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In defense of the simplicity and accuracy of dependency syntax: A reply to the discussion notes

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Abstract. My focus article in *Language Under Discussion* from 2018 argued that dependency syntax is both simpler and more accurate than phrase structure syntax with respect to the results delivered by tests for constituents. Four linguists (Richard Hudson, Lachlan Mackenzie, Stefan Müller, and Matthew Reeve) have responded to my focus article with discussion notes, challenging aspects of my message in various ways. In this article, I respond to the counterarguments produced in the discussion notes. In order to address one of the main counterarguments, having to do with scope and meaning compositionality, I introduce a new unit of dependency syntax, namely the *colocant*. My claim is that aspects of scope and meaning compositionality, for which phrase structure is deemed necessary, can be addressed in terms of colocants. Hence, scope phenomena and the manner in which meaning is composed can no longer be construed as an argument against dependency syntax and in favor of the necessity of phrase structure.

Keywords: colocant, constituent, dependency grammar, phrase structure grammar

1. Introduction

In my focus article in *Language Under Discussion* (Osborne 2018), I developed an argument in favor of dependency syntax over phrase structure syntax based on tests for constituents. The same message also now appears in my book on *dependency grammar* (DG), which has just appeared (Osborne 2019: Ch. 3). I again demonstrate that most of the tests for constituents that are frequently employed in introductory textbooks on linguistics and syntax produce results that are actually more in line with the dependency analysis of sentence structure than with that

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of phrase structure. The tests for constituents readily support the existence of phrasal constituents, but they do little to support the existence of subphrasal strings as constituents. This situation is consistent with dependency syntax, because dependency does not acknowledge the existence of subphrasal strings as constituents to begin with. My message is controversial because phrase structure has been dominant in the study of syntax over the past 60 years and is taken for granted by most of the textbooks and monographs surveyed in my focus article.

Four linguists responded to my focus article with discussion notes, namely: Richard Hudson (2018), Lachlan Mackenzie (2018), Stefan Müller (2018), and Matthew Reeve (2018). All four of these discussion notes disagree with the message in my focus article at least to some extent, although the natures of the disagreements and counterarguments vary considerably. The current contribution responds to the various points raised in the four discussion notes, these issues being both empirical and conceptual in nature. I defend the original message in my focus article at length. Before beginning this defense, however, let it be known that I am thankful and grateful for the interest and earnestness that these four esteemed linguists have demonstrated and devoted to my focus article. The issues raised in the discussion notes and the discussion of these issues below deepen our understanding of the distinction between dependency and phrase structure syntax.

This paper is divided into five sections. The next section, Section 2, addresses challenges to my main message of the sort that I view as empirical in nature, these objections including data that are construed as contradicting my message to a greater or lesser extent. Section 3 then switches to objections to my message that are more conceptual in nature. I consider each of the four discussion notes in turn, examining the various critiques they express that have less to do with concrete data and more with general linguistic reasoning. Section 4 presents new material, namely the *colocant* unit. The colocant is the means of addressing a main objection to my message produced by Müller and Reeve, this objection being that phrase structure is needed to accommodate aspects of scope and meaning compositionality. Section 5 concludes my response.

2. Empirical challenges

The next five subsections examine what I consider to be direct observational and empirical challenges to the core data and message I present and develop in my focus article. These challenges are from Reeve, Mackenzie, and Müller.

2.1 Echo questions

The biggest challenge to the message in my target article comes, I believe, in the form of Reeve's echo questions and the corresponding answer fragments (Reeve 2018: 73–75), in particular his examples (8) and (11), which I reproduce here as (1) and (2):

(1) a. This test probes syntactic WHAT? – STRUCTURE.

b. This test does WHAT to syntactic structure? – #<u>TESTS</u>. / <u>TESTS it</u>.

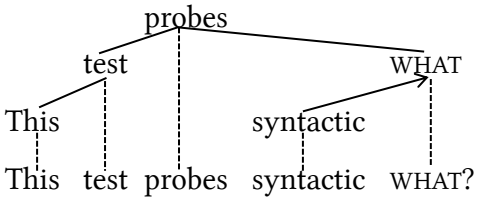
(2) A: He did what?

B: – Threw away Mary's present.

These answer fragments cannot be construed as constituents based on *dependency grammar* (DG) assumptions, as Reeve points out, hence they directly contradict the message in my target article. The noun – *STRUCTURE* in (1a) is not a DG constituent because it is not a complete subtree in the corresponding full sentence, but rather it takes a dependent. Similarly, the strings – *Tests it* in (1b) and – *Threw away Mary's present* in (2) are not DG constituents because they also are not complete subtrees in the corresponding full sentences. This challenge to my message must be conceded. However, there is an important aspect of these counterexamples that reduces the importance of the concession. The discussion in this section examines this aspect.

Examining (1a) first, consider its dependency structure (the dependency trees henceforth mark adjuncts using an arrow dependency edge, as done here with the attributive adjective *syntactic*):[1]

(3)



The ability of *what* to take an overt dependent (*syntactic* here) means that it is focusing a non-phrasal string. Given this ability, the fact that the corresponding answer fragment is non-phrasal is not surprising. The DG account distinguishes between *ex situ* and *in situ* focusing, whereby answer fragments responding to the former are necessarily constituents, whereas answer fragments responding to the latter can be non-constituents. Reeve (2018) acknowledges that this sort of distinction is necessary in his footnote 7. He mentions that approaches to answer fragments that see all fragments as originating from movement are also challenged by *in situ* focusing of the sort illustrated with his example (8). Worth noting in this area is that when the answer fragment test is used in the texts cited in my focus article (16 of them), *in situ* focusing is rarely considered.

Examples (1b) and (2) involve finite verb phrase (VP) fragments. A fuller data set is needed in order to discern what is going on in such cases. There is a systematic difference in the nature of the fragments according to whether the *wh*-word is *in situ* or *ex situ*:

<u>*In situ* focusing (echo questions):</u>

(4) He does what?
  a. – Throws away the cake.
  b. –*Throw away the cake.

[1] The practice of marking adjuncts in dependency trees has precedents, although the exact convention employed varies (e.g. Tesnière 1959/2015: 36; Baum 1976: 79; Tarvainen 1981: 61; Engel 1994: 44; Jung 1995: 111–6; Eroms 2000: 85–6; Uzonyi 2003: 237). The arrow convention employed here, pointing from the adjunct towards its head, is intended to indicate that semantic selection runs up the hierarchy, signifying that the adjunct semantically selects its governor. Note that adjuncts were not marked in the dependency trees in my focus article. There are two reasons why they are now being marked in this response to the discussion notes. The first is to deliver a more complete picture of the theoretical apparatus being employed and the second is that Müller's discussion note includes an example, the second tree in his Figure 4, in which an adjunct is marked using a different convention from what is employed here (Müller 2018: 58).

(5) He did what?
  a. – Threw away the cake.
  b. –*Throw away the cake.

Ex situ focusing:

(6) What did he do?
  a. –??Threw away the cake.
  b. – Throw away the cake.

(7) What does he do?
  a. –??Throws away the cake.
  b. – Throw away the cake.

