

What and why can't be shared

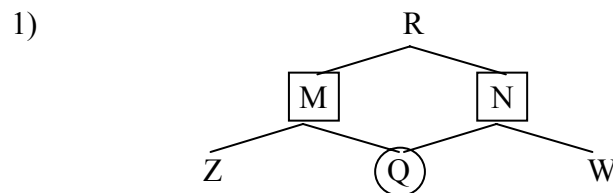
Abstract:

The paper discusses conditions on *multidominance* (MD) or *sharing*. A string of shared material may be shared so that the only shared node is the node that exhaustively dominates the entire string. I call this type of sharing *bulk sharing*. Here, I present novel evidence which argues that in addition to bulk sharing, the grammar also allows for *non-bulk sharing*, i.e. the string of shared material may be shared even if it does not form a constituent. Evidence for non-bulk sharing comes from structures in which two wh-phrases seem to be coordinated at the left periphery of the clause. I call these structures Q&Qs. I show that the structure of a Q&Q involves two coordinated interrogative CPs, and that these CPs share everything except the wh-phrases. I further argue that the shared material in a Q&Q must be shared in a non-bulk manner. Finally, I show that it is not the case that any MD representation is well-formed. I propose that MD is constrained by a Constraint on Sharing (COSH), which operates as a filter on representations and governs the distribution of shared and unshared nodes in an MD structure.

Keywords: multidominance, sharing, Q&Q, coordinated wh-phrases, COSH.

1. Introduction

This paper discusses structures that involve multidominance (MD) or, as it is also called, *sharing*. A sharing structure is one that contains at least one node which has more than one mother node. An example is given in (1).¹



The question whether the grammar does or does not generate structures like (1) has been a matter of considerable controversy among the linguists. Putting aside objections that have been put forth to the existence of sharing,² in this paper I assume that it is real. I also assume, for concreteness, that structures like (1) are created by the operation *Parallel Merge* (Citko, 2005).³

Assuming that an MD structure is a legitimate output of a syntactic computation immediately raises a number of questions. Is sharing free? Can any node in a structure be

¹ The shared node is circled, and its mothers are boxed.

² See Kayne (1994) and Chomsky (2007).

³ MD is an attempt to account for the fact that some material in a syntactic structure is pronounced only once, even though it is interpreted more than once. However, other mechanisms may be invoked to the same effect: PF deletion, generation of empty categories, or ATB movement. In this paper, I present examples of a structure where some material goes unpronounced, and I argue that this is due to MD. The paper is, however, not to be viewed as arguing for the claim that all instances of non-pronunciation of interpreted material are due to MD. In other words, in some cases, material may be unpronounced due to the fact that it is shared, while in others, it may go unpronounced because of some other process (ellipsis, ATB movement, etc.).

shared? If not, which nodes may be shared and why those particular ones? Can a string of material be shared if it does not form a constituent? What is the correct representation of a shared constituent that is structurally complex? In this paper, I attempt to provide answers to these questions.

I argue that sharing is in principle free, i.e. that any node may be multidominated or shared, as long as certain conditions hold. We will see that while these conditions may hold when the shared material forms a single constituent, they may also hold when it does not. The primary goal of this article is to establish what these conditions are.

To this end, I distinguish between cases of MD where the shared material forms a (simple or complex) constituent, and cases where material is shared which does not form a constituent. I refer to the former as *bulk sharing* and to the latter as *non-bulk sharing*.

I propose that the well-formedness conditions on *any* MD structure are imposed by a constraint which requires that by the end of the derivation, all unshared material be structurally higher than the shared material. In section 2.3.1, I formalize this requirement as a Constraint On Sharing (COSH). Here, I give an informal paraphrase of COSH.

2) *Constraint On Sharing (informal version 1)*

Multiple mothers of every shared node in an MD structure must dominate identical sets of terminal nodes.

I argue that only those MD structures in accordance with COSH are well formed, while those that violate it are not. COSH thus emerges as a crucial factor in constraining MD.

The argument is based on the discussion of multiple wh-questions where two wh-phrases seem to be coordinated at the left edge of the clause.⁴ In this article I refer to these constructions as *Q&Q's*. A Q&Q is illustrated in (3) below.

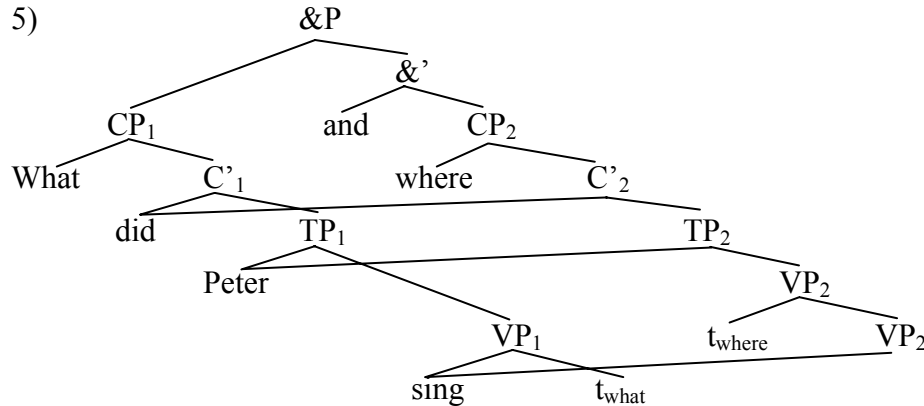
3) What and where does Peter sing?

I first propose that Q&Qs involve non-bulk sharing. The argument is presented in section 2, and it proceeds in two steps. First, in section 2.1, I argue that these questions are bi-clausal, i.e. that (3) involves the structure in (4).

4) [[What does Peter sing] and [where does Peter sing]]

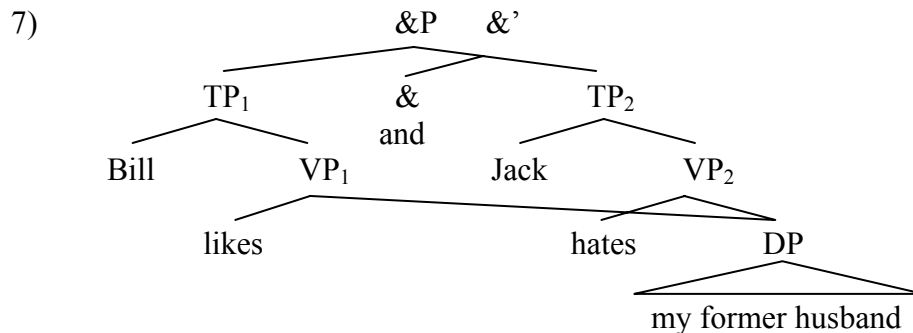
I next propose, based on grammaticality and interpretation judgments, that the 'missing' material in a Q&Q, in our case *does Peter sing*, is *shared* between the two interrogative conjuncts. Importantly, wh-phrases are not shared: each is contained only in its own conjunct. Consequently, the structure of a Q&Q contains no single node such that it dominates all and only the string of shared material. Instead, each of the shared nodes must be shared individually, as in (5). This amounts to saying that Q&Qs involve non-bulk sharing.

⁴ These questions are called "coordinated wh-constructions" in Kazenin (2000), "conjoined question words construction" in Zhang (2007), and "coordinated multiple wh-questions" in Gribanova (2009).



Both bulk and non-bulk sharing have been proposed in the literature. Bulk sharing is illustrated by a Right-Node Raising (RNR) sentence in (2). The analysis, as proposed by Bachrach and Katzir (2006), Kluck and de Vries (2009), Levine (1985), McCawley (1982), McCloskey (1986), Moltmann (1992), Muadz (1991), and Wilder (1999; 2008), is given in (7).⁵

6) Bill likes and Jack hates my former husband.



Other phenomena for which bulk sharing analyses have been proposed include Across-the-Board (ATB) questions (Citko, 2005; Goodall, 1983; 1987; Moltmann, 1992; Muadz, 1991), Free relatives (Citko, 2000; Van Riemsdijk, 2006), gapping (Chung, 2004; Goodall, 1983; 1987; Kasai, 2007; Moltmann, 1992; Muadz, 1991), parasitic gaps (Kasai, 2007), and object sharing in a serial verb construction (Hiraiwa and Bodomo, 2008). All of these analyses have in common the fact that the shared material forms a single constituent dominated, at least at some point in the derivation, simultaneously by at least two mother nodes.

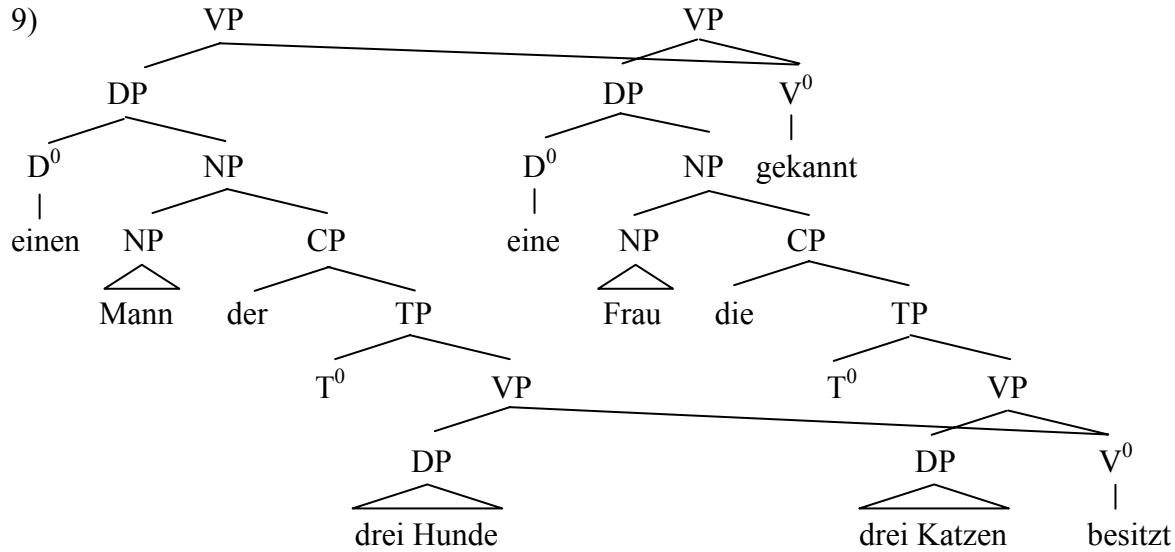
Non-bulk sharing has been proposed by Wilder (1999, 2008) for German RNR examples like (8), attributed to Wesche (1992), where the italicized verbs are shared even though they do not form a constituent. The relevant part of the syntactic representation of (8) is given in (9).⁶

⁵ I present coordination as involving an asymmetric structure, where the first conjunct asymmetrically c-commands the second (Johannessen, 1998; Kayne, 1994; Wilder, 1994), but nothing hinges on this choice.

⁶ Kluck and de Vries (2009) also propose that RNR of non-constituents, as in (i), is obtained through MD.

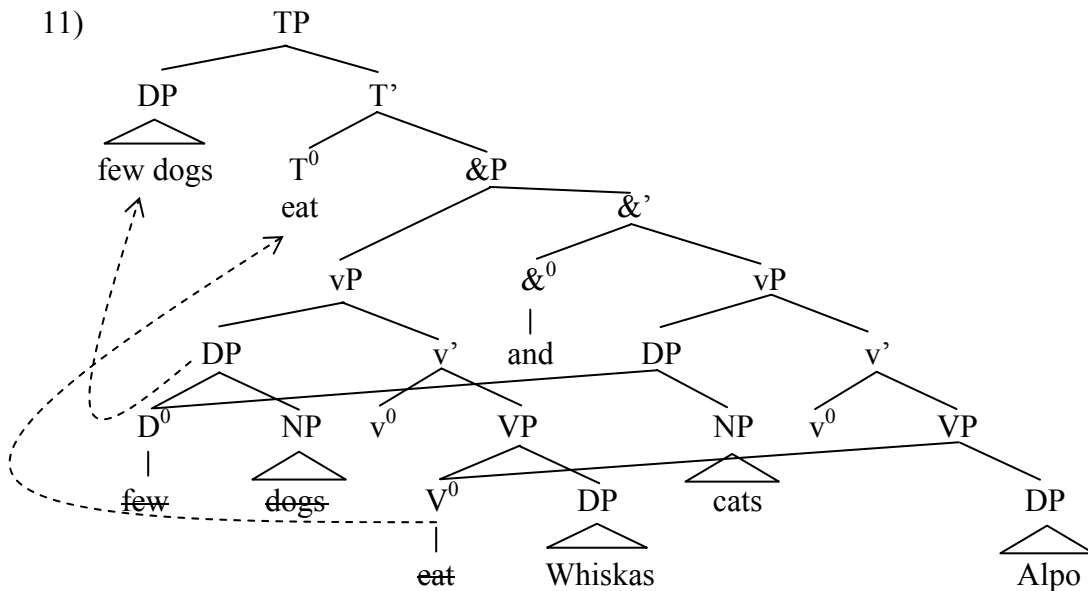
- i. Joop heeft drie en Jaap heeft vier *boeken gelezen*.
 Joop has three and Jaap has four books read
 'Joop has read three book and Jaap has read four books.'

- 8) [er hat einen Mann, der drei Hunde,] und
 he has a man who three dogs and
 [sie hat eine Frau, die drei Katzen besitzt, gekannt.]
 she has a woman who three cats owns known
 'He knew a man who owns three dogs and she knew a woman who owns three cats.'



Citko (2007), following original insights from McCawley (1993), proposes a non-bulk sharing analysis in (11) for a determiner sharing construction in (10).⁷

- 10) Few dogs eat Whiskas or cats Alpo. (Johnson 2000, ex. [59])



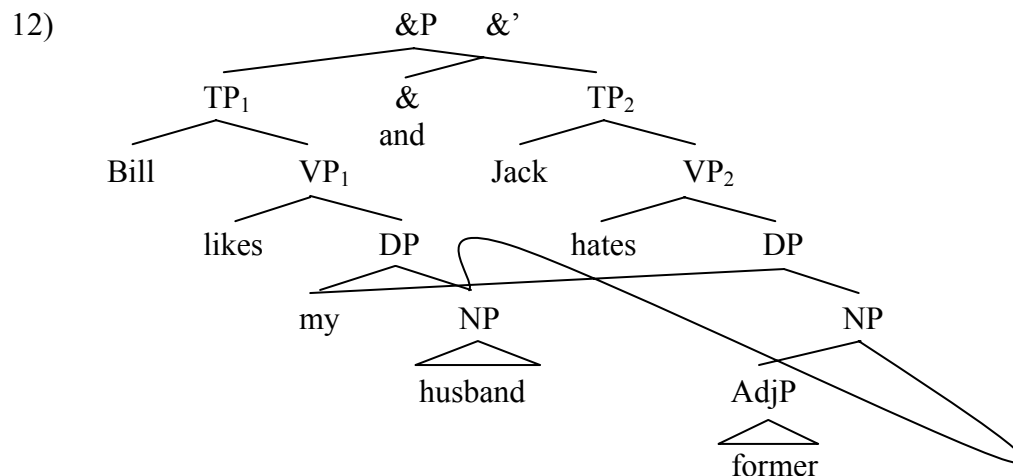
⁷ Citko's proposal for determiner sharing, with refinements that are irrelevant for our purposes, is adopted by Kasai (2007).

Wilder's and Citko's proposals are similar in that both authors make the claim that MD is constrained by linearization, i.e. that non-admissible MD structures are filtered out by an interface condition that any syntactic representation be linearizable. They also both attempt to make MD compatible with Kayne's (1994) Linear Correspondence Axiom (LCA), which derives linear order of terminals in a representation from asymmetric c-command relations among the non-terminals in the structure. The two proposals differ in ways in which this is done.

