drink de melk [$_{V}$ op t_V].
I drink the milk up
b. *Ik [$_{V}$ op drink$_V$] de melk t_V.
I up drink the milk

The principle in (66) makes it possible to treat the particle as marking the verb's base position, as required for our account of (65).

On our interpretation the data in (66) provide very direct evidence that what is crucial to the licensing of floating quantifiers is not whether they are followed by the right kind of material but whether they are part of the right kind of structure, namely one that allows them to be right-adjoined to a predicative category. In particle constructions, VP-shell formation entails separation of the verb from the particle. Our account therefore correctly predicts that object-oriented floating quantifiers depend on such separation: they are ruled out if the particle surfaces adjacent to the verb. This confirms the conclusion that not all verbal projections in English feature a VP-shell, and that object-oriented floating quantifiers are only licensed by those that do.

If our claim that particles mark the base position of the verb is correct, the data in (68) confirm that prepositional complements never give rise to VP-shell formation. Given that they are not dependent on the verb for case, verb movement as in (68) will not be triggered, irrespective of whether the particle projects.

(68) a. John [$_{VP}$ [$_{V}$ walked (right) out] on Mary]].
b. *John [$_{VP}$ walked [$_{VP}$ on Mary [$_{V}$ t_V (right) out]]].

The ungrammaticality of (68b) substantiates our earlier claim that prepositional complements can never be associated with a floating quantifier since they are never specifiers of VP-shells (see (36)).

There are many alternative analyses for English verb-particle constructions, and it would take us too far afield to compare these to our own proposal here. However, we should at least point out that the paradigm discussed above is also analyzed in Svenonius 1994 (section 3.4.6). The account is based on assumptions that are partially very different from ours: (i) particles are lexical heads in an extended small clause structure ([$_{PredP}$ _ [$_{Pred'}$ Pred [$_{PP}$ DP Prt]]]); (ii) conditions on case marking require that either the small-clause subject moves to Spec-PredP, or the particle moves to Pred; (iii) floating quantifiers are stranded by movement. These assumptions suffice to capture the distribution of floating quantifiers in (65). Only if the DP moves can it strand a floating quantifier, and if it moves it will precede the particle:

(69) a. John [$_{VP}$ took [$_{PredP}$ _ [$_{Pred'}$ out [$_{PP}$ [$_{DP}$ both the boys] [$_{P'}$ t_P]]]]]
b. John [$_{VP}$ took [$_{PredP}$ the boys [$_{Pred'}$ Pred [$_{PP}$ [$_{DP}$ both t_{DP}] [$_{P'}$ out]]]]]

Although we agree that word order in particle constructions is determined by case theory, we disagree with assumptions (i) and (iii) above. Evidence against a small clause analysis of particles is given in Neeleman 1994. The case against a stranding analysis of floating quantifiers is presented in section 5. One relevant fact discussed there is the ungrammaticality of **The boys were taken both out for their birthdays*, which is predicted to be grammatical on Svenonius' analysis. (The relevant structure would be: [$_{DP}$ The boys] were [$_{VP}$ taken [$_{PredP}$ _ [$_{Pred'}$ Pred [$_{PP}$ [$_{DP}$ both t_{DP}] [$_{P'}$ out]]]]].)

4.3 Ditransitive particle verbs

We now turn to double object constructions projected by a particle verb (see Den Dikken 1995 for extensive discussion). At first sight there seem to be several structures which accommodate the particle and allow the cases of the two objects to be checked. Perhaps the simplest such structure results from stranding of the particle under the verb movement required for VP shell formation. If the particle does not project, the representation should be grammatical (recall that traces can license case):[15]

(70) a. John [$_{VP}$ sent [$_{VP}$ the stockholders [$_{V'}$ [$_{V}$ t_V out] a schedule]]].
b. {John} {sent the stockholders} {t_V out a schedule}.

Given that floating quantifiers must be left-adjoined to a predicative category, we can explain that the pre-particle position is the only one that can host a floating quantifier associated with the indirect object. The particle marks the base position of the verb, and hence *both* is right-adjoined, rather than left adjoined, in (71b,c).