The acceptability pattern reveals that the form of the answer fragment should match the form of lexical *do* (as opposed to auxiliary *do*). When lexical *do* is finite in the question, as in (4) and (5), then the answer fragment should be finite and match the form of *do* in tense. When lexical *do* is an infinitive in the question, as in (6) and (7), then the answer fragment should be infinitival. What this means is that lexical *do* is necessarily part of the interrogative proform, that is, the interrogative proform has two parts, lexical *do* and *what*. Thus, the interrogative proform is *does what* in (4), *did what* in (5), and *What…do* in (6) and (7).

The insight that the form of lexical *do* is key to determining which VP fragments are possible is supported by a data set produced by Culicover & Jackendoff (2005: 252):

(8) What did you do?
  a. –*Ate the bagel. – Finite VP fragment
  b. – Eat the bagel. – Infinitive VP fragment

The acceptability judgements given here are those of Culicover & Jackendoff. We again see that the form of lexical *do* is responsible for determining which of the two fragments is possible. Since lexical *do* in the question in (8) is the infinitive, the VP fragment must be infinitival.

Another pertinent observation is that while lexical *do* must be construed as part of the two-part interrogative proform, it is not a pure proform, but rather it has some content of its own. This fact is evident in its need to take an agentive subject argument, e.g.

(9) Frank does what?
  a. –*Knows the answers.
  b. –*Looks like his father.
  c. –*Is quite friendly.

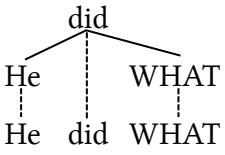
These finite VP fragments fail because the predicates there are stative and hence require that *Frank* be interpreted as a theme subject, which contradicts the use of lexical *do* in the question, which itself requires that *Frank* be construed as agentive.

A further pertinent issue concerns the fact that if lexical *do* is not present at all, it is impossible to produce such finite VP answer fragments. This fact is apparent when one attempts to produce finite VP fragments as answers to yes/no-questions. It is also apparent when one produces echo questions using *what* in the absence of lexical *do*, e.g.

(10) a. Has he thrown away Mary's present? – *Yes, has thrown it away.
b. Does he like Mary's present? – *Yes, does like it.
c. Will he throw away Mary's present? – *Well, could throw it away.
d. Should he throw away Mary's present? – *Well, can throw it away if he wants to.
e. He is what? – *Is a good friend.
f. They were what? – *Were quite helpful.

While one can explain the badness of examples (10a–b) and (10e–f) in terms of the failure to omit backgrounded material (i.e. material that appears in the question – the auxiliary/copula each time), the same explanation does not account for (10c–d). The auxiliaries *could* and *can* there do not appear in the questions and therefore cannot be construed as backgrounded material. Examples (10e–f) are of course fine if the copula is omitted from the fragment (e.g. – *A good friend*), but as finite VPs, they are robustly ungrammatical. These examples therefore help draw attention to the fact that finite VP answer fragments are possible only under narrow circumstances: finite lexical *do* together with interrogative *what* in an echo question format.

The necessity to view lexical *do* as a quasi-proform in interrogative combination with *what* means that Reeve's echo questions in examples (1b) and (2) can be analyzed along the same lines as (1a) – see (3). The root word of the interrogative proform, i.e. *did*, is the root of the sentence:

(11)


He did WHAT – Threw away Mary's present.

The fact that *did* takes a dependent that is not part of the proform, i.e. *he*, means that *did what* puts a string in focus that is not a DG constituent, similar to the manner in which *what* in (1a) and (3) is focusing a string that is not a DG constituent. The ability to do this means that the answer fragment elicited is also not a DG constituent.

To provide some commentary on the data just considered, both the dependency approach and phrase structure approach need to distinguish between *in situ* and *ex situ* focusing to address convincingly the variation that occurs in the nature of the fragments. The dependency approach sees *ex situ* focusing as necessarily involving constituents, whereas *in situ* focusing using *what* (and lexical *do*) has the ability to focus a non-constituent string. The phrase structure approach, in contrast, views *ex situ* focusing as necessarily involving phrasal constituents, whereas *in situ* focusing using *what* has the ability to focus certain subphrasal constituents. The ability of both approaches to address the distinction similarly in terms of *ex situ* and *in situ* focusing does not give the one approach an advantage over the other. The simpler dependency apparatus continues, however, to be advantageous in this area and others

The points just made concerning Reeve's echo question examples mitigate the challenge they pose to the DG analysis of fragments. Furthermore, one should not lose sight of the fact that other tests fail to identify head nouns alone and finite VPs as constituents and hence such answer fragments are an outlier, a point that Reeve (2018: 75) acknowledges, e.g.

(12) a. *…and **structure** the test probes syntactic. – Topicalization
b. *It is **structure** that the test probes syntactic. – Clefting
c. *What the test probes syntactic is **structure**. – Pseudoclefting

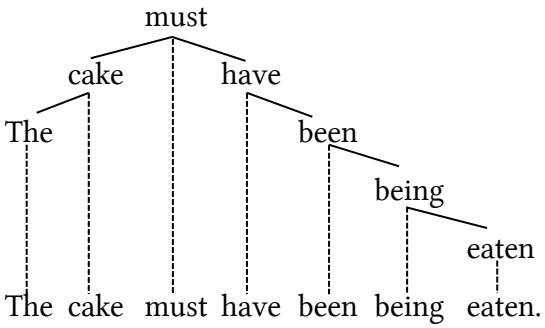
(13) a. *…and **threw away the cake** he. – Topicalization
b. *It was **threw away the cake** that he (did). – Clefting
c. ??What he (did) was **threw away the cake**. – Pseudoclefting

Examples (12a–c) suggest that the word *structure* alone is not a constituent, and examples (13a–c) that the finite VP *threw away the cake* is not a constituent.

2.2 Nonfinite VPs

Reeve (2018: 75–76) also points out that at times, the dependency analysis of sentence structure makes incorrect predictions. His message is that to be convincing, the dependency account would have to also correctly predict why certain dependency constituents fail the tests, such as nonfinite VPs headed by auxiliaries. An example sentence he discusses in this area is used here to illustrate his point (Reeve 2018: 76; I have adapted somewhat his dependency structural analysis to simplify and more clearly show what is at issue):

(14)



a. *…and **have been being eaten** the cake must.
b. *…and **been being eaten** the cake must have.
c. …and **being eaten** the cake must have been.
d. *...and **eaten** the cake must have been being.

This dependency analysis makes three incorrect predictions concerning this set of examples, since it predicts all four of these examples to be possible, as in each case, the topicalized nonfinite VP is a dependency constituent. Reeve's argument in this area must be conceded insofar as the dependency account has to be augmented in order to determine which nonfinite VPs can and cannot be topicalized.

However, one should again not lose sight of the big picture, that is, of the comparison across dependency and phrase structure. The phrase structure analysis makes the same three incorrect predictions with respect to the data set, since it too views nonfinite VPs as constituents. Hence, with respect to nonfinite VPs, both analyses come up short and must be augmented in some way to address the shortcoming.

The big picture includes the status of individual words with respect to topicalization. Recall that phrase structure views each individual word as a constituent, whereas dependency sees

only those individual words as constituents that are not modified by any other word(s). In this area, dependency makes the correct prediction where phrase structure fails:

(14) e. *…and **must** the cake have been being eaten.
(unacceptable as a declarative statement)
f. *…and **have** the cake must been being eaten.
g. *…and **been** the cake must have being eaten.
h. *…and **being** the cake must have been eaten.