Citko's proposal, in line with her previous work (Citko, 2005), is in a sense an attempt to reconcile an MD structure with the LCA. She suggests that an MD structure is admissible only if, by SpellOut, the symmetrical structure created by Parallel Merge is broken by overt movement of the (bulk or non-bulk) shared material to a position where it can be linearized. Crucially, this movement must be independently motivated, i.e. cannot result from the need of the structure to conform to the linearization requirements (contra Moro, 1997). Wilder, on the other hand, takes the opposite approach: he attempts to adjust the LCA to MD structures. Wilder proposes changes to the LCA, which make it possible for (bulk or non-bulk) shared material to be linearized *in situ*, provided that it occupies a final position in all non-final conjuncts.

In what follows, we will see, however, that the (non-bulk) shared material does not have to move overtly (contra Citko's approach). It will also become clear that the constraint which requires right peripherality of shared material only in all non-final conjuncts, as in Wilder's approach, incorrectly rules in examples that are ill-formed.

One such example is given in (12), where the *AdjP former* is contained in the second conjunct (TP₂), but not in the first (TP₁), and the shared material *my husband* is right-peripheral in its conjunct.⁸ Given (5), it is not immediately clear why syntax should not generate a representation like (12).



⁸ It has been argued that (12) is not a possible representation, because it cannot be linearized. An argument along these lines has been put forth by Gracanin-Yukse (2007). However, given the fact that we do not yet know how MD structures are linearized, it is not clear that this approach is indeed correct. Note, for example, that under Wilder's (1999, 2008) proposal, the representation in (12) *would* be linearized as (6). Wilder's algorithm for linearizing MD structures derives the right edge restriction, i.e. the fact that if shared material is to surface in the final conjunct, it must be at the right edge of the non-final conjunct(s). Since the shared material in (12) *is* at the right edge of the first conjunct, in this system, the structure would be linearized as (6), and it should be able to receive the interpretation in (13), contrary to fact. Until we have a better understanding of how MD structures are linearized, it is not clear that linearization is what makes (12) impossible.

The structure in (12) would result in the interpretation in (13). This reading, however, is not attested. The sentence in (6) can only mean that Bill likes my *former* husband and Jack hates my *former* husband.

13) Bill likes my husband, and Jack hates my *former* husband.

A natural question that arises at this point is why (12) is not a possible representation, while (5) is. The important difference between (5) and (12) is that in (5), the unshared nodes, wh-phrases *what* and *where*, have moved to positions that are higher in the structure than that of the highest shared node, *did*. This is not the case in (12), where there is an unshared AdjP *former* sandwiched between two shared nodes, *my* and *husband*. In other words, in contrast to (5), (12) violates COSH. As the reader may have noticed, representations in (7) and (9) also violate COSH. In fact, COSH rules out all MD analyses of RNR in which the shared material remains *in situ*.

Consequences of the present proposal for RNR and other phenomena that have been analyzed as involving sharing are discussed in section 3. In section 4, I review alternative analyses of Q&Qs, namely a backwards sluicing analysis, and a bulk sharing analysis. I show that neither of them makes correct predictions for Q&Qs. Section 5 is the conclusion.

2. Q&Qs

As mentioned above, I use the term Q&Qs for multiple wh-questions in which two wh-phrases seem to be coordinated at the beginning of the clause, as in (14).

14) What and where did Peter eat?

It is possible to imagine two broad classes of analyses of Q&Qs: a mono-clausal approach and a bi-clausal approach. On a mono-clausal analysis, the two wh-phrases originate in the same clause and move to its left periphery, where they are coordinated. This is shown in (15). For English Q&Qs, this possibility was, with different implementations, proposed by Zhang (2007) and Zoerner (1995).

15) [[_{&P} What_i and where_j] did Peter eat t_i t_j]

On a bi-clausal analysis, proposed by Whitman (2002), the question in (15) has the underlying structure in (16).

16) [[What_i did Peter eat t_i] and [where_j did Peter eat t_j]]

One argument for a bi-clausal analysis of Q&Qs in English comes from the fact that the two wh-phrases are an argument and an adjunct.⁹ This violates the Law of Coordination of Likes

⁹ A Q&Q in English can, of course, contain two wh-arguments, as in (i), or two wh-adjuncts, as in (ii). I have nothing to say about whether (i) and (ii) are bi-clausal or not. It is conceivable that the wh-phrases in these examples are coordinated in the base position (although given the proposals that different adverbs occupy particular and distinct positions in the structure (Cinque, 1999), (ii) is more likely to be bi-clausal).

(Williams, 1978) and is normally not allowed, as (17) shows.¹⁰

17) *Mary saw Peter and on Tuesday.

In the following sections, I present additional arguments in support of the claim that Q&Qs in English necessarily involve a conjunction of two single questions, one introduced by an argument *wh*-phrase and the other by an adjunct *wh*-phrase. The evidence for this claim comes from the choice of the verb, use of depictives, available readings, preposition stranding, and the impossibility of coordinating a *wh*-subject with a *wh*-adjunct in a Q&Q. The mono-clausal analysis, on which the two *wh*-phrases originate in the same clause, has no natural way of explaining the behavior of Q&Qs in these contexts.

We will see that in all of these cases, a Q&Q becomes ungrammatical when something in the sentence crucially relies on the presence of an argument phrase (direct object, object of a preposition, or the subject) in both conjuncts. Since, on the present proposal, the clause introduced by a *wh*-adjunct does not contain the argument *wh*-phrase, such sentences are ruled out.

2.1. Q&Qs are bi-clausal

2.1.1. Optionally vs. obligatorily transitive verb in a Q&Q

The Q&Q in (14) contrasts with the one in (18) below. The only difference between the two is the choice of the verb: while (14) contains an optionally transitive verb, *eat*, the verb in (18), *buy*, is obligatorily transitive.

18) *What and where did Peter buy?

-
- i. What and who did you see?
 - ii. When and where did Sue see John?

The claim made here is that the properties of those Q&Qs in which an argument is conjoined with an adjunct cannot be explained by a mono-clausal analysis. In the rest of the paper, I reserve the term Q&Q for the 'mixed' type, where only one of the *wh*-phrases is an argument.

¹⁰ Sometimes, coordination of unlike categories is allowed, as in (i) below (Grosu, 1985), if both conjuncts are focused. Lipták (2001) also suggests that categorially distinct elements may be coordinated when both conjuncts bear emphatic stress.

- i. John writes only funny letters and only to funny people.

An anonymous reviewer points out that *wh*-movement is in many respects like focus, and might account for why the un-like coordination obtains in a Q&Q, even under the view that the structure is mono-clausal. In the rest of the article we will see, however, that the inherent focused quality of *wh*-phrases cannot be the whole story behind Q&Qs. Such an approach does not explain, for example, why the subject cannot be one of the "conjoined" *wh*-phrases, or why, if one of the *wh*-phrases is a direct object, the verb in a Q&Q cannot be obligatorily transitive. However, as an anonymous reviewer points out, it is true that fronted "coordinated" elements must be *wh*-phrases. This is shown by the ungrammaticality of (ii) from Zhang (2007).

- ii. *Cheerfully and the watermelon John ate. (Zhang 2007, ex. [33b])

Other contrasts of the same sort are observed in (19) – (20). While all the examples in (19) are grammatical, the ones in (20) are all ill-formed.¹¹

- 19) a. Which song and why did John sing?
b. What and where did John teach?
c. What and when did Sally paint?
d. Which wine and why did you drink?
- 20) a. *What and where did you see?
b. *Which car and why did you demolish?
c. *Which of the children and why did you scold?
d. *What and when did you fix?

These judgments receive a natural explanation in the present proposal. If these strings involve an underlyingly bi-clausal structure, then all the examples in (19) are composed of two well-formed conjuncts, as shown in (21). This is because the verbs only optionally require an object, so the fact that the wh-object *what* is absent from the second conjunct does not lead to ungrammaticality.

- 21) a. [&P [CP1 Which song did John sing] and [CP2 why did John sing?]]
b. [&P [CP1 What did John teach] and [CP2 where did John teach?]]
c. [&P [CP1 What did Sally paint] and [CP2 when did Sally paint?]]
d. [&P [CP1 Which wine did you drink] and [CP2 why did you drink?]]

On the other hand, the examples in (20) all contain one well- and one ill-formed conjunct, as (22) illustrates. The verbs in these examples obligatorily require the presence of an object, and this requirement goes unsatisfied in the second conjunct, due to the fact that the wh-object, *what*, is absent from that conjunct. Thus, since the second conjunct in each of the examples in (22) is

¹¹ Whitman (2002) reports examples of Q&Qs with obligatorily transitive verbs that are attested on the Internet. In most of them the wh-object is the second conjunct, as in (i). Only a handful are reported in which the wh-object is the first conjunct, (ii).

- i. She was very concerned that she didn't know *how or what* to say.
ii. You obviously very much need a lawyer since you do not know *what or how* to do.

Whitman (2002)

All of my informants found examples in (20) unacceptable, regardless of the order of the wh-phrases. Whitman also presents experimental evidence which shows that examples like (19) were significantly more acceptable to his subjects than those with the pattern in (20). Thus, the examples attested on the Internet might suggest a processing effect, where the fact that the argument is adjacent to the rest of the sentence acts as a facilitating factor.

An anonymous reviewer finds examples like those in (i) only mildly degraded and suggests that the judgments reported in the text are due to a parsing issue, where the selected wh-operator, *what*, attempts to fill the gap, but fails presumably due to an intervening adjunct wh-phrase. If this were true, we would expect the order in which the wh-argument is adjacent to the rest of the sentence to always be preferred. However, speakers report that in Q&Qs with optionally transitive verbs, the order in (iii) is preferred to the one in (iv). This is unexpected on an account which relies on parsing alone, although the source of this preference is not clear to me at the moment.

- iii. What and where did you sing?
iv. ?Where and what did you sing?

independently ungrammatical, the whole conjunction is ungrammatical as well.¹²

- 22) a. [&P [CP₁ What did you see] and *[CP₂ where did you see?]]
b. [&P [CP₁ Which car did you demolish] and *[CP₂ why did you demolish?]]
c. [&P [CP₁ Which of the children did you scold] and *[CP₂ why did you scold?]]
d. [&P [CP₁ What did you fix] and *[CP₂ when did you fix?]]

2.1.2. Subject versus object depictives

Another contrast that supports a bi-clausal analysis of Q&Qs in English comes from the use of secondary predicates or depictives. Consider the following pair of examples:

- 23) a. What and where did John eat drunk?
b. *What and where did John eat raw?

The use of a subject depictive *drunk* is allowed, as in (23)a, but the use of an object depictive, *raw* is not, as shown in (23)b. This is expected if what is coordinated in the examples in (23) is two full-fledged interrogative CPs, as in (24). Both CPs in (24)a contain the subject, *John*, licensing the use of the subject depictive. However, since the second conjunct in (24)b does not contain a direct object, the use of the object depictive is ruled out.

- 24) a. [&P [CP₁ What did John eat drunk] and [CP₂ where did John eat drunk?]]
b. [&P [CP₁ What did John eat raw] and *[CP₂ where did John eat raw?]]

The second conjunct in (24)b is independently ill-formed, as (25) below illustrates, leading to the ungrammaticality of the whole coordinated structure.

- 25) *Where did John eat raw?

2.1.3. Interpretation of a Q&Q

The evidence presented so far argues that Q&Qs in English are derived from two coordinated single questions. The *wh*-object, *what*, which introduces the first conjunct, seems to be absent from the second conjunct, introduced by a *wh*-adjunct. The syntactic absence of the direct object from the second conjunct leads us to a prediction that the second conjunct also must be semantically interpreted as not containing an object. The following argument shows that this prediction is borne out.

The Q&Q in (26), only has the reading in (27)a, which I refer to as *the at-all-reading*.¹³ It does not have the reading in (27)b, which I call *the it-reading*.

- 26) What and where did Peter eat?

- 27) a. What did Peter eat and where did Peter eat *at all*? *At-all-reading*
b. #What did Peter eat and where did Peter eat *it*? *It-reading*

¹² This is not to say that conjuncts in a coordination structure must be clausal (cf. Goodall 1987, Wilder 1995). I assume that conjuncts may be of any size (Johannessen, 1998). However, if conjuncts happen to be clausal, as in a Q&Q, both must be well-formed.

¹³ Whitman (2002) calls the attested reading of a Q&Q an 'independent questions reading.'

Judgments on this point are hard, but are sharpened if the meaning of a Q&Q is compared to the meaning of the construction in (28)a, which is presumably derived by sluicing of the TP in the second clause, as shown in (28)b.

- 28) a. What did Peter eat and where?
b. What did Peter eat and where <~~did Peter eat t_{what}~~>?

The question in (28)a is interpreted as having only the it-reading; it means 'What did Peter eat and where did Peter eat *it*?' This is confirmed by the fact that (30) below is perceived as contradictory following the scenario in (29).

29) Scenario 1

Sue is a very jealous woman. Whenever she is out of town, she employs a private detective to keep an eye on her husband, Peter. While Sue was on her latest business trip, Peter called her every day. On three days he told her that he had dinner in a restaurant. On one occasion he said he had a filet mignon, on another a grilled salmon and the third time he said he had lasagna. On no occasion did Peter mention the name of the restaurant he ate at. When Sue came home, the private detective informed her that Peter was seen in the following three restaurants: Magnolia, Ole, and Cinderella's. However, his notes were all mixed up, and he couldn't tell her which day Peter went to which restaurant or what dish he had there.

- 30) #Thus, Sue ended up knowing what Peter ate and where, but she didn't find out which dish he ate in which restaurant.

The fact that the sentence in (30) is a contradiction indicates that its underlined part only has the it-reading. In other words, the relevant part of (30) means something like (31).

- 31) Sue ended up knowing what Peter ate and where he ate *the things that he ate*.

On the other hand, the scenario in (29) can be followed by (32).

- 32) Thus, Sue ended up knowing what and where Peter ate, but she didn't find out which dish he ate in which restaurant.

The absence of a contradiction in (32) indicates that the meaning of its relevant part is that given in (33), i.e. the at-all-reading.

- 33) Sue ended up knowing what Peter ate and where he ate.

The absence of the it-reading in a Q&Q is expected on the bi-clausal analysis proposed here. On this analysis, the Q&Q in (26) has the structure in (34). Since the direct object is absent from the second conjunct, it cannot figure in its interpretation.¹⁴

¹⁴ It is an open question why the underlined part of (30) must have the it-reading given in (31). Merchant (2001) notes that (i) below "has the interpretation parallel to that of [(ii)], which contains an overt pronoun anaphoric to the preceding non-c-commanding wh-phrase." (pg. 203)

34) [&P [CP₁ What did Peter eat] and [CP₂ where did Peter eat?]]

2.1.4. Preposition stranding in a Q&Q

If one of the wh-phrases in a Q&Q is fronted stranding a preposition, the sentence is ungrammatical. The grammatical (35)a thus contrasts with the ungrammatical (35)b.¹⁵

- 35) a. ?About which animal and when did you read a book?
b. *Which animal and when did you read a book about?

This contrast is also due to the bi-clausal structure of Q&Qs. While both conjuncts in (35)a are well-formed, the second conjunct in (35)b is missing the object of the preposition, ruling out the whole sentence. This is illustrated in (36).

- 36) a. [&P [CP₁ About which animal did Peter read a book] and [CP₂ when did Peter read a book?]]
b. [&P [CP₁ Which animal did Peter read a book about] and *[CP₂ when did Peter read a book about?]]

2.1.5. Impossible coordination of wh-subject and wh-adjunct

In previous subsections we saw evidence that in an English Q&Q, the clause introduced by the wh-adjunct does not contain (at any level) the argument wh-phrase. In other words, the “coordinated” wh-phrases always come from different clauses, and each of them is interpreted only in its own conjunct. Given the requirement observed in English, that [Spec, TP] be filled by an overt subject, we expect that those Q&Qs in which the argument wh-phrase is the subject will be ungrammatical. This is indeed the case: all of the examples in (37) are ill-formed.^{16, 17}

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- i. The report details what IBM did and why. (Merchant 2001, ex. [112b])
ii. The report details what_i IBM did and why IBM did it_i.