(71) a. John [$_{VP}$ sent [$_{VP}$ the stockholders [$_{V'}$ both [$_{V'}$ [$_{V}$ t_V out] a schedule]]]].
b. *John [$_{VP}$ sent [$_{VP}$ the stockholders [$_{V'}$ [$_{V}$ [$_{V}$ t_V out] both] a schedule]]].
c. *John [$_{VP}$ sent [$_{VP}$ the stockholders [$_{V'}$ [$_{V'}$ [$_{V}$ t_V out] a schedule]] both]].

If the particle does project, as in (72), its right edge will coincide with the right edge of a prosodic phrase. As a result the verb's trace and the direct object will be in separate prosodic phrases, in violation of (54). Indeed particles in the medial position cannot be accompanied by the modifier *right* or any other material forcing projection.

(72) a. John [$_{VP}$ sent [$_{VP}$ the stockholders [$_{V'}$ [$_{V}$ t_V [$_{PrtP}$ right out]] a schedule]]].

b. *{John} {sent the stockholders} {t_V right out} {a schedule}.

One might expect that a projecting particle may trigger further VP-shell formation in this context, on a par with simple transitive structures. If so, the verb would move twice giving rise to two VP-shells.

(73) *John [$_{VP}$ sent [$_{VP}$ the stockholders [$_{V'}$ t_V [$_{VP}$ a schedule [$_{V'}$ t_V right out]]]]].

Although well formed from the perspective of case theory, (72) violates constraints central to θ-theory. In particular, no thematic relation can be established between *the stockholders* and *sent*. The θ-role involved is an internal one, which implies that it must be assigned within the projection of head that introduces it. The head in question is the lowest verbal trace (see Brody 1995, 1998). However, the indirect object is not contained with the projection of this trace.

One more potential position for the particle to appear is immediately following the verb. But the structure giving rise to this word order is derived by joint movement of verb and particle (recall that VP-shell formation is necessary in order to license the indirect object). Such movement is ruled out by the principle in (66):

(74) *John [$_{VP}$ [$_V$ sent out] [$_{VP}$ the stockholders [$_{V'}$ t_V a schedule]]].

We finally turn to structures projected by di-transitive particle verbs that select a prepositional complement. The simplest possible structure that can host such verbs is the one in (75a). Of course projection of the particle would block case checking and is consequently ruled out. This explains why inclusion of the specifier *right* is incompatible with the word order in (75b).

(75) a. John [$_{VP}$ [$_{V'}$ [$_V$ sent out] the schedules] to the stockholders].
a'. {John} {sent out the schedules} {to the stockholders}.
b. *John [$_{VP}$ [$_{V'}$ [$_V$ sent [$_{PrtP}$ right out]] the schedules] to the stockholders].
b'. *{John} {sent right out} {the schedules} {to the stockholders}.

An object-oriented floating quantifier should not be able to appear in the structure in (75a), because it cannot be left-adjoined to a predicative category containing the object θ-role. This expectation is upheld:

(76) a. *John [$_{VP}$ [$_{V'}$ [$_{V'}$ [$_V$ sent out] the schedules] both] to the stockholders].
b. *John [$_{VP}$ [$_{VP}$ [$_{V'}$ [$_V$ sent out] the schedules] to the stockholders] both].

The ungrammaticality of (76) shows almost conclusively that what is relevant to the licensing of floating quantifiers is not what category follows them, but in what position they are merged. After all, an example like *John showed the schedules both to the stockholders* is perfectly grammatical. But as we have seen in section 3.3, one of the structures associated with this example contains a VP-shell, whereas VP-shell formation is impossible in (76), assuming that the particle marks the base position of the verb.

As already argued VP-shell formation takes place in DP-PP structures if the PP is attached as the verb's first complement. Verb movement is then necessary to facilitate case checking. This gives rise to examples like (77). In the structure at hand the particle is free to project, as no checking relation between the verb's trace and the PP needs to be established (see (77b)).

(77) a. John [$_{V'}$ sent [$_{VP}$ the schedules [$_{V'}$ [$_{V}$ t_V out] to the stockholders]]].
a'. {John}{sent the schedules} {t_V out to the stockholders}.
b. John [$_{V'}$ sent [$_{VP}$ the schedules [$_{V'}$ [$_{V}$ t_V [$_{PrtP}$ right out] to the stockholders]]].
b'. {John}{sent the schedules} {t_V right out} {to the stockholders}.