The dependency analysis correctly predicts ungrammaticality in these cases, whereas the phrase structure analysis must be augmented again to account for the fact that auxiliary heads cannot be topicalized alone without their complements. An additional datum that is problematic for the phrase structure analysis occurs when finite VP is topicalized (as mentioned in the previous section; see example 13a):

(14) i. *…and **must have been being eaten** the cake.

The dependency analysis correctly predicts (14i) to be ungrammatical, whereas the phrase structure analysis must again augment its apparatus to account for this unexpected ungrammaticality.

Summarizing all the results just considered for Reeve's example sentence, nine instances of topicalization were produced, examples (14a–i). Of these nine, the dependency analysis makes the correct prediction in six of them, whereas the phrase structure analysis makes the correct prediction in just one of the nine cases. It should therefore be apparent that this big picture strongly supports dependency over phrase structure.

Reeve (2018: 75) also mentions VP-ellipsis in the context of his example sentence. The data delivered by VP-ellipsis contradict those delivered by topicalization, as the following data set illustrates:

(15) We think the cake must have been being eaten, and
a. ? it definitely must ~~have been being eaten~~.
b. it definitely must have ~~been being eaten~~.
c. it definitely must have been ~~being eaten~~.
d.?? it definitely must have been being ~~eaten~~.

Both dependency and phrase structure make mostly correct predictions with respect to this set of examples. When one probes further with such data, however, one again sees that dependency fares much better than phrase structure:

(15) We think the cake must have been being eaten, and
e. *it definitely must ~~have~~ been being eaten.
f. *it definitely must have ~~been~~ being eaten.
g. *it definitely must have been ~~being~~ eaten.[2]

[2] Example (15g) can be acceptable on the reading where nothing is omitted. In such a case, the voice and aspect have changed.

The dependency analysis correctly predicts these attempts at ellipsis to fail, whereas the phrase structure analysis does not necessarily do the same. One might object here that VP-ellipsis necessarily elides a phrase, not just the head of a phrase. While this objection is based on a valid observation, it constitutes a clarification about the nature of the ellipsis mechanism implicated; the dependency analysis does not need this clarification.

To summarize my response to Reeve's argument that dependency makes incorrect predictions, he is right – but it makes many fewer incorrect predictions than phrase structure. Hence, augmenting the dependency apparatus to address the deviant data is going to take less effort than augmenting the phrase structure apparatus to do the same. Furthermore, one should not forget that the results of tests for constituents are known to be inconsistent, at times contradicting each other. My message is therefore that absolute accuracy and consistency in the predictions that each theory makes is unobtainable; the one theory (dependency) does, however, get one much closer to what the tests actually reveal than the other (phrase structure).

2.3 Pseudogapping

Transitive verbs taking complements are not DG constituents. Mackenzie draws attention to pseudogappiing as a source of contradictory data in this area, that is, to a source of support that one can in fact take individual transitive verbs as constituents, contrary to the DG analysis (Mackenzie 2018: 48). The relevant example from the focus article is (22h), given here as (16):

(16) *Drunks would ~~put off~~ the customers. – Omission

The claim in the focus article is that the inability to omit *put off* in this case suggests that it is not a constituent. Mackenzie produces the next example to illustrate that *put off* can in fact be omitted if the context licenses the omission:

(17) Flower-sellers put off the staff, and drunks would ~~put off~~ the customers.

This example of pseudogapping strikes me as somewhat unsuccessful, but if a clear contrast is established using a comparative clause, it becomes perfect:

(18) Flower-sellers would put off the staff more than drunks would ~~put off~~ the customers.

It must be conceded that such instances of pseudogapping can be construed as supporting the status of *put off* as a constituent. There are, however, additional considerations that mitigate any conclusion based on such data from pseudogapping. Most importantly, the pseudogapping mechanism can easily elide strings that no approach to syntax would view as constituents (cf. Osborne et al. 2012: 386–390).

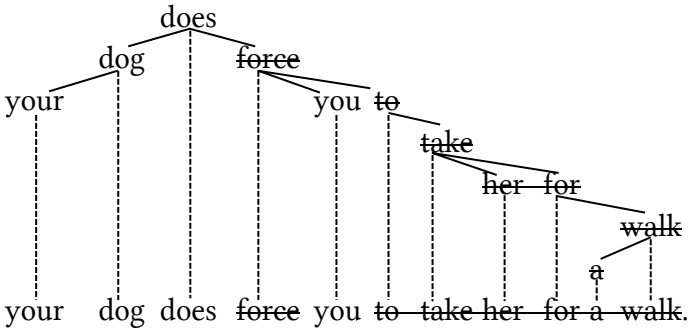
First, however, the standard use of the omission diagnostic is relevant. The omission diagnostic is usually employed in such a manner that does not involve a specialized context and can hence identify only those constituents that are standardly viewed as optional, e.g.

(19) a. The (very muscular) gentleman (next to me) lit a cigar. (Burton-Roberts 1997: 14–15)
b. This is (very) important (indeed). (Quirk et al. 2010: 61)
c. Mary arrived (in the afternoon). (Sobin 2011: 33)

The strings in parentheses are optional, that is, they can be omitted without rendering the sentences ungrammatical. Such optionality is possible in the absence of a specialized context and hence easy to test.

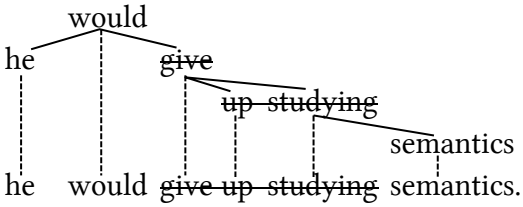
The notion that pseudogapping can help identify constituents is problematic in view of examples like the following ones (I include the dependency analyses to make a point about the elided material):

(20) My dog forces me to take her for a walk more often than



– Pseudogapping

(21) Frank would give up studying syntax more readily than

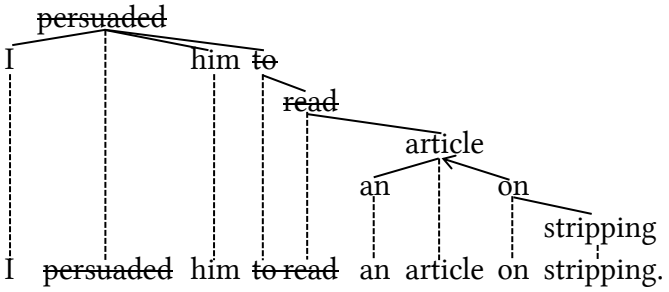


– Pseudogapping

The elided material indicated in these cases cannot be construed as forming constituents on most any approach to syntax. This fact is most vividly true of example (20), in which the pseudogapping mechanism has elided a non-string word combination. It is also true of example (21), where the verb combination *give up studying* cannot, to the exclusion of the object *semantics*, be construed as a constituent in most any approach to the syntax of English.