Merchant adopts Fiengo and May's (1994) mechanism of 'vehicle change', according to which non-pronominals may be treated as pronominals under ellipsis. I leave open the issue of whether this analysis is correct. For our purposes it is only important that the interpretation of sentences like (i) contrasts with the interpretation of Q&Qs.

Whitman (2002) notes that a sluicing construction may have the at-all reading, citing the example in (iii), which he attributes to Carl Pollard.

- iii. I don't know what he eats or when.

It seems to me that the conjunction here plays a crucial role, since the same reading is impossible in an affirmative sentence with the conjunction *and*. For our purposes, it is crucial that sluicing constructions and Q&Qs have different readings when the conjunction is the same in both (*and*).

¹⁵ Example (35)a is not perfect for most speakers, presumably because preposition stranding is independently preferred to pied-piping. Thus, the single wh-question in (i) receives the same judgment.

- i. ?About which animal did you read a book?

¹⁶ Whitman (2002) reports examples found on the Internet where one of the wh-phrases is the subject, *who*. In all of them, *who* is the second wh-phrase, adjacent to the rest of the sentence, as in (i).

- i. It is not known exactly why or who burned the village.

- 37) a. *Tell me who and when sang.
b. *Tell me who and why ate.
c. *Tell me who and how fixed the sink.
d. *Tell me who and where gave a talk.

On the present proposal, this is expected. The underlying representation of, say, (37)a is given in (38). The second conjunct in (38) does not contain an overt subject. This leads to ungrammaticality of the second conjunct, which in turn rules out the whole sentence.

38) Tell me [_{&P} [_{CP1} who sang] and *_{CP2} when sang]]

2.2. *Interim summary*

In this section we saw several pieces of evidence supporting a bi-clausal analysis of Q&Qs in English:

- the use of the obligatorily versus optionally transitive verbs,
- the use of subject versus object depictives,
- preposition stranding,
- impossibility of coordination of a wh-subject and a wh-adjunct, and
- the interpretation of Q&Qs.

All the evidence points to the fact that, in a Q&Q, there exists no clause such that it contains both of the “coordinated” wh-phrases. Rather, a Q&Q is derived from a coordination of single wh-questions, each containing only one wh-phrase.

Once we have convinced ourselves of the bi-clausal analysis of a Q&Q, a question arises how to derive the surface string from the larger underlying structure. I propose that in a Q&Q, the part of the string that is pronounced once, but interpreted twice is shared between the conjuncts. However, the properties of Q&Qs discussed in section 2.1 cannot be explained by bulk sharing. Since the CP introduced by a wh-adjunct does not contain the wh-object, there doesn't seem to exist a node in the structure that dominates the shared string, *excluding* the (copy of) the direct object. The analysis proposed in the following section for English Q&Qs is thus a non-bulk sharing analysis.

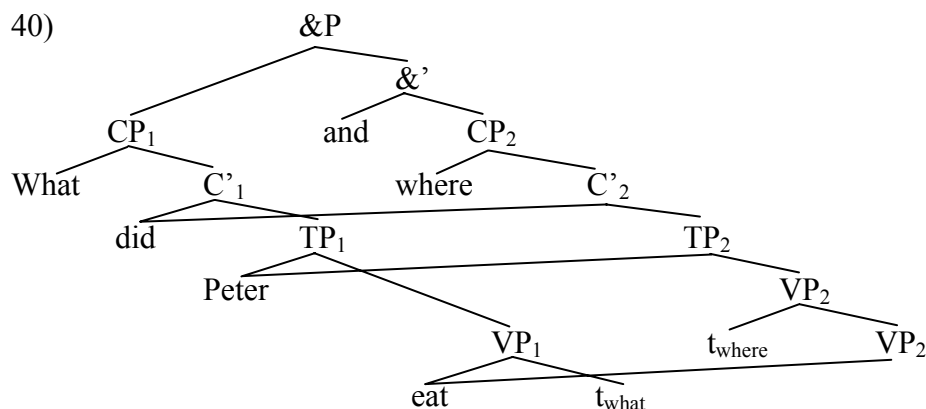
2.3. *Q&Qs involve non-bulk sharing*

As mentioned in the Introduction, I propose the structure in (40) for the Q&Q in (39).

39) What and where did Peter eat?

My informants rejected the Q&Qs involving a subject wh-phrase, regardless of the order of wh-phrases. An anonymous reviewer claims that the sentence improves dramatically with a heavy pause after the adjunct wh-phrase in examples like (i). I have not been able to replicate this judgment.

¹⁷ Here, I use embedded Q&Qs in order to avoid any confounding effect of the subject-Aux inversion, which is required in a matrix CP introduced by an adjunct wh-phrase, but not in a matrix CP introduced by the subject wh-phrase. In embedded Q&Qs, T-to-C movement of the auxiliary is never required.



In (40), each of the terminal nodes *did*, *Peter* and *eat* is individually shared between the two coordinated CPs. This is an instance of non-bulk sharing, i.e. the shared string, *did Peter eat* is not shared as a single constituent.

The structure in (40) straightforwardly derives two observed characteristics of Q&Qs: the contrast in grammaticality between Q&Qs with optionally transitive verbs and those with obligatorily transitive verbs, discussed in section 2.1.1 and the fact that a Q&Q only has the at-all-reading of the second conjunct, while the it-reading is absent, as we saw in section 2.1.3. Let us examine each of these results in turn.

According to (40), the verb in a Q&Q is shared between the conjuncts. This means that whatever subcategorization requirements the verb has must be met in both conjuncts. If the verb *obligatorily* requires an object, this requirement must be satisfied both in the *what*-clause (first conjunct) and in the *where*-clause (second conjunct). We saw, however, that the direct object, *what* is absent from the second conjunct. It follows that in this conjunct, the subcategorization requirements of the verb are satisfied only if the verb can also surface *without* a direct object. This is the case with verbs such as *eat*, *sing*, *read*, *teach*, etc., but not with verbs like *buy*, *fix*, *devour*, *hit*, etc. The contrast between (41)a and (41)b is therefore explained.¹⁸

- 41) a. What and where did you eat?
 b. *What and where did you buy?

The fact that a Q&Q only has the at-all-reading also directly follows from the structure in (40). Given that the direct object is absent from the syntactic structure of the second conjunct, it cannot be interpreted there. This rules out the it-reading. We therefore have an explanation for why the question in (42) only has the meaning in (43)a.

42) What and where did Peter eat? = (26)

- 43) a. What did Peter eat and where did Peter eat *at all*? *At-all-reading* = (27)a
 b. #What did Peter eat and where did Peter eat *it*? *It-reading* = (27)b

What about the other relevant properties of Q&Qs? Recall that we also observed the following:

- the contrast between a Q&Q with a subject depictive and one with an object depictive,

¹⁸ See Wilder (2008) for a view that transitive and intransitive variants of the same verb are not considered identical.

- the impossibility of having the subject as one of the wh-phrases in a Q&Q, and
- the fact that preposition stranding in a Q&Q is bad in English, even though the language otherwise allows it.

I argue that these also fall out from the structure in (40). However, in order to see that this is indeed so, we first need to know more about the ways in which structures that contain (non-bulk) shared material are constrained.

2.3.1. COSH

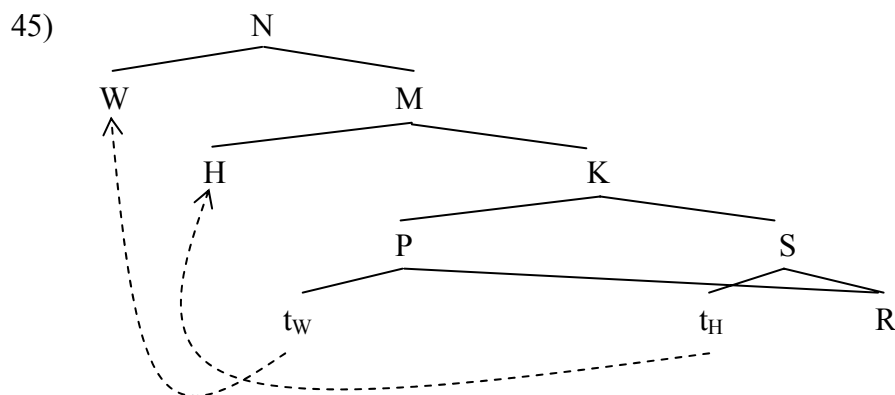
As I already mentioned in the Introduction, I argue that sharing is constrained by COSH (Constraint On Sharing). In (2), we saw an informal formulation of COSH. I repeat it here as (44).

44) *COSH (informal version 1)*

Multiple mothers of every shared node in an MD structure must dominate identical sets of terminal nodes.

According to (44), if there is unshared material dominated by one mother of a shared node, but not (the) other(s), the structure is not legitimate. This formulation is not entirely correct. In the following paragraphs we will develop a formal statement of COSH in a step-by-step fashion. In order to do this, we first need to decide how to treat those unshared nodes that start out below (or interleaved with) the shared material, but undergo movement to a position which is structurally higher than all shared material.

Consider, for example, an abstract representation in (45). The shared node, R has two mothers, P and S. In order to evaluate the structure with respect to COSH, we need to examine what terminal nodes P and S dominate. P dominates the set $\{t_w, R\}$ and S dominates the set $\{t_H, R\}$. Since these two sets are not identical, the representation in (45) violates COSH.



I would like to suggest, however, that this representation is in fact legitimate. To this end, I will replace the notion of ‘dominate’ in the formulation of COSH by the notion of ‘completely dominate’, as in (46) below.

46) *COSH (informal version 2)*

Multiple mothers of every shared node in an MD structure must *completely* dominate identical sets of terminal nodes.

The definition of complete dominance is given in (47) below.

47) *Complete dominance*

α completely dominates β if every path from β upwards to the root includes α .

(Fox & Pesetsky, *in preparation*)

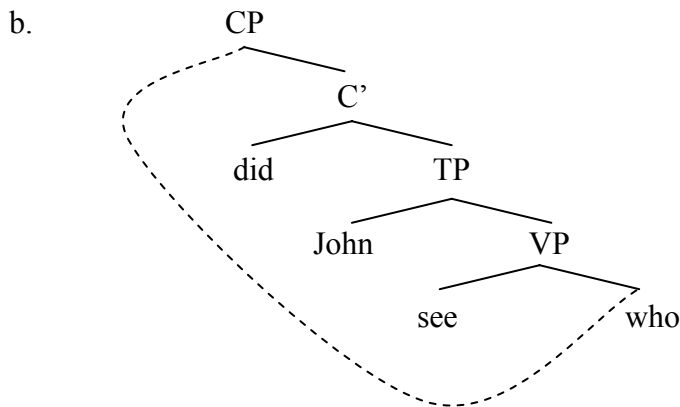
The representation in (45) does not violate the new formulation of COSH. The node P does not completely dominate t_w , nor does it completely dominate R. In fact, P completely dominates nothing. The same is true of S: it completely dominates neither t_H , nor R. We are now in a position to formalize the definition of COSH. This is done in (48).

48) *Constraint On Sharing (formal version 1)*

For any α , M and N, where $M \neq N$, and M and N are both mothers of α , for any terminal node β , M completely dominates β , iff N completely dominates β .

As it is formulated in (48), COSH rules in the representation in (45). However, on the view presented here, every structure in which an element has more than one mother is considered an MD representation. Crucially, familiar instances of “movement” also create MD structures (Engdahl, 1986; Frampton, 2004; Gartner, 1999; 2002; Kracht, 2001; Starke, 2001; De Vries, 2007 among others). This as illustrated in (49).

49) a. Who did John see?



In (49)b, the wh-phrase *who* is multiply dominated or shared between the VP and the CP. COSH, as it stands, requires that the two mothers of *who*, VP and CP, completely dominate identical set of terminal nodes. This requirement is not met in (49)b: VP completely dominates only the verb *see*, while CP completely dominates *who*, *did*, *John*, and *see*. Since the sentence is well-formed, this is an unwelcome result. As a consequence, we need to reformulate COSH so that MD structures created by “movement” are exempt from it.¹⁹ The final version of COSH is given in (50).

¹⁹ For ease of exposition, I will continue using terms such as ‘move’ and ‘copy’ as well as represent lower instances of re-merged phrases as traces, but the reader should keep in mind that this is only for convenience.

50) *Constraint On Sharing (final version)*

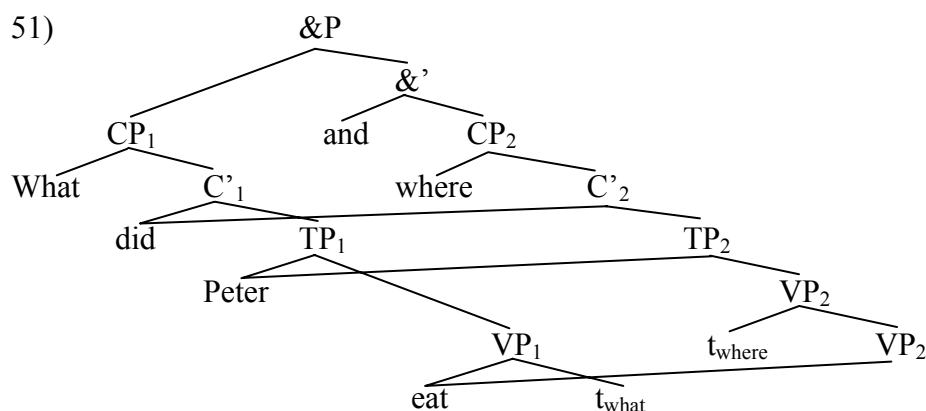
For any α , M and N, where $M \neq N$, and

- (i) M and N are both mothers of α , and
- (ii) α does not have a unique highest mother (a mother that dominates all other mothers of α),

For any terminal node β , M completely dominates β , iff N completely dominates β .

Before we take a look at how COSH operates, let me note that COSH is a condition that holds of representations. Thus, a piece of structure that is ruled out by COSH at a certain stage in the derivation may still survive, if by the end of the derivation the structure conforms to it.

With this in mind, let us examine how the structure in (40), repeated here as (51), fares with respect to COSH.



The shared nodes, *did*, *Peter* and *eat* have multiple mothers, one in each conjunct. However, none has a unique highest mother. We now need to look at what the mothers of each shared node completely dominate. The two VPs completely dominate nothing. The verb, *eat* is shared, therefore not completely dominated by either VP. The wh-object, *what* has moved out of VP₁, so that VP₁ no longer completely dominates it. The same is true of the two TPs: neither of the TPs completely dominates *Peter* or *eat*, since both these nodes are also dominated by the TP in the other conjunct. In addition, TP₁ does not completely dominate *what*, because it has moved out to the [Spec CP] of the first conjunct, and TP₂ does not completely dominate *where*, since it too has been remerged in a position higher than the TP₂ ([Spec CP] of the second conjunct). The same reasoning applies to the two C' projections. So, for each shared node, there is nothing that is completely dominated by one of its mothers that is not completely dominated by the other. Thus, the structure satisfies COSH.²⁰

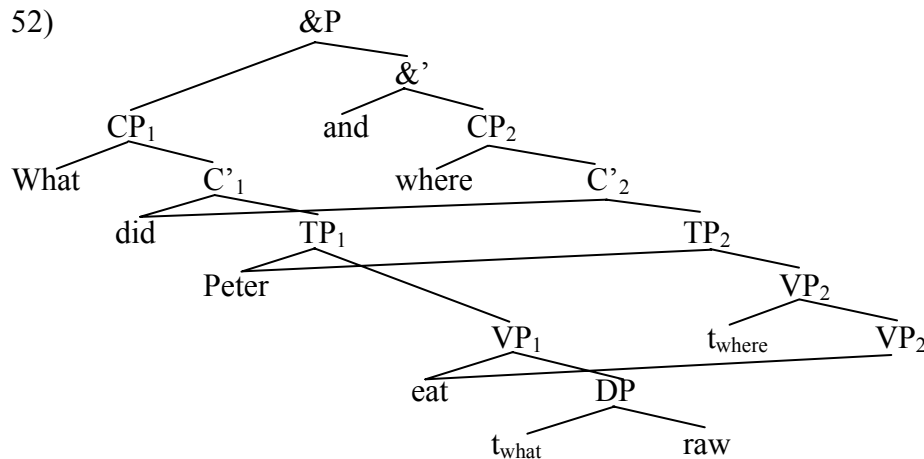
Let us now return to the question of how (40)/(51) derives the remaining properties of a Q&Q: the contrast between a subject vs. object depictive, the ban on wh-subject as one of the wh-phrases and the ban on preposition stranding in a Q&Q.