Given that these structures involve VP-shell formation, we expect floating quantifiers associated with the direct object to be fine, as long as they precede the particle. This turns out to be correct:

(78) a. John [$_{V'}$ sent [$_{VP}$ the schedules [$_{V'}$ both [$_{V'}$ [$_{V}$ t_V (right) out] to the stockholders]]]].
b. *John [$_{V'}$ sent [$_{VP}$ the schedules [$_{V'}$ [$_{V}$ [$_{V}$ t_V (right) out] both] to the stockholders]]].
c. *John [$_{V'}$ sent [$_{VP}$ the schedules [$_{V'}$ [$_{V'}$ [$_{V}$ t_V (right) out] to the stockholders] both]]].

4.4 Interim Summary

We started this section with a sketch of how case adjacency can be derived using a prosodic theory of case checking. This allowed us to account for the word order alternations found with particle constructions. On the assumption that the particle marks the base position of the verb, separation of particle and verb indicates short verb movement and hence VP-shell formation. As the table below demonstrates, separation of particle and verb is a prerequisite for the inclusion of object-oriented floating quantifiers (as before, floating quantifiers and their associated DPs are underlined). This supports our main claim, namely that English VP structure varies between a right- and left-branching structure, and that object-oriented floating quantifiers are sensitive to this variation.

(79)

Monotransitive particle verbs	*Ditransitive particle verbs*	*Prepositional di-transitive particle verbs*
DP FQ V Prt DP	DP FQ V DP Prt DP	DP FQ V Prt DP PP
DP FQ V DP Prt	*DP V DP FQ Prt DP	DP FQ V DP Prt PP
*DP V DP FQ Prt	DP V DP FQ Prt DP	*DP V DP FQ Prt PP
DP V DP FQ Prt	*DP V DP Prt FQ DP	DP V DP FQ Prt PP
*DP V Prt DP FQ	*DP V DP Prt DP FQ	*DP V DP Prt FQ PP
*DP V DP Prt FQ		*DP V DP Prt PP FQ
		*DP V Prt DP FQ PP
		*DP V Prt DP PP FQ

5. NP Raising

Our analysis so far has ignored a basic fact about floating quantifiers, namely that they can apparently be stranded by NP-raising:

(80) The boys seemed both to like Cat Stevens.

It is not immediately obvious how the present account can be extended to examples like (80). We will turn to this issue in section 5.2 and 5.3. First, however, we consider a popular approach to floating quantifiers according to which floating quantifiers form a constituent with a DP, before being stranded by movement. The analysis goes back to

Sportiche 1988 and has been pursued further by Benmamoun (1999). On their account the example in (80) would be assigned the following representation:

(81) $[_{IP}$ The boys $[_{VP}$ seemed $[_{IP}$ $[_{DP}$ both $t_{DP}]$ to $[_{vP}$ t_{DP} $[_{VP}$ like Cat Stevens].

More recently, Bošković (2004) has developed this analysis in more detail, solving one of the long-standing problems it faced. It is therefore important to evaluate the empirical and conceptual adequacy of the stranding analysis, before we go on to consider the relation between NP-raising and floating quantifiers.

5.1 Acyclic adjunction of floating quantifiers

There are two main assumptions on which Bošković bases his reinterpretation of Sportiche's theory. The first is that floating quantifiers are adjoined acyclically to a DP, which subsequently strands them if it moves. The order of relevant operations in (81) is as follows. The DP *the boys* is merged in spec-vP, where it is θ-marked. It then moves to spec-IP, after which *both* is left-adjoined to it. This floating quantifier is left behind by movement of the DP to the matrix spec-IP position (as a result of the principle in (66)). Bošković's second assumption is that adjunction to θ-positions is impossible, which explains why in simple unaccusative structures no floating quantifier can occur post-verbally:

(82) *$[_{IP}$ The boys $[_{VP}$ arrived $[_{DP}$ both $t_{DP}]]]$.

This was one obvious problem with Sportiche's original proposal, the one Bošković set out to solve.

The first important feature of any stranding theory of floating quantifiers is that it requires a proliferation of argument positions. In order to explain the grammaticality of the following examples, each head in the extended verbal projection must have a specifier through which the subject moves. In addition there must be one more specifier in which the subject surfaces (in (83a), *both* is adjoined to the specifier of *may*, so *the boys* must occupy a higher specifier).