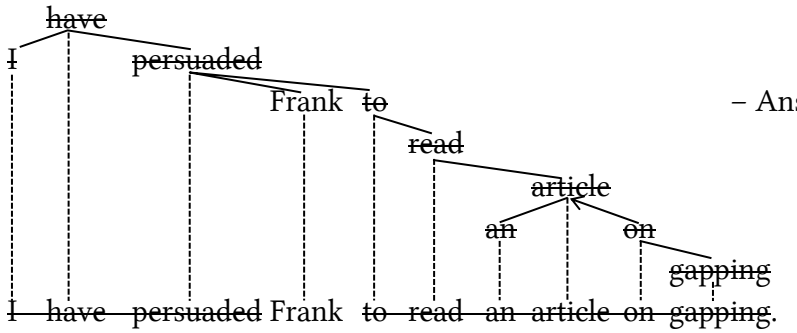
Pseudogapping is like gapping in its ability to elide word combinations that clearly do not form constituents, and the same goes for answer fragments and sluicing as well. In fact, most ellipsis mechanisms often elide non-constituent material, as in (22):

(22) Frank persuaded me to read an article on gapping, and



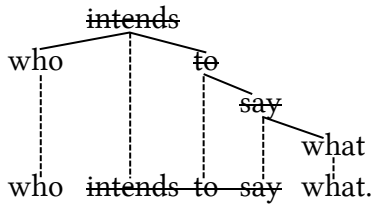
– Gapping

(23) Who have you persuaded to read an article on gapping?



– Answer fragment

(24) Someone intends to say something, but we don't know



– Sluicing

The elided material in each of these examples cannot be construed as a constituent in most any approach to syntax. It does form a catena, however, as my co-authors and I have discussed and illustrated at length (see Osborne 2005: 275–285; Osborne et al. 2011: 343–347; Osborne et al. 2012: 379–391). The catena unit was mentioned in my focus article in the context of *one* and *do so* substitution (Sections 7.2 and 7.3), and it appears again below in Section 4.2.

2.4 Coordination

Müller (2018: 54–55) appeals to coordination as providing support for phrase structure. The crux of his argument is apparent with his example (5), given here as (25):

(25) a former professor in Stuttgart

This phrase is ambiguous: 'a person who used to work as a professor in Stuttgart' or 'a person who used to work as a professor elsewhere but now lives in Stuttgart'. Müller's point is that an X-bar-style phrase structure is warranted in such a case because the flatness of dependency structure cannot capture the ambiguity in an obvious way. The relevant structural analyses should be as follows:

(26) a. [a [former [professor in Stuttgart]]]

b. [a [[former professor] in Stuttgart]]

These two analyses are congruent with an X-bar analysis, because such an analysis allows for the indicated flexibility in groupings. In contrast, the dependency analysis cannot accommodate the ambiguity because it allows for just the rather flat structural analysis, with *former* and *in Stuttgart* as sibling dependents of *professor*.

While the ambiguity Müller points to does seem to support phrase structure at first blush, considering a more extensive set of examples undermines this support:

(27) a former professor of linguistics in Stuttgart
   a. [A former] and [a current] professor of linguistics in Stuttgart sat next to each other.
   b. Hans is a former professor [of linguistics in Stuttgart] and [of political science in Tübingen]
   c. A [former instructor] and [current professor] of linguistics in Stuttgart was present.

It is difficult to see how an X-bar analysis could group the determiner *a* and the attributive adjective *former* together to the exclusion of the noun *professor* to accommodate the coordinate structure indicated in (27a). Similarly, the X-bar analysis that could group the PPs *of linguistics* and *in Stuttgart* together to the exclusion of the noun *professor* to accommodate the coordinate structure in (27b) is also not apparent. Example (27c) presents a somewhat different challenge to the X-bar analysis: it would require the adjective *former*, which is an adjunct, to combine with the noun *instructor* before *instructor* combines with the PP *of linguistics*, which is a complement, despite the fact that *former* necessarily scopes over *instructor of linguistics* (not just over *instructor*). The distinct readings of the starting noun phrase that would be necessary to motivate the distinct structural analyses in these cases are elusive.

To further establish the point, examine the next set of examples from German. Verb-final word order in subordinate clauses in German illustrates well the extent to which non-constituent strings can be coordinated:

(28) dass er sie zweimal gestern zu erreichen versucht hat
that he her twice yesterday to reach tried has
'that he tried to reach her twice yesterday'
   a. dass [er sie] und [sie ihn] zweimal gestern zu erreichen versucht hat
he her she him
   b. dass er [sie zweimal] und [mich dreimal] gestern zu erreichen versucht hat
her twice me thrice
   c. dass er sie [zweimal gestern] und [dreimal heute] zu erreichen versucht hat
twice yesterday thrice today
   d. dass [er sie zweimal] und [sie ihn dreimal] gestern zu erreichen versucht hat
he her twice she him thrice
   e. dass er [sie zweimal gestern] und [mich zweimal heute] zu erreichen
her twice yesterday me twice today
versucht hat
   f. dass [er sie zweimal gestern] und [sie ihn zweimal heute] zu erreichen
he her twice yesterday she him twice today
versucht hat

Further similar examples of this sort could easily be produced. Coordination is symmetric in these cases, and the intonation contour is standard, which means that the gapping or the Right Node Raising (RNR) mechanisms are likely not implicated. It should be apparent that it is impossible to produce a single phrase structure analysis that could view all of the bracketed strings as forming constituents simultaneously. If one chooses instead to allow for flexible

constituent structure, then one is faced with the difficulty of motivating the distinct structures in terms of the distinct readings associated with ambiguity.

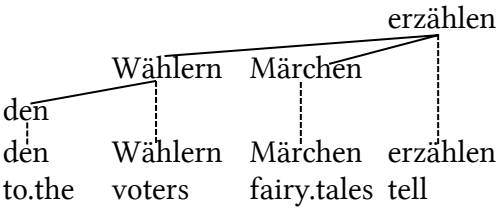
The fuller sets of examples just considered suggest that the ambiguity in Müller's example (5), example (25) above, is not present in the hierarchy of syntactic structure. It is, rather, present purely in the linear dimension of organization. The attributive adjective *former* can scope over the string *professor* or over the string *professor in Stuttgart*. Both of these strings are what I have chosen to call *colocants* – much more about the colocant unit below in Section 4. On a related note, the fact that it is so easy to produce instances of symmetric coordination in which the coordinated strings clearly are not constituents has long motivated dependency grammars to abandon the stance that coordination necessarily operates on phrase structure constituents (e.g. Hudson 1988, 1990: 404–421; Lobin 1993; Osborne 2006a, 2006b, 2006c, 2008; Osborne & Groß 2017). These approaches all assume that coordination coordinates strings, some of which are non-constituent strings.

2.5 Fronting in German

Müller (2018: 56) draws attention to the ability to front 'partial constituents' in German. His two examples in this area are given below as (29a–b); I have added the dependency structural analyses that we, Thomas Groß and I, assign to them (following Groß & Osborne 2009, which Müller cites). Based on such data, one can construct an argument against dependency syntax because the fronted strings do not qualify as constituents in more canonical structures.