We will first look at the contrast in the use of depictives. For a depictive to be grammatical in a sentence, the sentence must contain a phrase that provides an argument for the depictive. In the case of a subject depictive, the relevant phrase is the subject; and for the object depictive, it is the object. If (40)/(51) is correct, the second conjunct in a Q&Q does not contain the object wh-phrase. Therefore the second conjunct cannot contain an object depictive. On the

²⁰ The two wh-phrases are also shared, but each has a unique highest mother, so COSH can 'overlook' them.

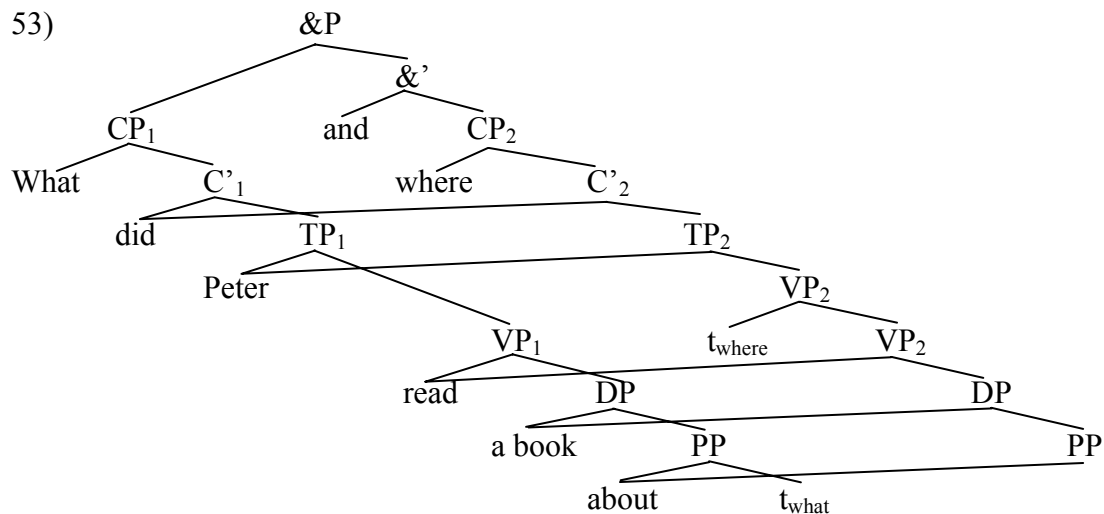
other hand, a subject depictive is allowed, since both conjuncts have a (shared) subject.

The reader might ask why it is not possible to have an object depictive merged in the first conjunct *only*, without its being shared by the second conjunct, as in (52).



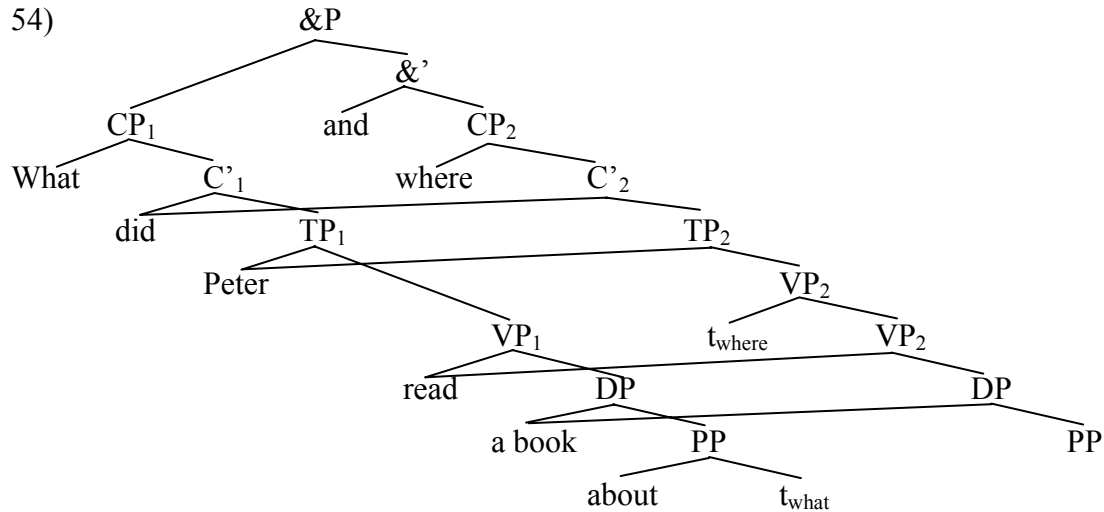
The reason why (52) is ruled out is that it does not satisfy COSH. The multiple mothers of the shared verb *eat*, VP₁ and VP₂, do not completely dominate identical sets of terminal nodes. While VP₁ completely dominates the depictive, *raw*, VP₂ does not, in violation of COSH. Given the transitivity of (complete) dominance, the same violation is incurred by multiple mothers of other shared nodes, *Peter* and *did*. Thus, even though in (52) the depictive does have a proper host, the structure is not legitimate.

The same reasoning applies when we look at how the proposed structure explains the ban on preposition stranding in an English Q&Q. If the *wh*-phrase in the first conjunct moves to [Spec CP₁] stranding a preposition behind, the structure only satisfies COSH if the preposition is shared between the conjuncts, as in (53). However, since the *wh*-object is absent from the second conjunct, the subcategorization requirements of the preposition in that conjunct are not met, and the sentence is ruled out.



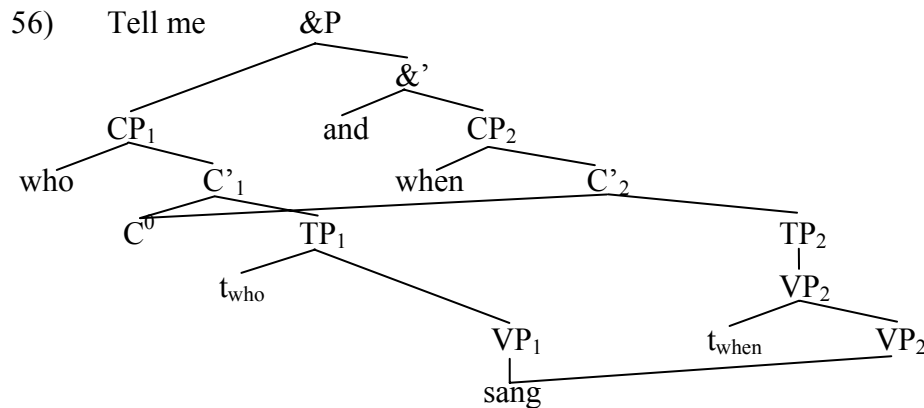
If, on the other hand, the preposition is not shared, but is merged and interpreted only in

the first conjunct, as in (54), the structure is ruled out by COSH, since in the first conjunct, mothers of the shared nodes, *a book*, *read*, *Peter* and *did* all completely dominate the preposition *about*, while their counterparts in the second conjunct do not.



Finally, let us see why the subject may not be one of the wh-phrases in a Q&Q. I have argued that a Q&Q is derived from a structure in which each of the conjuncts only contains one wh-phrase. The sentence in (55), where one of the wh-phrases is the subject, would have a representation in (56) (I only represent the relevant part of the structure).

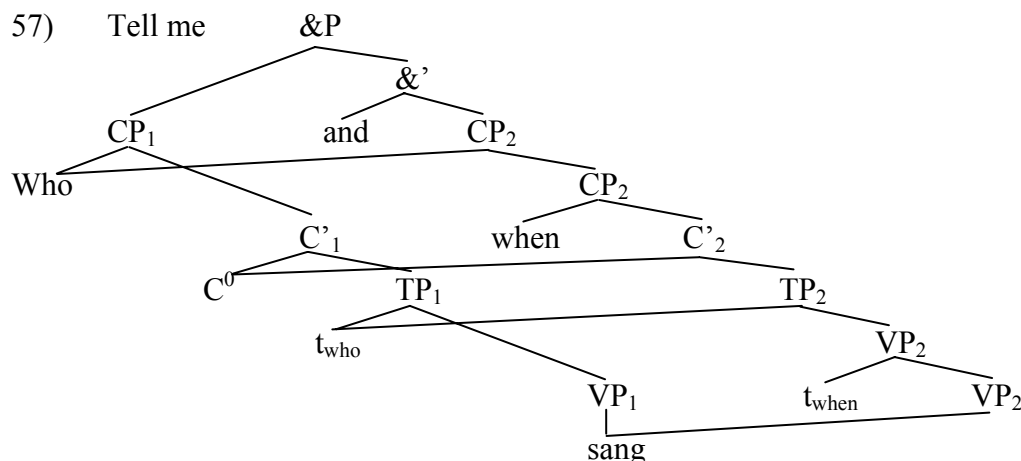
55) *Tell me who and when sang?



In (56), the second conjunct does not contain a subject, which rules the sentence out. We might ask at this point whether it is possible for the subject phrase, *who* to be shared between the two conjuncts. As far as I can tell, the possible outcomes that may result from sharing the wh-subject phrase, *who* between the two conjuncts, are problematic.

We might, for example, suppose that *who* is shared and that it moves to [Spec CP] in both conjuncts, as illustrated in (57).²¹

²¹ Note that the movement of *who* to [Spec CP] of both conjuncts does not create a unique highest mother of *who*.



There are two reasons for which this outcome is problematic. First, COSH is violated, since the mother of *who* in the second conjunct, CP₂ completely dominates *when*, while the mother of *who* in the first conjunct, CP₁ does not. In addition, the second conjunct contains two fronted *wh*-phrases, which is independently disallowed in the language.

Another scenario one might imagine if *who* were shared is that it is remerged as a lower specifier of CP₂. A structure like that would satisfy COSH, but there would still remain the problem of multiple *wh*-movement, just as we saw is the case in (57) above.²²

In sum, COSH, in conjunction with independent principles that govern *wh*-movement in English, makes (55) non-derivable, even under the assumption that the subject *wh*-phrase is shared between the conjuncts.

So far, we saw that an acceptable Q&Q must satisfy two conditions: (i) both conjuncts must be independently well-formed, and (ii) the structure must obey COSH. In all the ungrammatical cases we looked at, if COSH was satisfied, then the conjunct introduced by a *wh*-adjunct was ill-formed. In the following paragraphs, we will see examples of Q&Qs in which if COSH were satisfied, the conjunct introduced by a *wh*-argument would be ill-formed. Let us begin by considering (58).

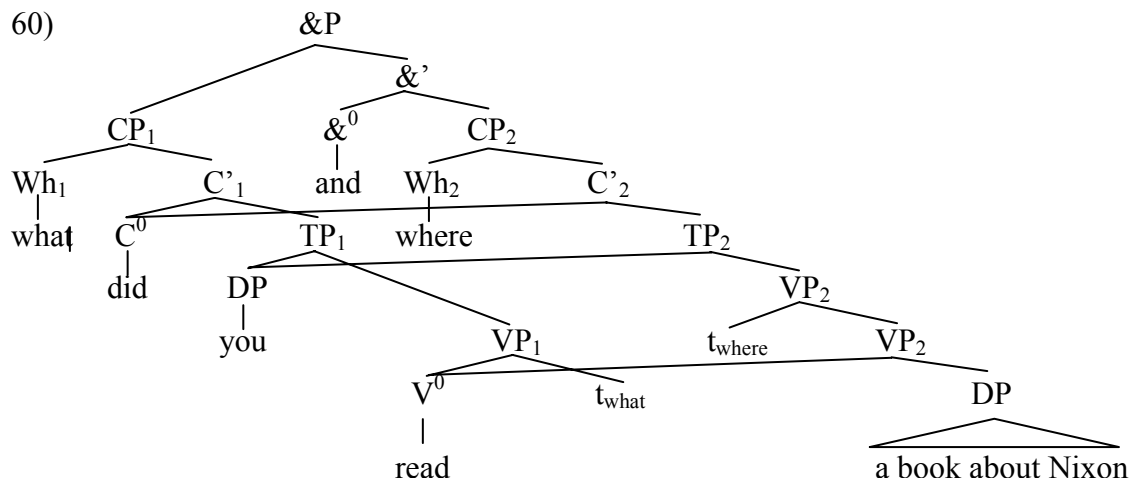
58) *What and where did you read a book about Nixon?

The two plausible underlying conjuncts in (58) are given in (59), where shared material is bold-faced and underlined. Importantly, both conjuncts are independently well-formed.

59) [&P [CP₁ What **did you read**] and [CP₂ where **did you read** a book about Nixon]]

If the analysis presented here is correct, (58) is in no respect different from other ungrammatical examples of Q&Qs, which we saw above. A possible structure of the Q&Q in (58) is given in (60).

²² In this scenario, the multiple *wh*-movement would also violate Superiority.



This structure, however, does not satisfy COSH: the set of terminal nodes completely dominated by VP₁ is not identical to the set of terminal nodes completely dominated by VP₂. While VP₁ completely dominates nothing, VP₂ completely dominates the DP, *a book about Nixon*. The unshared DP in the second conjunct, *a book about Nixon*, is completely dominated not only by VP₂, but also by TP₂ and C'₂. Thus, (60) yields multiple violations of COSH. For the structure to satisfy COSH, the DP *a book about Nixon* would have to be a part of both conjuncts. If this were the case, however, the first conjunct would be as in (61), leading to the ungrammaticality of the whole structure.²³

61) *What did you read a book about Nixon?

Similar problems arise in (62)a below. The sentence, although grammatical, does not have the reading in (62)b.²⁴ In other words, the adverb, *often* is necessarily interpreted in both

²³ An anonymous reviewer suggests that all of the examples discussed in this section can be accounted for under the HPSG syntax-prosody mapping approach developed in Chaves (2008). On this analysis, Q&Qs are an instance of Right-Periphery Ellipsis, which “allows the deletion of non-initial independent *phonological* constituents, under morphophonological identity.” (Chaves 2008, pg. 286 [emphasis mine]) On this approach, in (26)/(42), the missing string *did Peter eat*, because it follows a contrastively prominent word *what*, forms an independent phonological unit (or perhaps more than one) and as such may be deleted under identity with the same string (with an identical phonological status) in the second conjunct. This analysis explains the ill-formedness of (53) for example, because, as the reviewer notes, the missing string *<did, Peter, read, a, book, about>* is not identical with the string *<did, Peter, read, a, book>*, which makes ellipsis impossible. However, I do not see how the same reasoning might account for the ill-formedness of (58). In particular, the DP *a book about Nixon* may be deleted in the first conjunct to the exclusion of the rest of that conjunct, as shown in (i) below (the sentence may have the reading where *a book about Nixon* is part of both conjuncts).

- i. When did you read and why did you read a book about Nixon?