(83) a. The boys $[[_{DP}$ both $t_{DP}]$ may $[t_{DP}$ have $[t_{DP}$ been $[t_{DP}$ arrested $t_{DP}]]]]$.
b. The boys $[t_{DP}$ may $[[_{DP}$ both $t_{DP}]$ have $[t_{DP}$ been $[t_{DP}$ arrested $t_{DP}]]]]$.
c. The boys $[t_{DP}$ may $[t_{DP}$ have $[[_{DP}$ both $t_{DP}]$ been$[$ t_{DP} arrested $t_{DP}]]]]$.
d. The boys $[t_{DP}$ may $[t_{DP}$ have $[t_{DP}$ been $[[_{DP}$ both $t_{DP}]$ arrested $t_{DP}]]]]$.

An account along these lines is acceptable to the extent that independent evidence can be found for the existence of the argument positions on which it depends. At least for the specifiers of *may*, *have* and *been*, that evidence is indirect at best, since the specifiers in question are never occupied by overt arguments. (There might of course be theory-internal reasons for assuming this radical decomposition of raising to subject; see Bošković 2002).

(84) a. *There $[[_{DP}$ two boys] may $[t_{DP}$ have $[t_{DP}$ been $[t_{DP}$ arrested $t_{DP}]]]]$.
b. *There [may $[[_{DP}$ two boys] have $[t_{DP}$ been $[t_{DP}$ arrested $t_{DP}]]]]$.
c. *There [may [have $[[_{DP}$ two boys] been $[$ t_{DP} arrested $t_{DP}]]]]$.
d. There [may [have [been $[[_{DP}$ two boys] arrested $t_{DP}]]]]$.

A more important problem concerns the claim that floating quantifiers cannot be attached to θ-marked DPs. Note that it is not self-evident that this should be so. Floating

quantifiers could occupy the spec-DP position, in which case they would not be subject to the ban on adjunction to θ-positions. Independent evidence for the sensitivity of floating quantifiers to this ban is required. Such evidence would consist of structures in which elements like *both* and *all* cannot accompany an overt DP, because it is in its base position. Structures of this type are conspicuously absent in English, and to the best of our knowledge in any other language that has floating quantifiers. For example, the following is perfectly grammatical:

(85) Both the boys gave both the girls both the books.

This observation can be answered for if it is assumed that no argument ever surfaces in its base position. As such this might not be a problem for Bošković, who posits a very rich phrase structure for the English VP. However, it does have the consequence that it becomes impossible to test the claim that *both* and *all* are sensitive to the ban on adjunction to θ-positions. This introduces an element of unfalsifiability into the theory, thereby undermining the account of examples like (82).

There is a further problem that involves the ban on adjunction to θ-positions. As is well known, this constraint goes back to Chomsky 1986. It is perhaps less well known that its consequences in the *Barriers* framework are crucially different from those in Bošković's proposal. The reason for this is that Chomsky did not allow for acyclic adjunction, whereas Bošković does. In the absence of acyclic adjunction, a ban on adjunction to θ-positions in effect rules out adjunction to any argument, whether moved or not.

The independent evidence for the ungrammaticality of adjunction to arguments comes from the examples below, which are due to McCloskey (1992). There is a sharp contrast between (86a), where an adverbial clause has been adjoined to a θ-marked CP, and (86b), where it is adjoined to an IP contained in a θ-marked CP.

(86) a. *He promised most solemnly [$_{CP}$ when he got home [$_{CP}$ that he would cook dinner for the children]].
b. He promised most solemnly [$_{CP}$ that [$_{IP}$ when he got home [$_{IP}$ he would cook dinner for the children]]].

If the ban on adjunction to θ-positions could be circumvented by acyclic adjunction, we would expect the contrast in (86) to disappear when the θ-marked CP has moved. If the ban cannot be circumvented in this way, as in Chomsky's original proposal, movement should have no effect. The latter seems to be true:

(87) a. *[$_{CP}$ When he got home [$_{CP}$ that he would cook dinner for the children] he promised most solemnly.
b. [$_{CP}$ That [$_{IP}$ when he got home [$_{IP}$ he would cook dinner for the children]]] he promised most solemnly.

Hence, to the extent that there is independent justification for the claim that adjunction to arguments is impossible, this ban holds both before and after movement. But adjunction to a moved argument is exactly the kind of operation on which Bošković's account relies.