First, however, the neutral analysis of the core verb phrase is provided as a point of comparison:

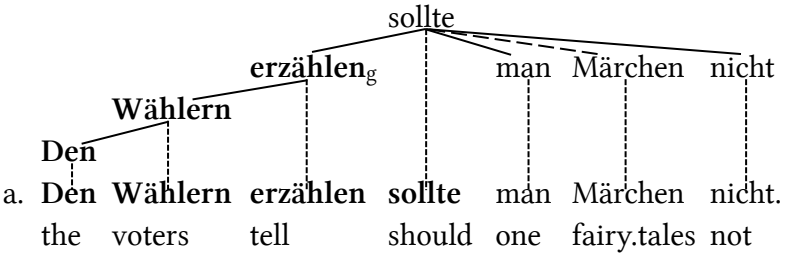
(29)



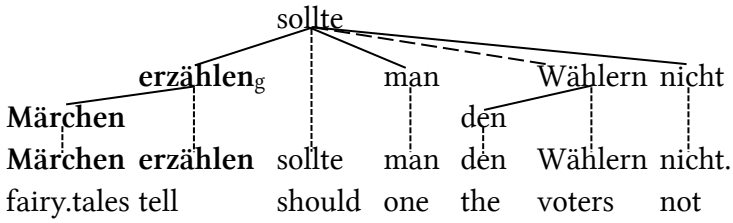
'tell the voters fairy tales'

Müller's examples are next with the dependency analyses we assume added:

(30)



'One should not tell the voters fairy tales.'



b. **Märchen** **erzählen** sollte man den Wählern nicht.
fairy.tales tell should one the voters not

'One should not tell the voters fairy tales.'

Müller's point is that assuming that the neutral structure of the infinitival verb phrase is as shown in (29), the fronted strings in bold in (30a–b) cannot be construed as full constituents; they are, rather, 'partial constituents'. In Groß & Osborne (2009), we address this aspect of fronting (and other types of discontinuities) in German. Our solution to the problem is the notion of *rising*, which is indicated in these dependency analyses by the presence of the dashed dependency edges and the $_g$-subscripts. The dashed dependency edge marks a constituent that has 'risen' and the $_g$-subscript marks the governor of the risen constituent. The risen constituent takes a word as its head that is not its governor. This rising analysis of discontinuities results in dependency structures that are entirely projective (i.e. no crossing lines in the tree). Our analysis is in a sense similar to how movement is employed in many phrase structure grammars to address long distance dependencies, the result being essentially the same in that the resulting phrase structures are also entirely projective.[3]

The necessity to acknowledge the existence of these partial constituents must be conceded. Permutation diagnostics such as topicalization are more flexible in languages that have freer word order than English, such as German and the Slavic languages. I was aware of this issue when drafting my focus article, adding Section 8. The first paragraph of Section 8 is cited next:

> The discussion so far has focused on data from English. In this respect, one can object that the account of the tests for constituents above is not so relevant from a cross-linguistic point of view, since the extent to which the tests are relevant for other languages is not apparent. Some of the tests explored here may not be directly applicable to the syntax of other languages, especially languages with freer word order than that of English. The account here concedes this point, but the importance of this concession should not be overestimated. There are a couple of considerations that elevate the importance of the data from English, and one should also not ignore the fact that some of the tests employed above are likely valid for many other languages beyond English (Osborne 2018: 32.)

The difference between English and German suggested with examples (30a–b) is sometimes characterized in terms of *scrambling*. Languages that have relatively free word order like German and Russian allow scrambling, whereas relatively strict word order languages like English do not. In any case, the problem of how to address data such as (30a–b) confronts dependency and phrase structure syntax alike.

[3] The terminology we (Groß & Osborne 2009) employ – e.g. *rising*, *risen constituent*, etc. – is to be understood metaphorically. Our DG is monostratal and representational. We do not posit a deep layer of syntax, transformations, or derivations that derive surface structures from underlying ones.

3. Conceptual objections

The next four subsections respond to each of the discussion notes individually. The issues addressed concerning each of the four have more to do with conceptual objections to the methodology and message in my focus article than with empirically motivated counterevidence (of the sort addressed in the preceding section).

3.1 Hudson

Richard Hudson's discussion note is brief (Hudson 2018). He makes two central points: the first is to disagree with the main message in my focus article that the combination of simplicity and accuracy (concerning the strings identified as constituents by the tests for constituents) gives dependency an advantage over phrase structure, although he characterizes my position in this area entirely in terms of "node counting" (Hudson 2018: 44). Hudson's second point draws attention to what he views as a valid argument in favor of dependency over phrase structure, namely the psychological reality of dependencies as opposed to the absence of this reality for phrase structure. Concerning this second point, there is full agreement. I also view the psychological reality of dependencies as an argument in their favor. Due to full agreement on this second point, the issues addressed in the next paragraphs focus on Hudson's first point.

Hudson characterizes my position entirely in terms of the counting of nodes, without addressing any of the extensive examples and discussion of the tests for constituents that constitute the bulk of my focus article. He does not engage with the tests, but rather he seems uninterested in what they might reveal about the nature of sentence structure, commenting instead that linguistics is more like psychology than astronomy, so parsimony is not so relevant for assessing linguistic theories. His reasoning in this area is difficult for me to grasp. Given two competing theories of how the mind works whereby both are capable of explaining and predicting mental processes, the simpler of the two is better. In other words, Hudson seems to be claiming that Occam's Razor has no import in psychology and linguistics.

Hudson concedes that in the past, he too has argued that parsimony is a strength of dependency syntax. To provide an example, the following passage is from his 2007 book, *Language Networks*:

> The contrast between the two approaches [dependency and phrase structure] can be seen in Figure 3.1, which makes the rather obvious point that dependency structures […] are very much simpler than phrase structures. Of course, this is not in itself evidence for or against either theory, but other things being equal *we should presumably prefer the simpler analysis* [emphasis mine]. Since the early 1980s my view has been that the *extra nodes* [emphasis mine] are not only unnecessary, but undesirable because they make certain kinds of generalization harder to state. Since 1990, this view has been confirmed by other kinds of evidence – statistical and psychological – which I shall report later (Hudson 2007: 117.)

From early in his academic career, Hudson has been a strong and consistent advocate of dependency syntax – see especially his works from the early 1980s (Hudson 1980a, 1980b, 1984: 94–98), in which he explicitly argues that phrase structure is not needed (except for coordination). Hudson's views, reasoning, and arguments in this area have influenced my own position strongly, especially regarding the nature of coordination. As recently as 2016 (Hudson 2016: 660), Hudson was continuing to point to parsimony as an advantage of dependency syntax,

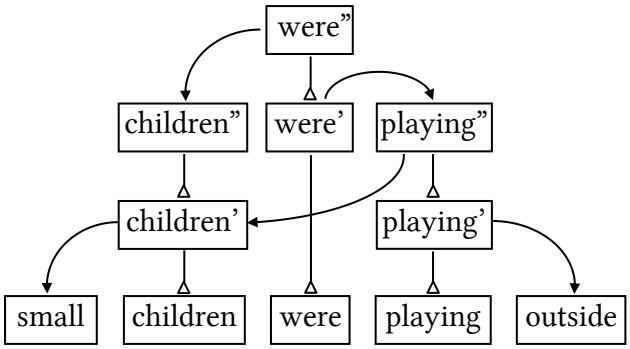


Figure 1. Hudson's (2017: 106) structural analysis of the sentence *Small children were playing outside.*

as he himself states. It is hence with some surprise and disappointment that I learn about his new position, namely that he no longer views the simplicity (as understood in terms of the number of nodes) as a strength of dependency syntax.

Hudson is now arguing that (something akin to) phrase structure is needed in Word Grammar (Hudson 2017: 104–108), a fact that Stefan Müller discusses in his discussion note (Müller 2018: 57–58) and in his book (Müller 2016: 401). Müller considers Hudson's new position, examining a key example from Hudson's (2017) article. Müller renders Hudson's full syntactic analysis of the sentence *Small children were playing outside* in terms of the conventions of phrase structure. Hudson's original diagram and Müller's phrase structure rendition thereof are given as Figure 1 and Figure 2.