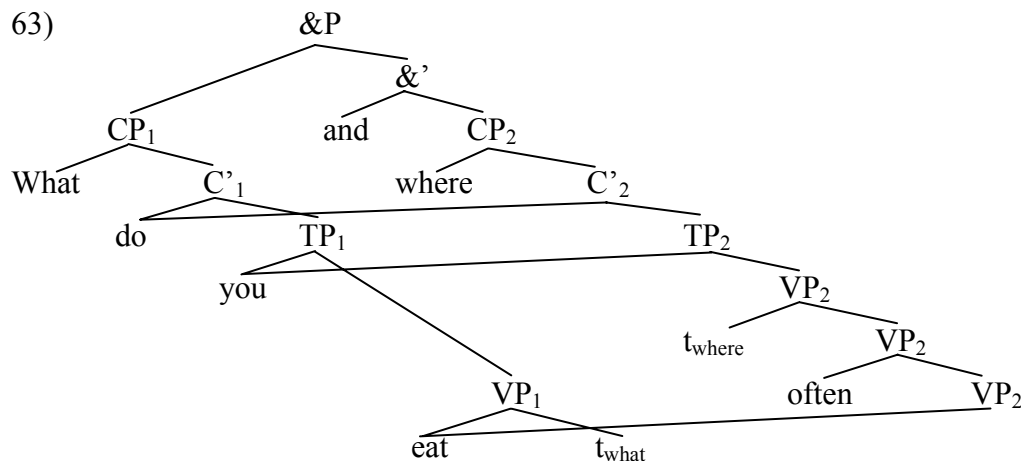
This implies that the DP may have an independent phonological/prosodic status, even though it does not follow a contrastively prominent word. This opens up a possibility that in (58), the DP is also an independent phonological unit, separate from the rest of the second conjunct. This means that the string *<did, you, read>* also forms a phonological unit in and of itself, which should allow for the same phonological unit in the first conjunct to be deleted, contrary to fact.

²⁴ Neither does it have the interpretation in (i) below.

conjuncts.

- 62) a. What and where do you often eat?
 b. #What do you eat and where do you often eat?

The structure that would result in the reading in (62)b is shown in (63). By now it is easy to see that (63) is ruled out by COSH for the same reasons for which (60) is inadmissible. Namely, the mothers of the shared nodes, *you* and *do* in the second conjunct (TP₂ and C'₂) completely dominate the adverb, *often*, while their counterparts in the first conjunct, TP₁ and C'₁ do not.



An interesting question arises with respect to the ungrammatical sentence in (64), brought up by an anonymous reviewer.

- 64) ??How well and why did Robin behave?

Example (64) contains two well-formed conjuncts: *How well did Robin behave?* and *Why did Robin behave?* and its structure seemingly satisfies COSH. However, I would like to suggest that COSH is, in fact, violated. The verb *behave* is peculiar in that when it is used without an adverb, it can only mean that a person behaved *well*, as shown by (65).

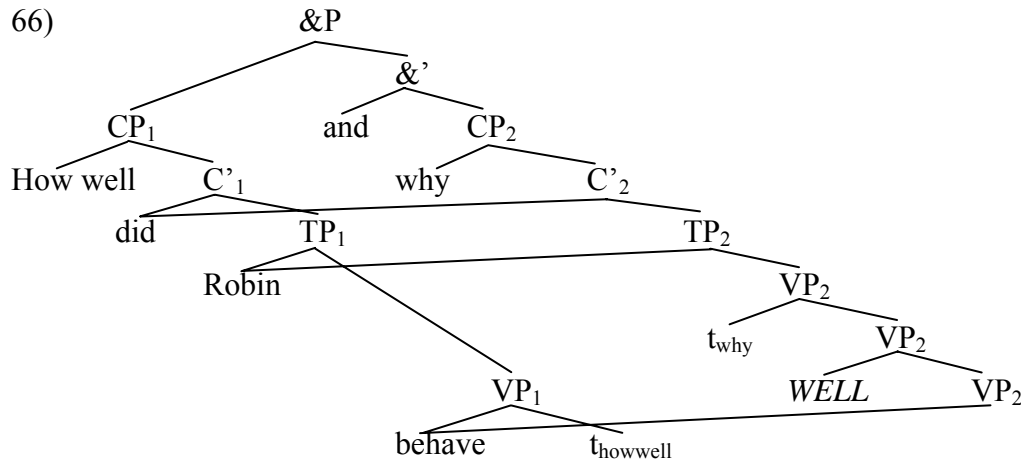
- 65) *I know Jill behaved today, but I don't know how badly.

If we capture this fact by positing a silent adverb *WELL* in the structure, as in (66), then (64) no longer satisfies COSH.²⁵ Mothers of the shared nodes *Robin* and *did* in the second conjunct completely dominate the silent *WELL*, while those in the first conjunct do not, in violation of COSH, thus accounting for the ill-formedness of the sentence.²⁶

(i) #What do you often eat and where do you eat?

²⁵ Thanks to David Pesetsky for this idea.

²⁶ An anonymous reviewer reports that the sentences in (i) and (ii) contrast with respect to the availability of the at-all-reading: (i) allows it, but (ii) does not. I have argued that the at-all-reading of a Q&Q is derived from a bi-clausal structure where the non-pronounced material is shared. It is then plausible to suppose that the at-all-reading of (i) is derived in an analogous way – from a bi-clausal structure where the unpronounced material is shared. However, if this is so, the structure violates COSH.



In this section we saw that the non-bulk sharing analysis, complemented by COSH, explains the observed behavior of Q&Qs in English. It also correctly rules out those examples and/or readings that are not attested. Thus, the proposed analysis seems to be empirically well grounded.

- i. Peter sings what and where?
- ii. Peter bought what and where?

The judgments I was able to elicit with respect to (i) and (ii) are extremely unstable. While none of the speakers reported the reviewer's judgments, some found both sentences unacceptable, some found (i) well-formed, but only with the it-reading, and (ii) ill-formed, while some found both well-formed, but both with the it-reading only. If indeed (i) allows for the at-all-reading, as the reviewer reports, the question of why the structure is not ruled out by COSH might amount to the question of whether covert movement can save the structure from a violation of COSH. The reviewer's example suggests that it can.

However, as I mentioned in footnote 3, the fact that Q&Qs seem to be best explained by an MD analysis, does not exclude the possibility that sharing exists alongside other mechanisms responsible for the phonological reduction of material (ellipsis, ATB movement and/or empty categories). Thus, if (i) indeed allows for an at-all-reading, this reading might also be derived through an ellipsis operation (Wilder's (1997) FWD, for example), which operates on a bi-clausal structure, but does not involve MD.

As to the it-reading, I can think of two possibilities that would derive it for these examples. One is the phrasal coordination of unlike categories, represented in (iii), and the other is sluicing, shown in (iv).

- iii. a. Peter sings [what and where]?
- b. Peter buys [what and where]?
- iv. a. [Peter sings what] and where [~~Peter sings what~~]?
- b. [Peter buys what] and where [~~Peter buys what~~]?

Interestingly, the reversal of wh-phrases in sentence (ii), shown in (vi), results in a degraded sentence, while it does not affect the acceptability of (i), as (v) illustrates.

- v. Peter sings where and what?
- vi. *^{??}Peter buys where and what?

This suggests that the it-reading of (i) and (ii) is not derived from a mono-clausal structure, which predicts no ordering restrictions on wh-phrases, but is a result of the sluicing operation in (iv). If this is the case, the ungrammaticality of (vi) is predicted, since the structure contains an ill-formed conjunct **Peter buys where*?

We would, of course, like to know why COSH exists. It would make sense to speculate that COSH can be reduced to some aspect of the PF interface, most likely linearization. However, given the considerations presented in footnote 8, namely, the fact that sometimes COSH violating structures may in fact be linearized, it is not clear that the effects of COSH are due to linearization issues.²⁷

Another possible source of COSH is the LF interface. Perhaps it is crucial for the semantic interpretation of the structure that shared material not be interleaved with unshared material. In order to find out why this should be so, however, we need to examine whether, given two conjuncts that share some elements, the interpretive system, while interpreting each one in turn, “knows” that some material from that conjunct will be interpreted again. Since at the moment it is not clear to me how semantics operates on MD structures, I will leave the answer as to what forces COSH for future research.

Let us now take a look at what predictions the present proposal, that shared material in a (non-bulk) sharing structure must obey COSH, makes for previously proposed analyses that involve sharing.

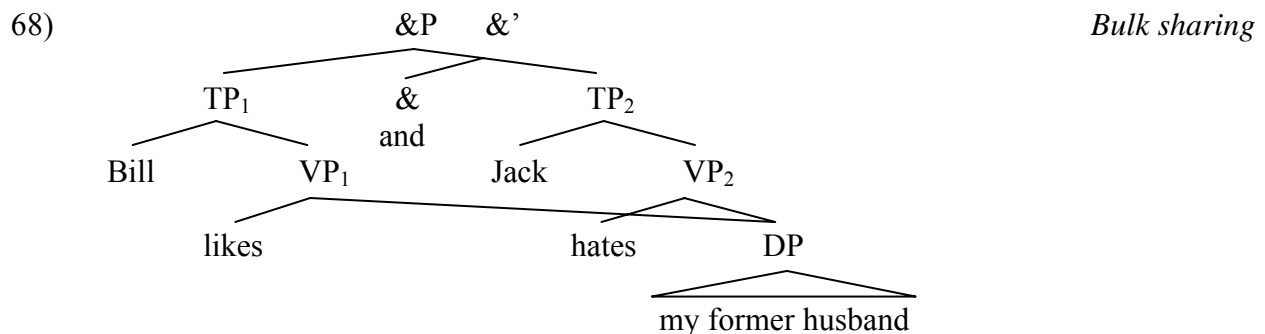
3. Previous sharing analysis in light of the present proposal

The discussion of Q&Qs in the previous section provides evidence that non-bulk sharing is real. We might ask ourselves at this point whether this kind of sharing is in fact the only possible way for material to be shared, i.e. whether bulk sharing may also be reduced to non-bulk sharing. In the following subsection, I show that it cannot.

3.1. Bulk sharing is not non-bulk sharing

Consider again the example in (6), repeated here as (67). On an MD analysis, (67) is represented as in (68), repeated here from (7). However, given what I have argued for so far, we expect (68) to be ruled out since it violates COSH, as the reader can verify for herself.

67) Bill likes and Jack hates my former husband.

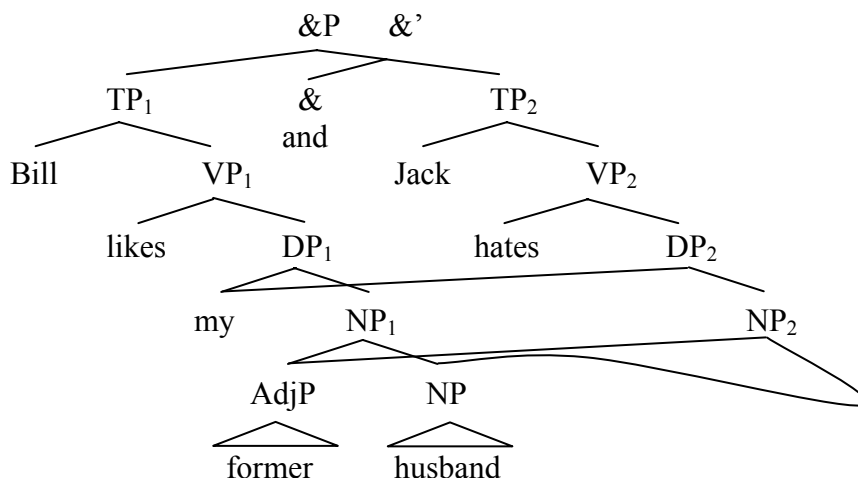


However, in light of the discussion in the previous section, the complex shared constituent, the DP, *my former husband*, might be represented along the lines of (69), which does not violate COSH.

²⁷ See Gracanin-Yukse (2008) for an argument that linearization is independent of well-formedness conditions that hold of MD structures.

69)

Non-bulk sharing



I would like to suggest that (68) and (69) in fact represent the same derivation. The reason why these two representations seem to be different from one another is that the diagram notation commonly used to represent syntactic structures is sufficiently imprecise to allow for the same derivation to map onto two distinct diagrams, in our case (68) and (69). To make this obvious, it is helpful to review these derivations in terms of sets (Chomsky, 1995).

Following Chomsky (1995, pg. 243-260), I assume that a derivation proceeds by iterative application of Merge to lexical items and already formed syntactic objects. One addition to this view is the assumption that Merge can apply to a subpart of a formed syntactic object and merge it with a node that does not dominate it. Each instance of Merge creates a two-membered set of the form $\{\gamma \{\alpha, \beta\}\}$ where the first member, γ is a label, and the second member, the set that contains objects that have undergone Merge. If, upon the creation of the set $\{\gamma \{\alpha, \beta\}\}$ either α or β undergoes Merge with an element other than γ , the element which underwent the second instance of Merge now participates in two derivations, i.e. the “workspace” in Chomsky’s (1995) sense has been split.

Under this view, the first three steps in (68) and (69) may be represented as in (70) and (71) respectively.²⁸ In (70), the first shared node is the whole DP, *my former husband*. Thus the workspace does not split until this DP undergoes two instances of Merge, with the verb *likes* and with the verb *hates*.

70) Set-theoretic representation of the derivation in (68): bulk sharing

	a) Derivation of TP ₁ : workspace 1	b) Derivation of TP ₂ : workspace 2
Step 1:		{former, husband}
Step 2:		{my, {former, husband}}
Step 3:	{likes, {my, {former, husband}}}	{hates, {my, {former, husband}}}

In (71), however, the splitting of the workspace presumably occurs in the very first step, since the merging of *former* and *husband* seemingly results in two different NPs: NP₁ and NP₂.

²⁸ For reasons of simplicity, I omit the first member of the set created by Merge, namely the label.

71) Set-theoretic representation of the derivation in (69)

a) Derivation of TP ₁ : workspace 1	b) Derivation of TP ₂ : workspace 2
Step 1: {former, husband}	{former, husband}
Step 2: {my, {former, husband}}	{my, {former, husband}}
Step 3: {likes, {my, {former, husband}}}	{hates, {my, {former, husband}}}

In (71), the sets created in the first two steps in each workspace are identical. Since the set is defined by its elements, these seemingly distinct sets are in fact one and the same. We may conclude that if an instance of Merge in a derivation m creates the same set as an instance of Merge in a derivation n , then m and n are the same derivation. This means that, despite the deceiving appearances of diagram notations in (68) and (69), only the bulk sharing representation in (68) is possible. In other words, if a string of shared material forms a constituent, then this constituent must be shared as a bulk. Thus, the range of legitimate MD structures that syntax may produce includes both bulk and non-bulk sharing representations.

In the following paragraphs we will take a look at the bulk sharing analyses proposed for various phenomena in light of COSH.

3.2. Bulk sharing and COSH

As I mentioned in the introduction, bulk sharing analyses have been proposed for Right-Node Raising, gapping, Across-The-Board (ATB) questions, parasitic gaps, free relatives (FRs), and object sharing in serial verb constructions. The proposal that MD is constrained by COSH has consequences for these, i.e. only those MD representations that are in accordance with COSH should be legitimate.²⁹ We will see that analyses of ATB questions, FRs, parasitic gaps, and serial verb constructions, as they have been proposed, are supported by the present proposal, but the analysis of RNR on which the shared material remains *in situ* is ruled out.