In sum there are serious flaws in Bošković's analysis of the ungrammaticality of examples like (81). These examples therefore remain problematic for a stranding approach to floating quantifiers. In the next section we reconsider the relation between A-movement and floating quantifiers, and show that a rethinking of the nature of A-

movement allows a straightforward analysis of floating quantifiers as anaphoric adverbials.

5.2 *A-Movement and Θ-Theory*

In Bošković's proposal, an a priori attractive theory of floating quantifiers based on examples involving NP-raising (such as (88a)) is generalised to structures that do not seem to involve movement. For example, in *Mary gave the kids both some candy* it must be assumed that *the kids* has moved at least twice (as in (88b)). The success of the analysis depends on the extent to which such movements can be justified.

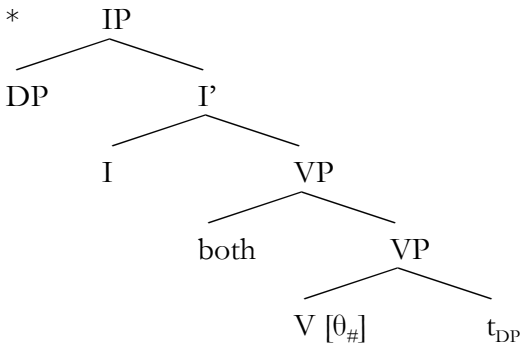
(88) a. The students seem $[_{IP}\ [_{DP}$ both $t_{DP}]$ to [vP t_{DP} know French]].
b. Mary gave the kids $[_{IP}\ [_{DP}$ both $t_{DP}]\ [_{NP/VP}\ t_{DP}$ some candy]].

Our task is the opposite. For examples like (88), we do not need to assume successive A-movement: the structure we adopt is repeated in (89a). However, we do need to generalise a θ-theoretic account of floating quantifiers to structures that at first sight do not involve θ-role assignment. The problem is not so much the structure in (88a). If *both* is adjoined to I', and subjects are generated external to the VP, all relevant conditions on quantifier float are met (see (89b)). But the grammaticality of (89c) is a different matter. As the verb's single θ-role is assigned before *both* is merged, there seems to be no θ-role that the floating quantifier can be associate with.

(89) a. $[_{IP}$ Mary $[_{VP}$ gave $[_{VP}$ the kids $[_{V'}$ both $[_{V'}\ t_V]$ some candy]]]]].
b. $[_{IP}$ The students seem $[_{IP}\ t_{DP}\ [_{I'}$ both [to $[_{VP}$ know French]]].
c. $[_{IP}$ The boys $[_{VP}$ both $[_{VP}$ arrived $t_{DP}]]]$.

As the structure below illustrates, assignment of the θ-role within the VP precludes its being linked to the floating quantifier:

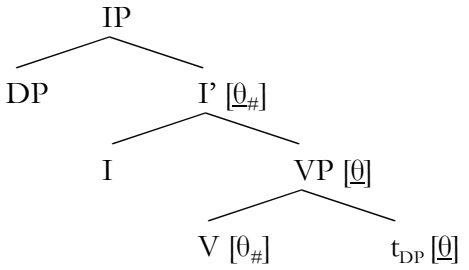
(90) *



A solution to this problem is provided by an analysis of NP-raising first proposed by Williams (1987, 1994). The basic idea is that a VP containing a trace of A-movement is a predicate associated with the raised subject in much the same way that other predicates are related to their subjects. Williams relates this property of passive and unaccusative VPs to the common assumption that NP-trace is caseless. This implies, in his terms, that although NP-trace can be assigned a θ-role, it cannot satisfy one.

We would like to implement this idea as follows. NP-trace is an argument that, possibly as a result of being caseless, must introduce a θ-role. This θ-role is in turn assigned to the DP in subject position. So, (91) is the representation for an example like *The boys arrived* (see Neeleman & Van de Koot 2002 for more detailed discussion).