For explicit statements about how Hudson's diagram is to be interpreted, see Hudson's (2017: 106) and Müller's (2018: 59) discussions thereof. What is important in the current context is the nodes in these diagrams. Both diagrams contain 11 nodes, six more than the number of words (11 vs. 5). Therefore, from the point of view of node counting, Hudson's diagram is a phrase structure analysis.

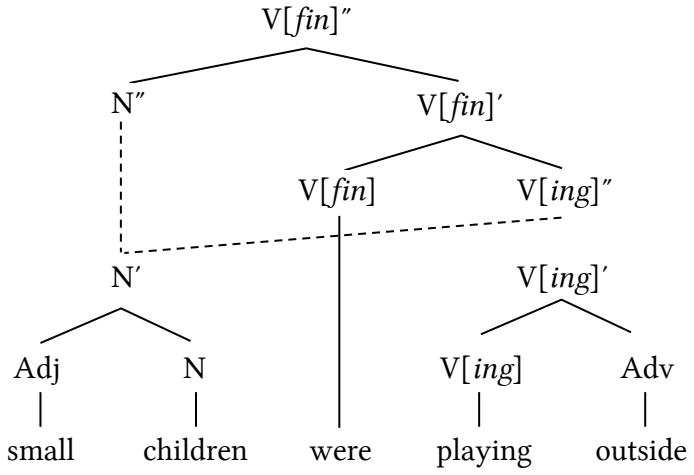


Figure 2. Müller's (2018: 60) reinterpretation of Hudson's structural analysis in terms of X-bar conventions.

My understanding is that the impetus motivating Hudson to expand his Word Grammar apparatus in the direction of phrase structure is an old problem facing dependency syntax in general. This problem has to do with scope and the manner in which meaning is compositional. The problem is evident in the noun phrase *an ordinary French house*, which is the example Dahl (1980) produced in response to Hudson's (1980a) attack on phrase structure. Dahl argued that the additional nodes of phrase structure are necessary to accommodate the fact that *ordinary* scopes over *French house*, not just over *house*. This issue comes up again in Section 3.3 below where aspects of Müller's discussion note are considered. It is also taken up explicitly below in Section 4, where I sketch the manner in which the *colocant* unit can account for meaning compositionality and aspects of scope without recourse to the extra nodes of phrase structure.

3.2 Mackenzie

In his discussion note (Mackenzie 2018), Lachlan Mackenzie also does not engage with the main issue discussed in my focus article (dependency vs. phrase structure), but rather he critiques

what he perceives as an erroneous assumption underlying the entire endeavor of the focus article. He characterizes this endeavor in terms of a tacit belief in autonomous syntax on my part and on the part of phrase structure grammarians who use the tests. His point is that tests for constituents should not be exacted on test sentences in the absence of considerations of meaning and context in which the sentences might appear. His critique is hence directed both at the dependency grammar in my focus article and at the phrase structure use and interpretation of the tests for constituents described in my focus article. A related point is that Mackenzie seems reluctant to acknowledge sentence structure of the sort represented using brackets and/or trees; he does not show the reader how atomic units of syntax, e.g. words, are grouped into larger units of syntax, phrases and clauses in the grammar framework he prefers.[4]

Nowhere in my focus article do I express a stance in favor of autonomous syntax. My personal view is that syntax, semantics, pragmatics, etc. are intertwined and that attempts to view each as an autonomous module of grammar are mistaken. It is impossible to produce syntactic analyses in the absence of meaning. In order to assign a structural analysis to a given sentence, one has to have at least some inkling of what the sentence means. If, for instance, I am confronted with an utterance in a language that is completely unknown to me, it is impossible for me to assign a syntactic structure to that sentence, for I cannot recognize modifier from modified and am therefore unable to acknowledge any groupings of the linguistic units involved. For the linguist who lacks exposure to Chinese, it is impossible to produce a syntactic analysis of the Chinese sentence *我用筷子吃饭*. Compare this Chinese sentence to Chomsky's famous sentence *Colorless green ideas sleep furiously*.[5] As a native speaker of English, I can assign a meaning to each of the individual words of Chomsky's sentence, which enables me to recognize syntactic categories and thus to subject the sentence to a structural analysis. While the whole is nonsensical, I can nevertheless assign it a meaning, however metaphorical this meaning may be. The same is not true of the Chinese sentence, where there is a complete absence of ability to recognize and assign meaning.

Turning to Mackenzie's interpretation of the data delivered by tests for constituents, it is difficult for me to assess his points, since he couches his critique in his own grammatical framework, namely *Functional Discourse Grammar*, in which I am not versed. The points I am now going to make should therefore be viewed with my lack of exposure to FDG in mind.

My main difficulty concerns Mackenzie's notion of *subact* – the word *subact* occurs 26 times in his discussion note. In many of these 26 cases, I can replace *subact* with *constituent* to help make the point at hand more accessible to me. In this respect, I wonder how many subacts one can acknowledge in a given sentence. For instance, Mackenzie discusses the first example sentence in my focus article, *Trees can show syntactic structure*. He comments that the string *show syntactic structure* contains two potential topics, each of which is a subact, the referential subact *syntactic structure* and the ascriptive subact *show*. At the same time, the former subact, i.e. *syntactic structure*, can itself NOT be divided into two smaller subacts, *syntactic* and *structure*, because neither word alone can be topicalized.

[4] In a personal communication, Mackenzie comments that he did not do this because that was not the/a goal of his discussion note and there was not necessarily room to do it. He points to a recent book chapter where such details about his syntactic approach are indeed provided (Mackenzie 2019).

[5] Chomsky's (1957) intent with this sentence was to demonstrate that a sentence can be syntactically well-formed, yet nonsensical.

The question I am entertaining with these comments is whether Functional Discourse Grammar's understanding of syntax is more aligned with dependency or phrase structure. On the one hand, the fact that the verb *show* alone corresponds to a subact suggests that the subact is closer to the phrase structure constituent than to the dependency constituent. On the other hand, the fact that Mackenzie does not divide *syntactic structure* into the two smaller subacts, *syntactic* and *structure*, suggests his understanding of sentence structure is more aligned with dependency than with phrase structure because dependency cannot view each of the two words alone as a constituent. This question about whether Functional Discourse Grammar is more a phrase structure grammar or a dependency grammar must, however, be answered by those versed in Functional Discourse Grammar.

Mackenzie offers alternative explanations for why certain target strings cannot be confirmed as constituents/subacts using the tests, and these explanations are plausible. This plausibility does not contradict my claims about constituent structure, however, but rather the two types of explanations dovetail. Consider example (22d) from my focus article, given here as (31):

(31) What would drunks do concerning the customers? – *__Put off__.

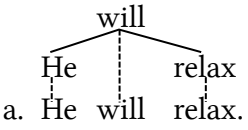
Mackenzie explains the ungrammaticality of the answer fragment *Put off* in terms of the strongly transitive nature of the phrasal verb *put off*; it necessarily takes an object. While this explanation is correct, it does not detract from, or otherwise contradict, the observation that *put off* is NOT a dependency constituent and that most of the tests confirm that it is not a constituent.

At other times, Mackenzie misinterprets what the tests reveal. For instance, he observes that the phrasal verb *put off* cannot be questioned as just illustrated with example (31) and he states that "English cannot question a verb" (Mackenzie 2018: 48). This claim is incorrect;[6] English can question many verbs if the verb is nonfinite and lacks dependents, that is, if it is a dependency constituent, e.g.