3.2.1. ATB questions, free relatives, parasitic gaps, serial verb constructions, and COSH
MD analyses of ATB questions, FRs, parasitic gaps, and serial verb constructions all have two features in common: (i) they all involve bulk sharing (there is only one node in the structure which has more than one mother and this node dominates all of the shared material) and (ii) in all of these analyses, the shared node undergoes movement that creates a unique highest mother for the node (the mother that dominates all other mothers). Since the existence of the highest mother of a shared node vacuously satisfies COSH, all of these analyses are in accord with the present proposal. I briefly illustrate this below. Since COSH is a filter on representations, I present only the final structure for each of these phenomena, which COSH operates on.³⁰

Under Citko's (2005) analysis of ATB questions, the *wh*-phrase starts out shared between the two coordinated TPs, and then moves to [Spec CP] position. Thus, (72) has the structure

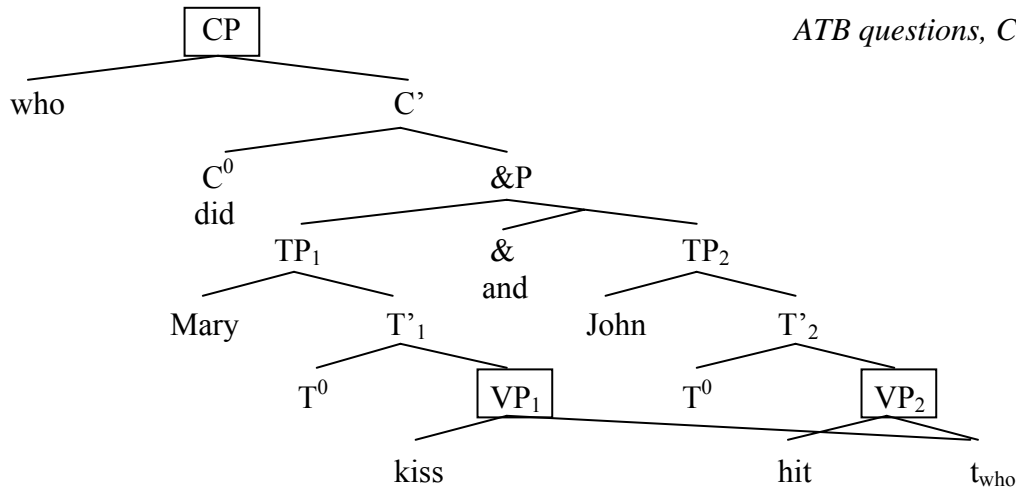
²⁹ Since the works proposing an MD analysis of gapping were published, the phenomenon has received an influential "small conjuncts" analysis (Johnson, 2000; To appear; Lin, 2002), according to which the two conjuncts in a gapping structure are not TPs, but vPs. Lin's proposal involves elipsis of the gapped verb, and as such cannot be reduced to MD. Johnson's can, but in order to discuss this proposal properly in light of MD, it is necessary to have better understanding of what constitutes ATB movement. In particular, we need to know whether all ATB movement in fact involves the movement of a single shared constituent (this is assumed in Wilder (2008)). More importantly for the discussion of gapping in light of MD, we should know more about the ATB movement of remnant phrases that contain a shared node. For these reasons, I leave this issue for further research, and omit the discussion of gapping from the text.

³⁰ The mothers of the shared nodes are boxed for convenience.

shown in (73). This structure conforms to COSH: the shared node, the wh-phrase *who*, has a unique highest mother, the CP, and therefore, the structure is not subject to COSH.

72) Who did Mary kiss and John hit?

73) ATB questions, Citko (2005)



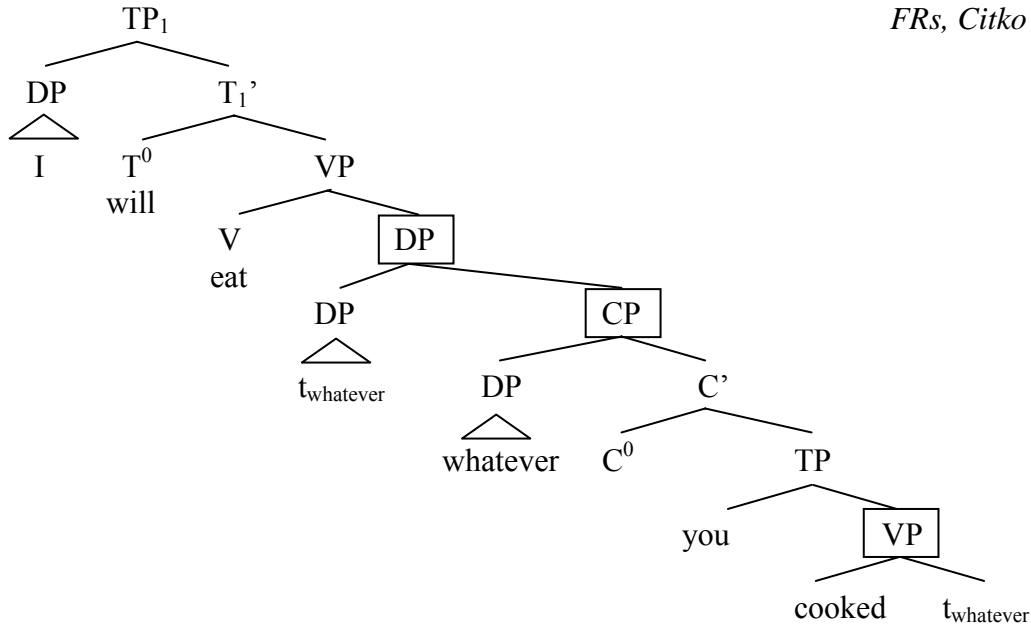
The same is true of the MD analysis of free relatives proposed by Citko (2000).³¹ Under this analysis, the wh-phrase which introduces the FR in (74) is shared between the matrix and embedded clauses. First, two separate TPs are built, with a shared wh-phrase. Next, the shared wh-phrase moves to [Spec CP] of the FR. Finally, the CP is adjoined to the trace of *whatever* in the object position of *eat*, as in (75).

74) I will eat whatever you cooked.

³¹ I do not review here the proposal by Van Riemsdijk (2006), where material in a free relative is shared in non-bulk manner between two separate representations. Under his view, these two representations are never merged under a single root node (see also Guimarães (2004) for a similar proposal). Since COSH makes reference to a unique highest mother, it is unclear to me how it would treat multiple mothers of a shared node when these mothers are dominated by different root nodes.

75)

FRs, Citko (2000)



COSH is formulated so that it checks whether by the end of the derivation the mothers of a shared node *that does not have a unique highest mother* completely dominate identical sets of terminal nodes. Since in (75) there are no such nodes, COSH is vacuously satisfied. Thus, as far as the predictions of COSH are concerned, the structure is well-formed.

Kasai (2007) proposes an MD analysis for a parasitic gap construction, illustrated in (76).

76) Which paper did you file without reading?

Under this analysis, the *wh*-phrase *which paper* originates inside the VP of the adverbial clause, from where it moves to [Spec CP] of that clause. There, it undergoes Parallel Merge with the verb of the matrix clause, *file*. Finally, it moves successive cyclically to [Spec CP] of the matrix clause. The derivation is shown in (77).³²

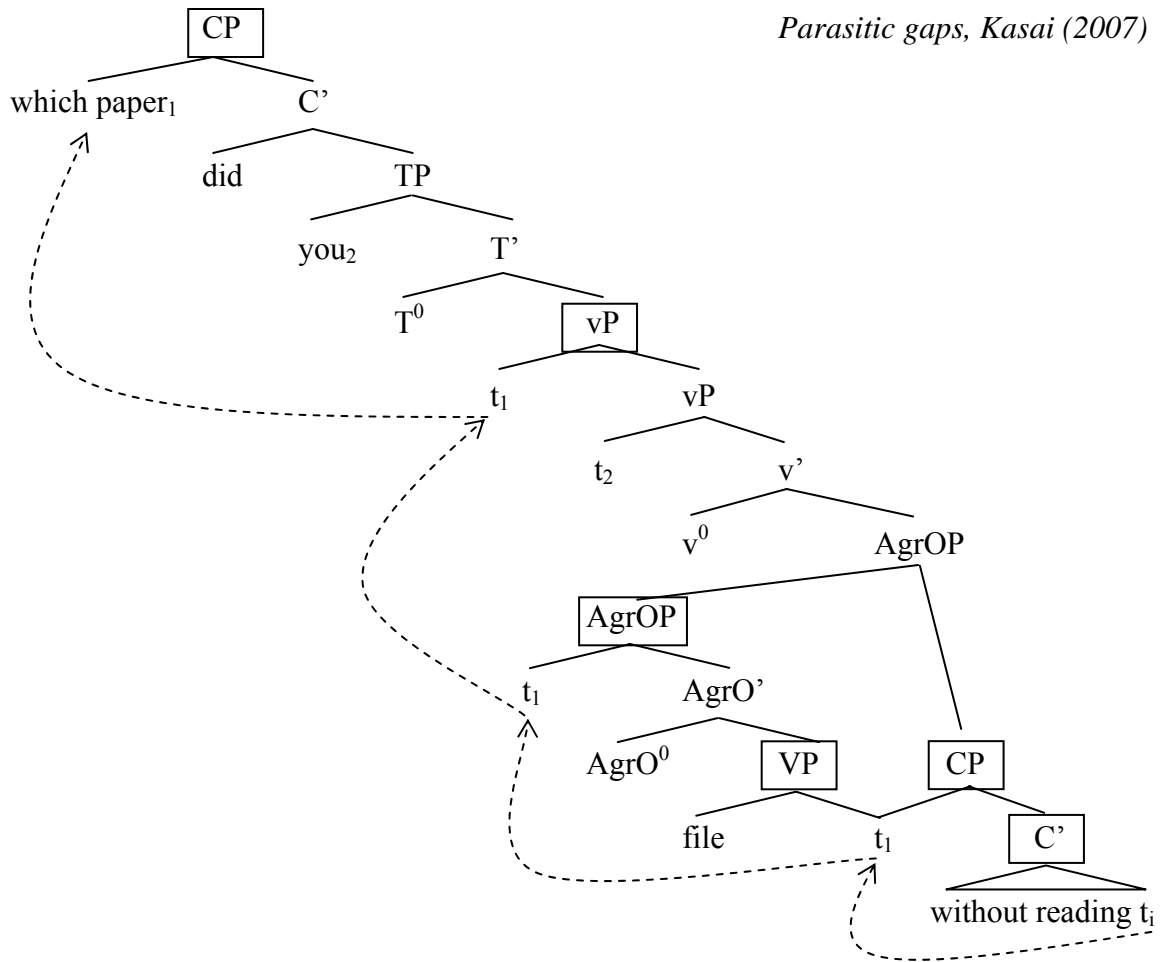
³² It is crucial for the analysis that the following holds:

- (i) The adverbial clause is fully built before the structure building of the matrix clause begins (preventing the *wh*-phrase from being shared in its base position, thus accounting for the categorical restriction on parasitic gaps), and
- (ii) The *wh*-phrase moves to the case-checking position [Spec AgrOP] of the adverbial clause, *before* the adverbial clause is merged with the matrix clause (preventing the adverbial clause from becoming an island for further movement of the *wh*-phrase).

Neither of these considerations is relevant for our purposes.

77)

Parasitic gaps, Kasai (2007)



As was the case with the analysis of FRs above, the structure in (77) satisfies COSH. This is again due to the fact that the shared *wh*-phrase *which paper* has a unique highest mother (in [Spec CP] of the matrix clause), so that COSH does not apply.

Based on evidence from predicate clefts, Hiraiwa and Bodomo (2008) propose that serial verb constructions in Dàgáàrè involve symmetric sharing, i.e. that the direct object in these constructions is merged as a sister to both verbs.³³ The authors propose that subsequently, the shared object and the first verb undergo separate instances of movement: the verb moves to vP, and the object undergoes short object shift to AspP. The object shift breaks up the symmetrical

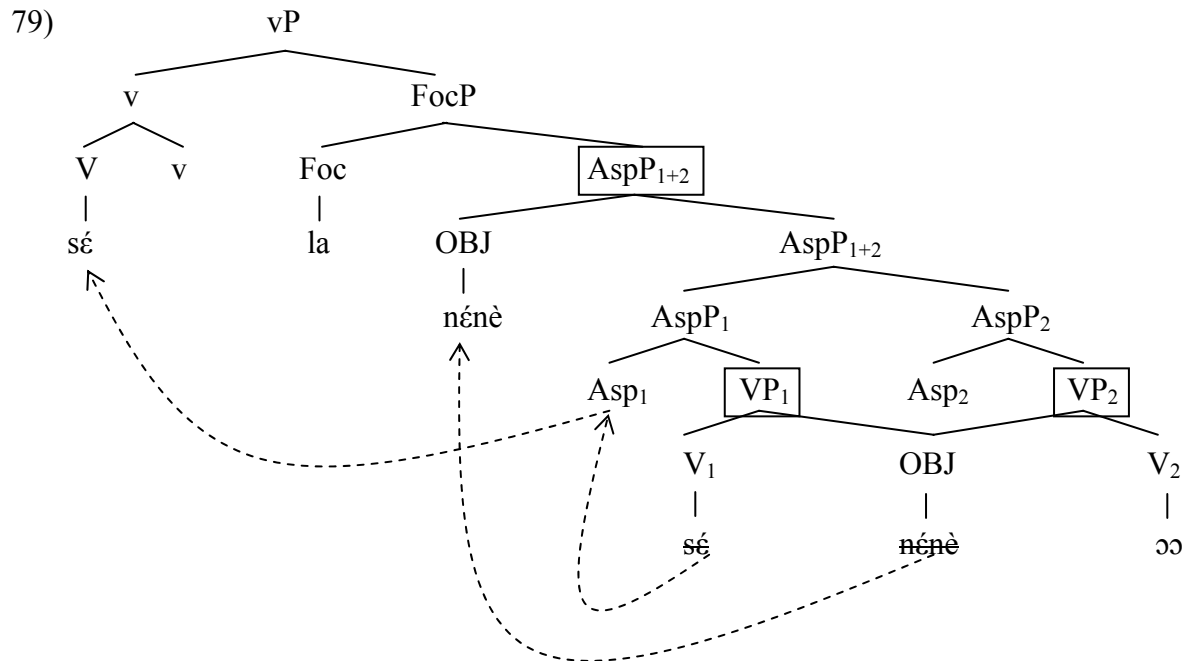
³³ This has as a consequence the fact that predicate clefting in this language may front the object with either of the serial verbs, or with both of them, as illustrated in (i).

- i. a. nènè sééó lá ká ó sé ɔɔ.
 meat roast F C 3sg. roast eat
 'It is roasting the meat that he did and ate.'
- b. nènè ɔɔó lá ká ó sé ɔɔ.
 meat eat F C 3sg. roast eat
 'It is eating meat that he roasted and did.'
- c. nènè sé-ɔɔó lá ká ó sé ɔɔ.
 meat roast-eat F C 3sg. roast eat
 'It is roasting meat and eating it that he did.'

(Hiraiwa and Bodomo 2008, ex. [27])

structure, and creates a unique highest mother of the shared object, thus exempting the structure from the effects of COSH. The relevant part of the derivation of (78) is shown in (79).

78) ò dà sé lá néné ɔɔ
 3sg. Pst roast F meat eat
 'He roasted the meat and ate it.'



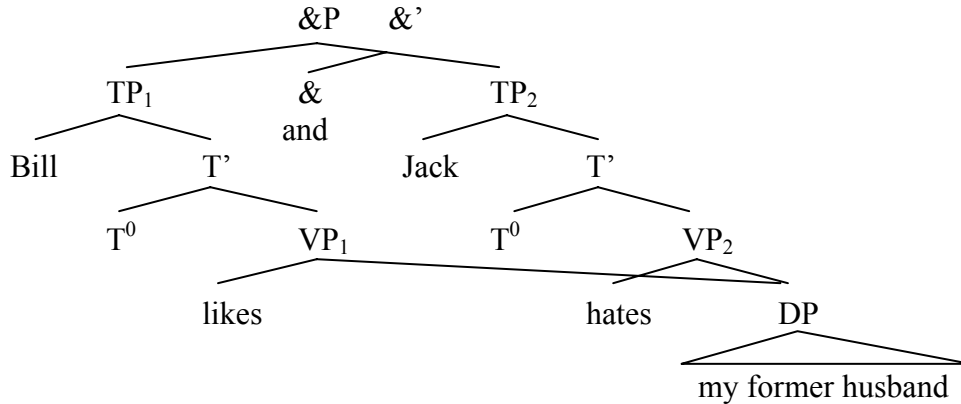
In this section we saw that bulk sharing analyses previously proposed for ATB questions, FRs, parasitic gaps, and serial verb constructions are not problematic from the viewpoint of COSH. In all of these, COSH is vacuously satisfied, because in each case the shared node has a unique highest mother. Next, we will take a look at RNR.

3.2.2. RNR and COSH

We have already seen and briefly discussed the structure for RNR repeated below as (80). Such a structure accounts for several facts about RNR that are problematic for a movement analysis, such as insensitivity to islands and the exemption from the Right Roof Constraint.