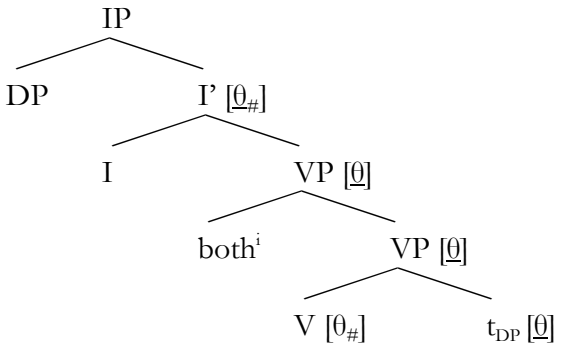
(91)



The θ-role introduced by NP-trace can be likened to the R-role assigned by a nominal predicate (such as *a doctor* in *John is a doctor*). An R-role is associated with the set of entities to which the predicate refers. The recipient of the R-role is interpreted as belonging to that set. The interpretation of (91) works in much the same way. Having no semantic content of its own, NP-trace refers to an unspecified set of entities. Assignment of the verb's internal θ-role to NP-trace restricts this set to those entities that arrive. The recipient of the trace's θ-role is then interpreted as belonging to that set, the desired result.

If this analysis of NP-raising can be maintained, the fact that floating quantifiers are licensed in unaccusative and passive structures is no longer puzzling. The tree below represents the example in (89c); as is apparent, *both* can be linked to the trace's as yet unassigned θ-role. The resulting structure is very similar to what Doetjes (1997) proposes.

(92)



There is, in fact, some independent evidence that NP-trace introduces a θ-role. To begin with, it is possible to coordinate predicates with VPs containing the trace of A-movement (see Burton & Grimshaw 1992):

(93) [$_{\&P}$ [$_{AP}$ Drunk] and [$_{VP}$ betrayed t_{DP} by everyone]], John prepared a hearty meal $t_{\&P}$.

It is well-known that coordinates must be of the same semantic type (but not the same syntactic category; Sag et al. 1985). Given that the AP in (93) is a predicate, the passive VP must be a predicate as well. However, the verb's external θ-role has been absorbed by passive morphology, suggesting that there is another source for VP's predicatehood. The idea that NP-trace introduces a θ-role solves the problem.[16]

Additional evidence comes from prenominal modification. As argued convincingly by Higginbotham (1985), prenominal modifiers are interpreted through identification of the modifier's external role with the R-role of the noun. This implies that passive participles derived from unergatives cannot be used prenominally. Indeed, Dutch freely allows impersonal passives, but impersonal passive participles are barred from occurring prenominally (see Perlmutter 1978, Hoekstra 1984 and Ackema 1999). In contrast, passive participles of transitive verbs can occur in this position.

(94) a. Er wordt (door Jan) overal geslapen.
there is by John everywhere slept
'John will sleep anywhere.'
b. *de (door Jan) geslapen hond.
the (by John) slept dog
c. de (door Jan) *t* geslagen hond
the (by John) beaten dog
'the dog beaten by John'

Apparently, the prenominal modifier in (94c) does have an unsatisfied θ-role, but since the single θ-role of a passive participle is assigned internally, it must again be NP-trace that contributes an external role, here identified with the noun's R-role (see Bach 1980 and Williams 1984 for related discussion).

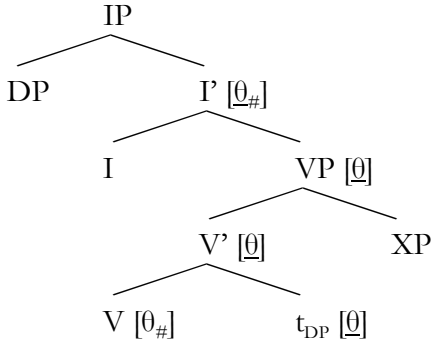
Finally, if NP-trace is not linked to its antecedent by movement, but rather θ-role assignment, we would not expect to find syntactic reconstruction effects with A-movement. Although there is a lot of discussion on the reconstructive properties of raising, it seems to us that as far as reconstruction is possible, it is not syntactic in nature. That is, A-movement may reconstruct for scope, but not for syntactic dependencies. For example, the anaphor in (95a) cannot be bound by *Bill*, suggesting that it is not linked to a copy in the lower subject position. Notice that A'-movement does allow this kind of reconstruction, as (95b) illustrates (for further argumentation, see Chomsky 1995, Lasnik 1999, Sauerland 1999 and Van de Koot 2004).

(95) a. John_1 expected [$\text{himself}_{1/*2}$ to seem to Bill_2 [t_{DP} to be intelligent]].
b. (It was) $\text{HIMSELF}_{?1/2}$ [John_1 thought [~~himself~~ Bill_2 would choose ~~himself~~]].