(32) a. What will Fred do tomorrow? – Relax.
b. What has Fred now done? – Exaggerated.
c. What has Fred been doing? – Writing.

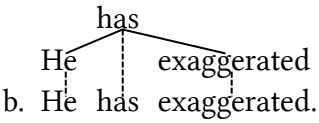
The dependency analyses of the full sentences corresponding to each of these answer fragments are as follows:

(33)

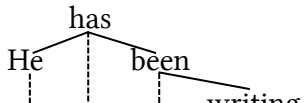


a. He will relax.

[6] In a personal communication, Mackenzie clarifies his point concerning the ability to question a verb. He states that English lacks a single-word verbal proform of the sort that exists in other languages such as Chukchi, e.g. ***Req***-*ərkən-əm* '**do.what?**-PROG-EMPH', cited from Idiatov & van der Auwera (2004).



b. He has exaggerated.



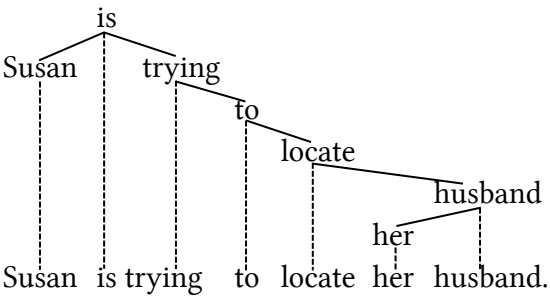
c. He has been writing.

In each of these structures, the content verb alone is a dependency constituent because it lacks dependents of any sort.

Mackenzie also misinterprets the nature of the questions that elicit fragment answers. Mackenzie (2018: 48) states that "On occasions, even the sentences that prompt the test seem ungrammatical." This insight is correct, but it should not be interpreted in such a manner that the test itself is faulty, but rather it is indicative of whether the target string is or is not a constituent. It is at times difficult to form *ex situ wh*-questions that target non-constituent material, and this difficulty is an indication that the target string is not a constituent to begin with.

Observe the following dependency analysis and corresponding examples in this regard:

(34)



a. Who is trying to locate her husband? – Susan.
b. Who is Susan trying to locate? – Her husband.
c. What is Susan trying to do? – Locate her husband.
d. What is Susan trying to do? – ?To locate her husband.
e. What is Susan doing? – Trying to locate her husband.

Of the six constituents shown in the dependency tree, only the possessive determiner *her* clearly cannot be questioned and then appear alone as an answer fragment (not illustrated). Switching to the target strings in (34) that are not shown as dependency constituents, it is impossible in most cases to form an *ex situ* question that could focus those strings, e.g.

(34) f. What is Susan doing to locate her husband? – *Trying.
g. What is Susan trying to do about her husband? – *Locate.
h. What is Susan doing about her husband? – *Trying to locate.

There is a mismatch in these cases insofar as the question each time, while it is a perfectly good question, is focusing something other than what appears as the answer fragment. The difficulty

in such cases is that it is impossible to form standard questions that could focus the indicated strings (because those strings are not dependency constituents).

The difficulty is even more evident when one tries to form a question that could focus the particle *to*, which is a phrase structure, but not a dependency, constituent. Even the *in situ wh*-question fails in such a case:

(34) i. *Susan is trying what locate her husband? – *To.

The point to all these examples is that a majority of dependency constituents can serve as answer fragments elicited by standard *ex situ wh*-questions, whereas the same is not true of phrase structure constituents. In fact, a majority of phrase structure constituents cannot be questioned. Mackenzie's comment concerning the difficulty in forming a sentence that prompts the test is also indicative of whether or not the target string is a dependency constituent; it offers further support to the dependency understanding of constituent structure.

I hope that my comments above help motivate functional grammarians to engage with the dependency vs. phrase structure distinction, and in so doing, to determine whether functional grammars are better served by dependency or phrase structure.

3.3 Müller

Stefan Müller (2018) critiques the message in my focus article in a number of respects. His objections are both empirical and conceptual in nature. Two of his empirical objections have been addressed above in Sections 2.4 (coordination) and 2.5 (fronting in German). Concerning his main conceptual objections, I recognize four main critiques, which I paraphrase and summarize in the following manner:

1) Individual words are constituents by default, that is, by virtue of the simple fact that they are recognizable parts of larger units, phrases and sentences.
2) Some prominent dependency grammarians (Lucien Tesnière and Richard Hudson) have seen the need to employ (some measure of) phrase structure to address the manner in which meaning is constructed compositionally.
3) My (Osborne's) dependency grammar is not formalized, a significant shortcoming.
4) My (Osborne's) dependency syntax does not address the manner in which meaning is constructed compositionally; it does not, for instance, address aspects of scope.

Critiques 2–4 reach far beyond my focus article, taking issue with central aspects of the body of my works on dependency syntax. In this respect, I would like to draw attention to the main caveat that I included in Section 2 of my focus article (Osborne 2018: 8):

> Minimalism of theoretical apparatus is of course of no benefit if this minimalism is incapable of shedding light on the phenomena under scrutiny, for complexity of theoretical apparatus may be necessary in order to address complex phenomena. The proponents of dependency syntax must concede this objection in general. In the specific area explored in this article, however, dependency syntax need concede nothing, since as suggested above with examples (1–9) and as established in much detail below, the minimal dependency structures are in fact more in line with what most tests for sentence structure actually reveal about the nature of syntactic structure in English.

These statements were intended to keep the debate concentrated on tests for constituents and what they reveal about the structure of English sentences. Hence, in order to address Müller's critiques 2–4, it will be necessary to expand the discussion considerably to areas that were not targeted in my focus article.

Concerning the first point just listed, Müller adopts the stance that individual words are constituents by default, he writes:

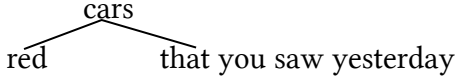
> In the case of words, the question of constituent status is trivially decided: constituents are parts of a larger structure and since all more complex structures consist of words (ignoring the possibility of having affixes as parts of syntax), words are constituents… (Müller 2018: 54.)

This default position is certainly correct from the viewpoint of phrase structure syntax, but it is a byproduct of the phrase structure starting point. Only when confronted with the alternative analysis of sentence structure that dependency brings to the table does this default position come into question. In any event, tests for constituents are the standard means by which phrase structure syntax identifies constituents. As I demonstrate in my focus article, most of the tests fail to identify most individual words as constituents, a fact that I will not demonstrate again here, since copious examples of this point are provided in my focus article (see examples 22– 25 there).

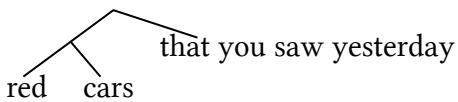
The discussion now turns to the second point listed above, namely that some prominent dependency grammarians have reached to phrase structure to address how meaning is constructed. Müller discusses one of Tesnière's stemmas in this regard and then turns to Hudson's recent article on pied-piping (Hudson 2017), in which Hudson augments his Word Grammar apparatus by adding nodes that can be construed as a type of phrase structure – see Section 3.1 above. I agree with Müller's point in this area insofar as I also think that Hudson has introduced a type of phrase structure into his Word Grammar framework. I disagree, however, insofar I do not think that phrase structure is needed to accommodate the manner in which meaning is constructed compositionally. I address this matter further below in Section 4.