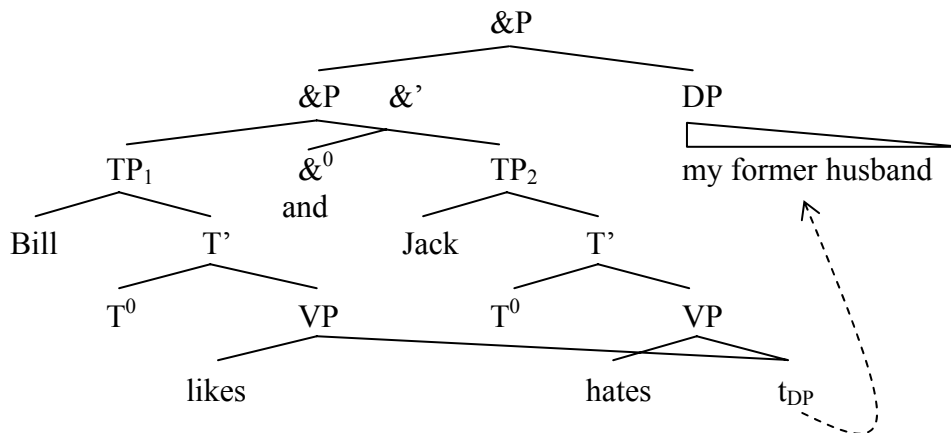
I noted at the beginning of section 3 that this structure violates COSH. The only shared node, the DP *my former husband*, has two mothers, VP₁ and VP₂. Neither of these VPs completely dominates this DP. However, VP₁ completely dominates the verb *likes*, while VP₂ completely dominates the verb *hates*. Thus, under the present analysis, (80) is ruled out on a violation of COSH.

80)



However, RNR might receive a sharing analysis even if the shared element moves. Representation (81) below, where the shared node undergoes a rightward movement to adjoin to the &P, is thus a possible representation.³⁴ In (81), the shared DP has a unique highest mother, namely the &P. This makes COSH vacuously satisfied.

81)



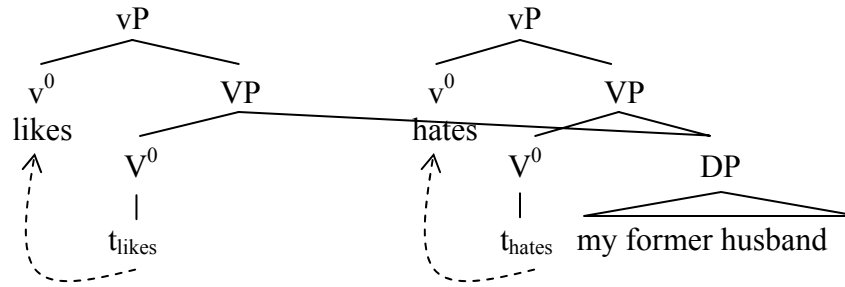
Alternatively, the shared DP may remain *in situ* if we posit a V-to-v movement of both verbs. In this case, the mothers of the shared node, VP₁ and VP₂ would both completely dominate nothing, in accordance with COSH. The relevant part of the structure is shown in (82).

³⁴ Fox and Pesetsky (in preparation) argue that by the end of the derivation, all shared material must have a mother that dominates all its other mothers. They posit The Total Domination Filter, given in (i).

- (i) The Total Domination Filter
 Every constituent α must be totally dominated by some mother of α .

However, the non-bulk shared material in a Q&Q presumably remains *in situ*, in violation of (i). Thus, if (i) is correct, it might be the case that it holds only for cases of bulk sharing.

82)



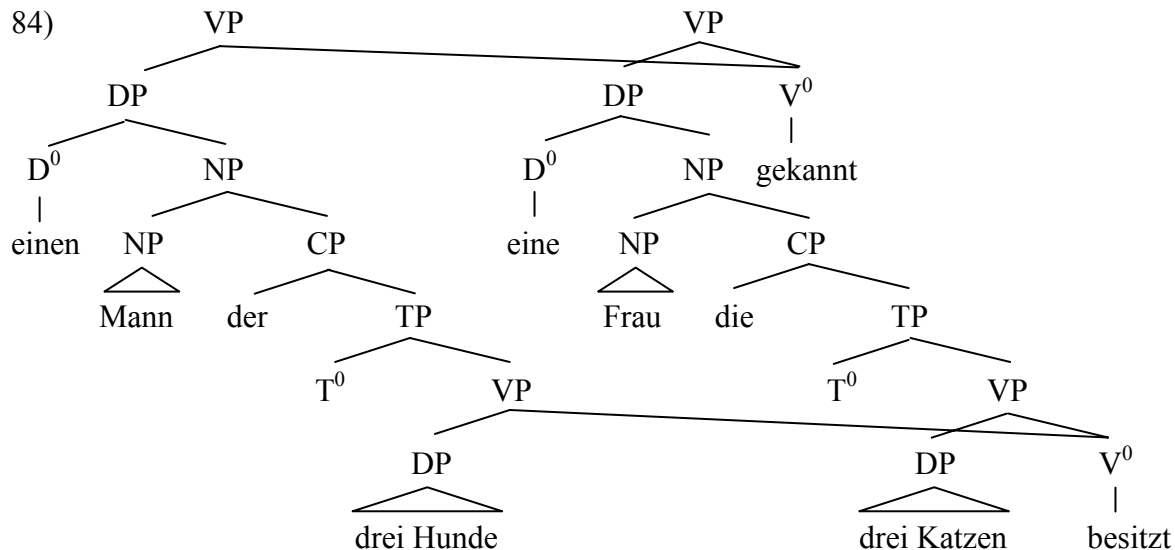
Since both (81) and (82) are compatible with COSH, the present proposal unfortunately does not help us decide between the movement and non-movement analyses of RNR. Once RNR is better understood, however, we might be able to decide which of the COSH obeying representations of RNR illustrated above is actually true.

3.3. Non-bulk sharing and COSH

Continuing with the discussion of RNR, let us take a look at how the proposal advanced here affects the analysis of a structure where the “RN raised” material is not a constituent, i.e. involves non-bulk sharing. Wilder (1999, 2008) proposes the structure in (84) for the RNR sentence in (83)³⁵ (examples are repeated from (8) and (9) in the Introduction).

83) [er hat einen Mann, der drei Hunde,] und
 he has a man who three dogs and
 [sie hat eine Frau, die drei Katzen besitzt, gekannt.]
 she has a woman who three cats owns known
 ‘He knew a man who owns three dogs and she knew a woman who owns three cats.’

84)



³⁵ Abbott (1976) also discusses RNR and points out that the right-node raised material is not always a constituent. If RNR involves MD, it follows from Abbott’s discussion that material may be shared even if does not form a single constituent.

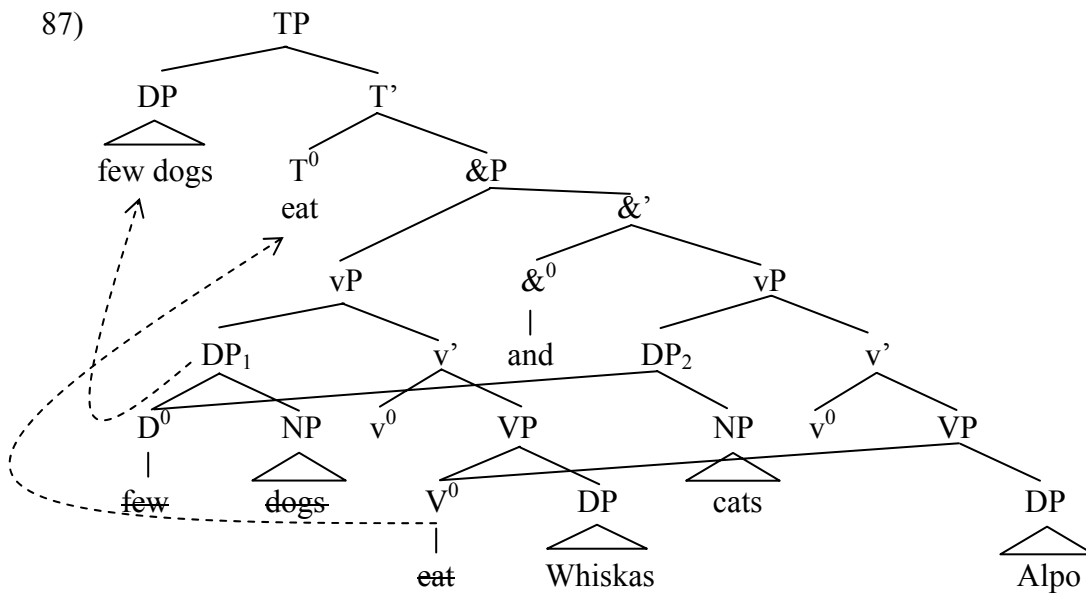
Obviously, the structure does not conform to COSH: mothers of both shared nodes *besitzt* and *gekannt* completely dominate different sets of terminal nodes. Positing a short V-to-v movement of both shared verbs in (84) does not save the structure, since the movement would not create a single highest mother for either of the verbs. Thus, the only possibility left, under the sharing approach to (83), is the movement of each verb to a position outside the coordination, where the unique highest mother for each would be created.³⁶ Alternatively, it is possible that (83) is derived through a deletion operation illustrated in (85), along the lines of Wilder (1997).

85) [er hat einen Mann, der drei Hunde ~~besitzt~~ ~~gekannt~~] und
 he has a man who three dogs ~~owns~~ ~~known~~ and
 [sie hat eine Frau, die drei Katzen *besitzt* *gekannt*.]
 she has a woman who three kats owns known

Finally, Citko (2006) proposes that the phenomenon of determiner sharing structures, illustrated in (86), is explained by an analysis where the determiner and the verb are generated individually (non-bulk) shared between the two conjuncts, as in (87). Subsequently, the shared verb raises to T⁰, and the shared determiner moves to its specifier, to satisfy the EPP. In English, the determiner necessarily pied-pipes the NP, since the language more generally does not allow discontinuous constituents.

86) Few dogs eat Whiskas or cats Alpo.

(Johnson 2000, ex. [59])



The implications of COSH for Citko's proposal are not straightforward. There are two shared nodes in (87): the verb *eat* and the determiner *few*. The shared verb has a unique highest mother (T') and COSH is thus vacuously satisfied with respect to this shared node. Situation is more complicated when we consider the shared determiner. While the DP *few dogs*, which contains the shared determiner, does have a unique highest mother (TP), the shared determiner

³⁶ As noted by Kluck and de Vries (2009), this movement would have to involve tucking in at the site of adjunction.

itself does not. Thus, COSH applies, checking whether all the mothers of this node completely dominate the same set of terminal nodes. One of the mothers of the shared determiner (DP₁) completely dominates the NP *dogs*, while the other (DP₂) completely dominates the NP *cats*, in violation of COSH. Given this fact, the structure is inadmissible.³⁷

Citko suggests that the determiner alone may move to satisfy the EPP on T⁰ (Bošković, 2005; Corver, 1992; Van Riemsdijk, 1989). This is a possibility in Polish and other languages that allow for Left-Branch Extraction (LBE). If the determiner alone undergoes head movement to [Spec TP], perhaps along the lines of Matushansky (2006), then the structure becomes admissible, since in this case TP becomes a unique highest mother of the determiner.³⁸

Thus far, COSH seems to allow for both bulk and non-bulk sharing. In particular, it allows for a non-bulk sharing analysis of Q&Qs that correctly derives all of their relevant properties.

Some conceptual questions arise, however. First, do we really need to resort to MD in order to derive all the properties of a Q&Q? The answer to this question seems to be affirmative. In section 2.1 above, we saw evidence that Q&Qs in English are bi-clausal. If this is correct, the only plausible analysis of these constructions that does not invoke MD is the deletion of the TP/C' in the first conjunct. In section 4.1 below, I show that this analysis makes wrong predictions for Q&Qs. I thus argue against the backwards sluicing analysis of these questions (Giannakidou and Merchant, 1998), on which (at least at LF) the structure contains two instances of the IP which is pronounced only once.³⁹

Another question is whether the properties of Q&Qs might be derived by a more familiar kind of sharing: bulk sharing. Here, the answer seems to be negative. I discuss the predictions and shortcomings of a bulk sharing analysis of Q&Qs in section 4.2.

4. Alternative analyses of Q&Qs

4.1. A backwards sluicing analysis of Q&Qs

Giannakidou and Merchant (1998), henceforth G&M, propose that the string in (88)a is derived

³⁷ The structure in (87) is linearizable in Citko's terms because for her, a shared node cannot be linearized as long as it participates in a symmetric structure. This can be restated in terms of the number of sisters a node has: in order for the structure to be linearized, all nodes must have one and only one sister. However, since in this system, movement is crucially not seen as MD, it is only *overt* nodes that must have a single sister; silent copies/traces may in fact participate in more than one sisterhood relation. In (87), the moved DP₁, which dominates the determiner, leaves behind a silent copy, which includes a silent copy of the determiner. Thus, after the movement of the DP₁ *few dogs* there is no sisterhood relation between the overt copy of the determiner *few* and the NP *cats*, contained in DP₂. This makes the structure linearizable. In a system where movement is reduced to MD, there is only one (shared) determiner, and whatever sisterhood relations it participates in in its base position remain in place until the end of the derivation. Since in a binary-branching structure multiple sisters entail multiple mothers, (87) violates COSH.

³⁸ Under alternative approaches to LBE, remnant movement approach (Bašić, 2004; Franks and Progovac, 1994; Sekerina, 1997) and the selective deletion approach (Fanselow and Čavar, 2002), the structure remains ill-formed with respect to COSH.

³⁹ Giannakidou and Merchant propose a reverse sluicing analysis for questions in which one of the "coordinated" constituents is *if/whether* and the other is an adjunct wh-phrase. I have nothing to say about whether such cases are indeed derived through backwards sluicing. Arguments I present in section 4.1 argue only against extending this analysis to Q&Qs, i.e. to constructions in which one of the "coordinated" wh-phrases is an argument and the other an adjunct, as the authors suggest in their footnote 2, pg. 234.

A backwards sluicing analysis of Q&Qs was also proposed by Browne (1972) for Serbo-Croatian and by Bánréti (1992) for Hungarian.

through sluicing of the TP in the first conjunct, as shown in (88)b.⁴⁰

- 88) a. The journalists want to know if and when the suspect will make a statement.
b. The journalists want to know [&P [CP1 if [TP1 ~~the suspect will make a statement~~]]
and [CP2 when [TP2 the suspect will make a statement.]]]

Seemingly, this analysis straightforwardly extends to the case of Q&Qs, in which one wh-phrase is an argument, and the other one an adjunct, as in (89).

- 89) a. What and where did Peter eat?
b. [&P [CP1 What [C'1 ~~did Peter eat~~]] and [CP2 where [C'2 did Peter eat]]]

Arguments advanced in this section show that, even though the analysis proposed by G&M may be correct for cases like (88), it does not cover cases like (89).

Let us first note that English allows backwards sluicing.

- 90) I don't know what, but John will have something. (Coppock, 2001)

Backwards sluicing is allowed even if the sluiced wh-phrase in the first conjunct does not have an overt indefinite correlate in the second conjunct, as in (91). The antecedent of the sluiced wh-phrase *what* is an implicit argument of the verb *eat*. Such sluicing is referred to as *antecedentless sluicing* (AS).⁴¹

- 91) I don't remember what, but I am sure John was eating.

In section 2.1 we saw evidence that in a Q&Q, the verb in the conjunct introduced by a wh-adjunct must obligatorily be interpreted intransitively, i.e. as containing an *implicit* direct object. Given this observation, if Q&Qs are derived through backwards sluicing, the antecedent of the sluiced wh-object, *what*, in the first conjunct is an implicit argument of the verb in the second conjunct. In other words, this should be a case of backwards AS. Thus, the backwards sluicing analysis of Q&Qs makes a prediction that these constructions will show properties normally associated with AS. The data below show that his prediction is not borne out.