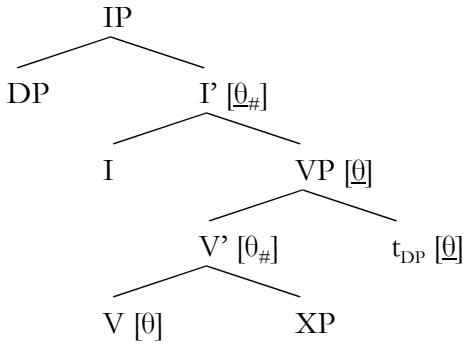
5.3 NP-trace and the structure of VP

Our analysis of NP-raising explains why floating quantifiers can appear preverbally in passive and unaccusative constructions. Crucially, however, it is predicted that such constructions will not tolerate postverbal floating quantifiers. We have argued at length that postverbal floating quantifiers can only be licensed under VP-shell formation. VP-shell formation, in turn, is triggered by case theory: if the verb is merged with some XP before it is merged with a case-dependent category, short verb movement must take place in order to facilitate case checking. It is commonly assumed that NP-trace does not bear case. Hence, its presence will not trigger VP-shell formation, whether adjacent to the verb, as in (96a), or not, as in (96b).

(96) a.



b.



We would therefore expect that postverbal floating quantifiers, which are licensed in active sentences, are barred under passivisation. There is no position to the right of the verb that could accommodate such elements in the left-branching structures shown.

This expectation is borne out by the following data. In all cases, the pattern is the same. A floating quantifier can appear postverbally in the active example, but must appear preverbally in the passive:

(97) a. I gave the boys both a good talking to.
b. *The boys were given both a good talking to.
c. The boys were both given a good talking to.

(98) a. He introduced the boys both to someone famous.
b. *The boys were introduced both to someone famous.
c. The boys were both introduced to someone famous.

(99) a. I arrested the boys both drunk.
b. *The boys were arrested both drunk.
c. The boys were both arrested drunk.

(100) a. I painted the doors both green.
b. *The doors were painted both green.
c. The doors were both painted green.

(101) a. I took the boys both out for their birthdays.
b. *The boys were taken both out for their birthdays.
c. The boys were both taken out for their birthdays.

The pattern illustrated above is highly problematic for theories of floating quantifiers that rely on NP-raising. In order to explain the grammaticality of the active examples, it must be assumed that some kind of hidden A-movement takes place. As already mentioned, Bošković (2004) suggests that the active examples involve an extended small clause complement in which two A-movements take place. In (102), *the boys* is generated within a small clause, before moving to the specifier of the inflectional head that takes the small clause as its complement. At this point, *both* is added. The DP then undergoes object shift, stranding *both*:

(102) I gave [the boys]$_1$ [$_{IP}$ [$_{DP}$ both t_1] [$_{I'}$ I [$_{SC}$ t_1 a good talking to]]].

This analysis can shed no light on the ungrammaticality of the passive variant of (103). Passive may extend the A-chain headed by *the boys*, but it should leave intact the part of the structure relevant to the licensing of postverbal floating quantifiers.

(103) [The boys]$_1$ were given (t_1) [$_{IP}$ [$_{DP}$ both t_1] [$_{I'}$ I [$_{SC}$ t_1 a good talking to]]].

So, where A-movement has not obviously occurred, it must be assumed in order to account for the acceptability of postverbal floating quantifiers. Where A-movement is uncontroversial, the ungrammaticality of postverbal floating quantifiers forces one to deny it.[17]

6. Conclusion

We have argued that the English VP has a variable structure. In some cases, traditional theories seem right in assuming a simple left-branching projection; in others, the English VP yields to a Larsonian shell structure. We have presented various types of evidence for this claim, but our main argument centred on the distribution of object-oriented floating quantifiers.

If correct, the analysis has some significant consequences for the theory of θ-assignment. The simple transitive verb, such as *drink*, can take its object as a complement in a sentence like *John drank the milk reluctantly* or as a specifier in a sentence like *John drank the milk warm*. This conclusion is incompatible with any theory that associates specific θ-roles with specific structural positions. In other words the data in this paper provides indirect evidence against Baker's (1988) Uniformity of Theta-role Assignment Hypothesis.

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Footnotes

[1] For ease of exposition, we will restrict our attention to *both*, which is taken to be representative of other floating quantifiers.
[2] Maling observes that examples like *I met them all* and *I spoke to them all* are grammatical. She suggests that in examples of this type *them all* is a possible surface structure constituent derived from *all them* by Q-Pro Flip. We believe that this analysis is on the right track, but will not attempt to demonstrate this here.
[3] Neil Smith (p.c.) points out that examples such as *I have seen your brother and your sister both* are grammatical. We speculate that in such structures *both* is not a floating quantifier, but a marker of coordination that appears in an exceptional position to the right of the coordination. There are two arguments for this. The first is that sentence-final *both* cannot be replaced by *all*. An example like **I have seen your brothers and your sisters all* is ungrammatical. The second argument is that sentence-final *both* is restricted to coordinate structures. **I have seen your brothers both* is unacceptable.
[4] We assume that both DPs bear accusative, but nothing hinges on this, as long as the case of both DPs is licensed by the verb.
[5] Of course, the PP is selected by the verb. For a discussion of the operations involved, see Neeleman & Weerman 1999.
[6] Maling (1976) observes that various adverbs cannot be used as a rescue device for object-oriented floating quantifiers. For example, **I met the boys both yesterday* is bad. We speculate that these kinds of adverbs resist incorporation into a VP-shell, because they need to be attached higher in the clause.
[7] Some native speakers might initially have the impression that (35b) is marginal, but better than (24). We hypothesise that this is due to the possibility of construing *so* as referring to *meet the boys both in an impressive room*, rather than to *meet the boys both*. This construal is irrelevant, as it tells us nothing about the internal structure of the constituent in which we are interested.
[8] The condition in (41) is not meant to be absolute, but rather a strategy that native speakers try to adhere to. If there is no alternative but to apply operations involving an external θ-role prior to operations involving internal ones, this is allowed. One example is binding of an anaphoric object across an indirect object:

(i) John showed Mary himself.

In the cases discussed in the main text, however, there is always an alternative in which (41) can be met.
[9] The distribution of subject-oriented versus object-oriented floating quantifiers could be explained in terms of an alternative soft constraint. Suppose speakers try to avoid merging adverbs between the two objects in a double object construction (see Den Dikken 1995). For object-oriented floating quantifiers, there is no alternative, as they must be c-commanded by the indirect object. Subject-oriented floating quantifiers, however, can be merged externally to VP, and so must be. We will not attempt to evaluate the efficacy of this alternative here.
[10] Since the PP headed by *as* is selected by *strike*, it is probably properly contained within VP, rather than adjoined to it. Yet, it will be attached after the object has been merged in order to comply with the principle in (41).
[11] The account developed here does not necessarily rely on the proposed prosodic account of case adjacency. The data discussed below will follow as long as it is assumed

that intervening heads do not violate case adjacency, but intervening phrases do. The point is that we derive this generalisation here.

[12] English has a rule of heavy NP shift that may derive structures in which verb and object are not adjacent (cf. *I met* t *yesterday my favourite uncle from Cleveland*). In such structures case checking involves the object's trace. Note that heavy XP shift can in principle be string-vacuous, so that heavy or contrastively focussed objects need not form a prosodic phrase with the verb.

[13] As is well known, the pattern described here does not extend to pronominal objects. Pronouns must be adjacent to the verb (cf. *We looked it up* versus **We looked up it*). An explanation for this could be based on the fact that the pragmatics of the pre-particle and post-particle positions are different. As argued by Dehé (2002), the former typically contains discourse-linked material (old information), while the later contains material not previously mentioned (new information). By their very nature, pronouns are discourse-linked and they will therefore tend to surface in the pre-particle position.

[14] Although the verb moves, it cannot cross an adverbial left-adjoined to the original VP. Such movement would create a prosodic structure that disallows checking:

(i) {John} {looked$_i$ slowly} {the information} {t$_i$ up}

[15] It is well known that constructions in which a particle verb takes two DP objects are not acceptable to all native speakers. For those speakers, then, the argument presented in this section does not hold. However, the judgments given here are agreed upon by all speakers that do accept double object construction projected by particle verbs.

[16] One might think that (90) involves coordination of propositional categories rather than predicates. This would require a small clause analysis of secondary predication, which we reject (for relevant discussion, see Williams 1983).

[17] This problem is not exclusive to Bošković's account; it presents itself in very similar form when the analysis in Doetjes 1997 is adopted. Doetjes argues that floating quantifiers are adverbs that must c-command a trace of NP-movement. Hence, it is not obvious why additional A-movement should have the effect of ruling out postverbal floating quantifiers.