4.1.1. Antecedentless Sluicing

Chung, Ladusaw and McCloskey (1995), henceforth CLM, note that AS does not have the same

⁴⁰ G&M follow Chung, Ladusaw and McCloskey (1995) in assuming that in sluicing, the position of the sluiced TP in the syntactic structure is occupied by a null constituent with no internal content or structure, which receives interpretation by being replaced by a copy of the LF representation of the antecedent IP. This process is referred to as "IP recycling." Here, I assume that sluicing involves construction of a full-fledged IP in the syntax, followed by its deletion at PF. As far as I can see, arguments advanced here hold regardless of the view of sluicing one takes. (See Fox (2000) and Goldberg (2005) for arguments against LF copying approach to VP ellipsis.)

⁴¹ Some speakers find (91) degraded compared to (90), (i), and (ii). If the degradation of (91) is sufficient to rule out backwards AS, that in itself constitutes an argument against the backwards sluicing analysis of Q&Qs. The argument which follows in the main text is relevant if speakers find (91) acceptable, even if somewhat degraded.

- i. I am sure John was eating, but I can't remember what. *Forward AS*
ii. I can't remember why, but I know John was eating. *Backwards AS, implicit adjunct*

characteristics that the sluicing with an overt antecedent does. While the latter is not sensitive to islands, the former is.⁴² Consider (92). In (92)a, the implicit argument of the verb *win* may serve as an antecedent for the wh-phrase *which race* in the sluiced clause. However, when the implicit argument is embedded in the subject island, as in (92)b, the sluice is no longer possible.

- 92) a. It is likely that Tom will win, but it's not clear which race.
b. *That tom will win is likely, but it's not clear which race. (CLM, 1995)

CLM note that (92)b is at least as bad as its overt counterpart in (93).

- 93) *It is not clear which race that Tom will win is likely.

Romero (1998) points out that AS is blocked not only by strong islands, but also by the intervention of other operators. She notes that examples like those in (94)a and (95)a are unacceptable, even though their overt counterparts in (94)b and (95)b are well-formed.

- 94) a. *Few kids ate, but I don't know what.
b. I don't know what few kids ate.
95) a. *Joan rarely fed my fish, but I don't know with which product.
b. I don't know with which product Joan rarely fed my fish. (Romero, 1998)

Romero argues that the ungrammaticality of the (a) examples in (94) and (95) is due to a violation of Scope Parallelism, which requires that the remnant of a deletion operation and its antecedent have the same scope (see also Fox (2000) for relevant discussion).

96) Scope Parallelism

The focused remnant and its antecedent have the same scope.

As noted by Fodor and Fodor (1980), an implicit argument always takes the narrowest scope in its clause. Romero argues that Scope Parallelism requires that in AS, the sluiced wh-phrase also take the narrowest scope in its clause. Here, the relevant notion of scope height is the one relative to other operators in the clause, not the one tied to a particular position in the structure. It is not the case, then, that the antecedent (the implicit argument) and the sluiced wh-phrase must take scope at the exact same level in the clause. This is always impossible, given that the sluiced wh-phrase always takes scope at the CP level, quite higher than the implicit argument. Rather, Scope Parallelism in AS is satisfied as long as the wh-phrase does not outscope any other operator in its clause. Given that the wh-phrase takes scope in its surface position, this is only true if the sluiced clause contains no operators that must take narrow scope with respect to wh-phrases.⁴³

Sluices in (94)a and (95)a both involve additional operators, *few kids* and *rarely*

⁴² CLM attribute this observation to Chris Albert.

⁴³ Romero in fact makes a stronger claim, that 'AS succeeds [...] only if there is no operator whatsoever under C⁰ at LF.' (pg. 63) Thus, AS should be bad even with those operators that allow pair-list reading in a wh-question, such as *everyone* (see Romero 1998, ft. 38, pg. 62). For our purposes, it is sufficient to show that Q&Qs do not behave as *bona fide* AS sluicing examples when both involve an operator that obligatorily scopes under the wh-phrase.

respectively. Both of these operators are outscoped by the *wh*-phrase, as shown by the fact that (97)a and (98)a only have the readings in (b), but not those in (c).

97) a. What did few kids eat?

b. *what* > *few kids*: What is the thing *x*, such that few kids ate *x*?

c. **few kids* > *what*: For few kids *y*, tell me what *y* ate.

98) a. What did John rarely read?

b. *what* > *rarely*: What is the thing *x*, such that John rarely read *x*?

c. **rarely* > *what*: On rare occasions *y* that John was reading, what did he read on occasions *y*.

In (94)a and (95)a then, the *wh*-phrase, *what*, in the sluiced clause necessarily outscopes *few kids* and *rarely* respectively, but in the antecedent clause, the implicit argument, which is the antecedent of *what*, scopes below these operators. The mismatch in scope height leads to a violation of Scope Parallelism.

4.1.2. Q&Qs do not involve AS

A backwards sluicing analysis of Q&Qs makes the prediction that they should be ungrammatical if the sluiced clause contains operators such as *few kids* or *rarely*, which take scope lower than the *wh*-phrase, for the same reason for which (94)a and (95)a are ungrammatical. However, (99) and (100) below show that this prediction is not borne out: both sentences are judged as well-formed.

99) What and where does John rarely eat?

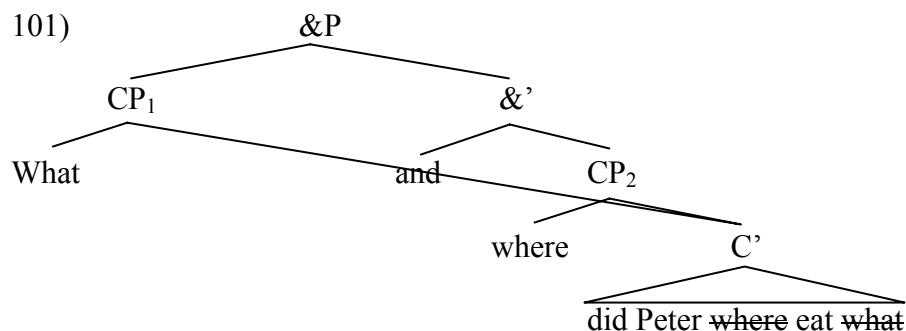
100) [?]What and when did few professors teach?

On the other hand, the non-bulk sharing analysis proposed here does not make the same prediction. On this account, the derivation does not involve deletion (or LF copying), so the scope parallelism requirement does not apply (is trivially satisfied). Thus, in contrast to the sharing analysis, the backwards sluicing approach to Q&Qs does not seem to be empirically adequate.⁴⁴

⁴⁴ An anonymous reviewer suggests that a deletion approach developed in Wilder (1997) is more relevant for the discussion of Q&Qs than the one discussed in the main text. On Wilder's proposal, coordination always involves clausal conjuncts and the surface string is a result of forward (FWD) and/or backward (BWD) deletion operation. BWD is constrained by a requirement that both the ellipsis site and the licensing string be right-peripheral in their respective conjuncts, and is subject to form-identity at PF. For FWD to apply, on the other hand, the elided material and its antecedent must be identical at LF. However, as Wilder himself points out, sluicing "may appear both in initial and in final conjuncts in coordination, and so [is] to be kept distinct from FWD and BWD." (pg. 60) Pre-theoretically, sluicing may be defined as a process that results in a phonologically present *wh*-phrase followed by phonologically absent structure that is recovered and interpreted at LF as a TP, under identity with some locally available TP. Assuming that Q&Qs are underlyingly bi-clausal, and that some kind of a deletion process is at work in deriving their surface form, we are forced to conclude that this process is sluicing. Given Wilder's own caution that sluicing should be treated as distinct from both FWD and BWD, I do not see how the proposals in his article are relevant for the discussion at hand. In any event, any deletion analysis would have to account for the contrast between AS in (95), and a Q&Q in (99).

4.2. A bulk sharing analysis of Q&Qs

Given the arguments in the previous section against the deletion analysis, it seems clear that the underlying representation of a Q&Q does not contain two *distinct* TPs. An obvious alternative is to treat the pronounced TP as *the only* TP in the structure. However, since the TP is interpreted twice, it has to simultaneously be part of both conjuncts, CP₁ and CP₂, i.e. it has to be shared between the two. The seemingly simplest representation of this possibility for the Q&Q in (39)/(89)a is given in (101).



In section 2.1, we saw evidence that Q&Qs behave as if each of the conjuncts contained a single wh-phrase. Assuming that wh-phrases *what* and *where* are externally merged within the shared TP, and subsequently move to their surface positions, the material under the shared node C' would have to contain traces/copies of both. After the wh-movement takes place, then, CP₁ and CP₂ form the following two sets:

- 102) a. CP₁: {what, did, Peter, ~~where~~, eat, ~~what~~}
 b. CP₂: {where, did, Peter, ~~where~~, eat, ~~what~~}

This raises a number of problems. First, under the view that movement of an element to a higher position forces the lower copy to be interpreted as a variable, the crossed-out elements in the sets in (102) have to be interpreted as variables, and would have to be bound. However, if the structure in (101) is correct, the higher copy of *where* is no longer part of the set that forms CP₁. This means that *within* CP₁, the variable left by the movement of *where* is left unbound. Similarly, the lower copy of *what* is unbound within CP₂. Thus, even though within the &P, both lower copies of wh-phrases are bound by their respective antecedents, in each of the conjuncts this is not the case. Under assumptions that CPs are phases, that semantics is read off of syntax and that material present in the syntactic structure cannot be ignored for purposes of interpretation, there would have to exist a way to bind the unbound variables by a different operator, one that *is* present in each CP. In the following paragraphs I examine and refute this possibility.

Suppose that in (101), the problematic copies of wh-phrases in a Q&Q are bound by an operator other than the wh-phrase that moved. Let us first consider what properties this operator would have to possess in order for a Q&Q to be interpreted correctly.

In section 2.1.3 we saw that the Q&Q in (39)/(89)a, repeated here as (103), only has the at-all reading in (104)a, but not the it-reading in (104)b.

103) What and where did Peter eat?

- 104) a. What did Peter eat and where did Peter eat *at all*? *At-all-reading*
b. #What did Peter eat and where did Peter eat *it*? *It-reading*

The attested reading in (104)a entails and is entailed by the reading in (105) below (Bresnan, 1978; Fodor and Fodor, 1980; Mittwoch, 1982).

- 105) What did Peter eat *somewhere* and where did Peter eat *something*?

It seems, then, that the unbound wh-trace in each conjunct is bound by some sort of an existential quantifier. An obvious first choice is the existential closure, proposed by Kamp (1981) and Heim (1982). However, this cannot be quite right, because existential closure is an implicit existential quantifier that is freely available in *all* sentences that contain otherwise unbound indefinites. In our case, the existential quantifier must be lexically restricted to a particular class of verbs, namely those that are optionally transitive. Otherwise, the contrasts observed in section 2.1.1, on transitive and intransitive verbs in a Q&Q, would not hold.⁴⁵ Thus, if (101) is a correct representation of (103), it must be true that *optionally transitive* verbs, such as *eat*, *sing*, *teach*, etc. inherently contain an existential quantifier that is capable of binding the otherwise unbound trace of the wh-object in a Q&Q. Alternatively, these verbs must be capable of somehow licensing an insertion at LF of such an existential quantifier. Let's call this quantifier \exists_{OT} .

It has been proposed in the literature that implicit arguments are 'intrinsic variables', bound by existential quantifiers inserted at LF (Johnson, 2001). If optionally transitive verbs always make available the use of \exists_{OT} , because it is needed in order to bind their implicit arguments, then the proposal under consideration here, that bulk sharing is the correct analysis of Q&Qs, must be taken seriously. In what follows I argue that this view of optionally transitive verbs is not correct.

We already saw, in section 2.1.3 that the Q&Q in (106)a does not have the same interpretation as the sluiced example in (107)a. The former only has the at-all-reading, given in (106)b, while the latter only has the it-reading in (107)b.

- 106) a. Sue knows what and where Peter ate. *Q&Q*
b. Sue knows what Peter ate and where Peter ate. *At-all-reading*

- 107) a. Sue knows what Peter ate and where. *Sluice*
b. Sue knows what Peter ate and where Peter ate the things he ate. *It-reading*

I take this contrast to indicate that the sluiced TP in (107)a contains the trace/copy of the wh-phrase *what*, as in (108)a, but the pronounced TP in (106)a does not, as in (108)b.⁴⁶

⁴⁵ The existential closure in the sense of Kamp-Heim theory might be what binds the lower copy of the wh-adjunct in the first conjunct, in our case *where*. Given this fact, in the rest of the argument against bulk sharing analysis of Q&Qs, I will make reference only to the lower copy of the wh-object, since existential closure does not seem to be a possible choice there.

⁴⁶ The striking through of the material in these examples is to be taken simply as non-pronunciation of the crossed out material.

- 108) a. Sue knows [_{&P} [_{CP1} what_i Peter ate t_i] and [_{CP2} where_j ~~Peter t_j ate t_i~~]] *Sluice*
b. Sue knows [_{&P} [_{CP1} what_i ~~Peter ate t_i~~] and [_{CP2} where_j Peter t_j ate]] *Q&Q*

If optionally transitive verbs, such as *eat*, introduce into the structure an existential quantifier, \exists_{OT} , then this quantifier should be able to existentially close the unbound trace in the elided second conjunct in (108)a, giving it the interpretation in (109), which is equivalent to the at-all reading. This is, however, not the case.

109) Sue knows what Peter ate and where Peter ate *something*.

Given that the reading in (109) is absent from the sluicing example in (107)a, it seems that the copy of the wh-phrase *what* is not bound by the \exists_{OT} . If \exists_{OT} cannot bind the unbound variable in sluicing, it should not be able to do so in a Q&Q either.

An objection might be raised that two situations, sluicing and a Q&Q, are not exactly the same – namely, that in a sluice the whole structure in which the ‘non-canonical binding’ takes place is ultimately deleted, while in a Q&Q the structure is shared, but not deleted. In particular, one might suggest that binding in the sluice fails because sluicing in fact involves LF-copying and not PF-deletion. If so, then given that the verb in the antecedent clause in the sluice in (107) is transitive, \exists_{OT} is not required, and therefore not present. When the antecedent clause is copied into the sluice site, this fact does not change. However, if copying of a verb results in the two copies being identical with respect to the availability of \exists_{OT} , we would definitely expect that *sharing* of the verb forces the same identity.

Given the discussion in this section, it seems that there are good empirical arguments not to analyze Q&Qs as involving bulk sharing of the TP/C'.⁴⁷

5. Conclusion

In this paper I discussed conditions that constrain MD structures. Based on evidence from Q&Qs, I proposed that MD is subject to COSH, a requirement that all mothers of a shared node which has no unique highest mother completely dominate an identical set of terminal nodes. COSH crucially does not apply derivationally, but acts instead as a filter on representations. Thus, while sharing is in principle free, an MD representation is well-formed only if it satisfies COSH. We have seen that COSH may be satisfied when the shared material forms a single constituent (as, for example, in ATB questions), but it can also be satisfied when it does not (as in Q&Qs). Q&Qs thus provide additional evidence for non-bulk sharing.

I further argued that bulk and non-bulk sharing are both represented in the grammar, i.e. neither can be reduced to the other. However, COSH is a constraining factor on both, and this proposal has consequences for the discussion of phenomena that have been analyzed as involving bulk sharing. In particular, I argued that the analysis of RNR, if it involves MD, must also involve some movement: either of both verbs to little v^0 , or of the shared material to a position higher than the conjunction phrase. Alternatively, it may involve base-generation of material in both conjuncts, followed by deletion in the non-funeral conjunct(s).

Thus, the proposal that sharing (in various guises) is real, and that it is subject to COSH

⁴⁷ Park (2006) proposes an RNR analysis of G&M's data on which the two conjuncts are CPs that share the same TP. Extended to Q&Qs, this proposal faces the same challenges as a bulk sharing analysis discussed in the text.

is not meant as an alternative to other mechanisms which have as a consequence the non-pronunciation of material. Rather, it is a step towards an understanding of the division of labor between these mechanisms.

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