Müller's discussion of Tesnière's 'polygraph' stemma (Tesnière 1959: Stemma 149) focuses on a related point, namely that Tesnière augmented his syntax in order to address an aspect of meaning compositionality in noun phrases.[7] While it is true that Tesnière considered augmenting his account of the structure of noun phrases in terms of the 'polygraph' analysis, the claim that such an analysis is like an X-bar analysis is not correct. The pure dependency tree of Tesnière's polygraph example *red cars that you saw yesterday* appears next. A phrase structure rendition thereof and Tesnière's actual polygraph analysis then follow for easy comparison:

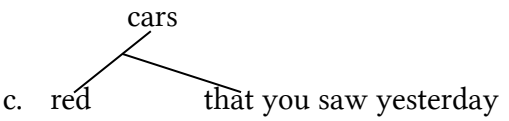
(35) – Pure dependency analysis

a.


b. – A pure phrase structure rendition



[7] *Stemma* is the term Tesnière used to denote his sentence diagrams.



c. – Tesnière's polygraph

These structural analyses are distinct. Tesnière's polygraph is a hybrid structure, combining both dependency and phrase structure. This point becomes evident when one renders each tree in terms of brackets, whereby a node in the tree corresponds to a pair of brackets:

(36) a. [[red] cars [that you saw yesterday]] – Pure dependency analysis
b. [[[red] [cars]] [that you saw yesterday]] – Pure phrase structure analysis
c. [[[red] cars] [that you saw yesterday]] – Hybrid polygraph analysis

There are three sets of brackets in (36a), five in (36b), and four in (36c). Of these three analyses, only the pure dependency analysis completely identifies heads and dependents; it shows *cars* as head over both *red* and *that you saw yesterday*. The phrase structure analysis (36b), in contrast, provides no guidance concerning heads and dependents. The polygraph analysis (36c) occupies an intermediate position between the two insofar as it identifies *cars* as head over *red*, but fails to indicate whether *red cars* should be construed as head over *that you saw yesterday* or vice versa. For these two latter analyses to completely identify heads and dependents, the brackets can be augmented with node labels, e.g. *[$_{NP}$ [$_{N'}$ [$_{A}$ red] [$_{N}$ cars]] [$_{CP}$ that you saw yesterday]]* and *[$_{NP}$ [$_{N}$ [$_{A}$ red] cars] [$_{Rel}$ that you saw yesterday]]*.

Müller's discussion of Tesnière's unique stemma, one of the 366 that Tesnière produced in his main oeuvre (Tesnière 1959), overlooks an important aspect of Tesnière's position toward phrase structure. I argue in the introduction to the translation Müller cites (Kahane & Osborne 2015) and elsewhere (Osborne 2013) that Tesnière's transfer schema is a manifestation of phrase structure. Tesnière devoted almost half his massive volume *Éléments de syntaxe structural*, approximately 300 pages, to discussing transfer, and he produced countless stemmas illustrating it, as opposed to just the one "polygraph" stemma. Hence, my position, as the primary translator into English of Tesnière's volume, is that Tesnière's grammar is a hybrid, combining dependency and phrase structure extensively. It is important in this regard to be aware that Tesnière himself did not set out to produce a dependency grammar. Awareness of the distinction between dependency and phrase structure was first established in the 1960s – Tesnière died in 1954 – as Tesnière's ideas were being received and evaluated. Thus, my response to Müller pointing out that Tesnière saw the need to use phrase structure is, well, yes, but much more extensively than the one "polygraph" stemma implies.[8]

Müller's third main critique of my works points to the absence of formalization (Müller 2018: 59). Müller goes so far as to state that "they [Osborne's theories] are not even theories" (Müller 2018: 56). Müller's trust in the value of formalization in linguistics is greater than my own. For me, formalization of linguistic ideas, insights, and concepts should occur sparingly,

[8] In a personal communication, Müller disagrees with my characterization of his discussion of Tesnière's polygraph example. He comments at this point as follows:

What I did with this example was pointing out that there is complexity in the data that was acknowledged by Tesnière but not by you. Acknowledging it results in more complex theories. PSG is one way to go. You do not provide one and have to augment your theory. Until this is done, no comparison is possible.The necessary augmentation of the DG apparatus that this comment points to is provided below in Section 4.

and when it does occur, it should be accompanied by examples and much discussion of these examples in plain language. Heavily formalized accounts of linguistic phenomena are difficult to access for the average linguist. When I encounter them, the suspicion often arises that obfuscation is occurring, that is, the linguist behind the formalizations does not have much to say that is insightful because if they did, they would choose to express those insights in a manner that is accessible to a wider audience.

The fourth main critique Müller expresses concerns the extent to which dependency syntax is capable of addressing aspects of scope and meaning compositionality. Müller's critique in this area is warranted. Some in the dependency grammar community have been aware of the difficulty for decades, at least since Hudson (1980a, 1980b) and Dahl (1980) discussed it in their exchange from 1980. The issue is taken up in Section 4 below, where I sketch the problem and my solution to it.

3.4 Reeve

Matthew Reeve's discussion note contains a number of counterarguments pointing to the necessity of at least some measure of phrase structure. These counterarguments have been addressed in sections 2.1 (echo questions) and 2.2 (non-finite VPs), and yet more of his counterarguments are addressed below in Sections 4.4 and 4.5 (scope of adverbs). An interesting aspect of Reeve's position in these matters is that he does not deliver a full-throated defense of phrase structure, but rather he takes an intermediate position between dependency and phrase structure. He comments that in line with dependency syntax, "the head-phrase distinction posited within PSGs is unnecessary" (Reeve 2018: 69). His intermediate position should be evaluated with Michael Brody's (2000a, 2000b, 2003) *Mirror Theory* in mind, which Reeve sees as in some sense ideal in that it combines the advantages of both dependency and phrase structure at the same time that it avoids the drawbacks of each.

My exposure to Brody's works is superficial, so I cannot assess with confidence the extent to which his approach to syntax can be deemed in line with dependency syntax, phrase structure syntax, or a hybrid syntax of some sort. I will instead cautiously express my skepticism that his approach can be construed as close to dependency syntax. I base my skepticism in part on Reeve's own assessment of Brody's Mirror Theory (MT). Reeve writes:

> MT is particularly interesting in that it is in a sense intermediate between Minimalism and DG. On the one hand, it is like O[sborne's]-DG in that it rejects the distinction between heads and phrases (a property Brody 2000a, 2000b refers to as Telescope), and allows spell-out of nonterminal nodes. On the other hand, MT is like Minimalism, and unlike O-DG, in postulating a relatively 'abstract' syntactic structure in which *the number of nodes is normally larger than the number of words, and in adopting a maximally binary-branching structure (i.e., a mother node has no more than two daughter nodes)* [my emphasis] (Reeve 2018: 69.)

The fact that Brody's syntax does not allow the number of branches reaching down from a node to exceed two is the main source of my skepticism. Given this restriction to unary (one branch) or binary (two branches) branching, Brody's structural analyses must be quite layered, and hence quite unlike the relatively flat structures that dependency necessitates.

Also noteworthy is the existence of multiple phonologically null nodes, i.e. nodes that do not correspond to sounds actually produced by the speaker Reeve's example (4) is reproduced

in Figure 3. This tree shows the *Mirror Theory* analysis of the simple sentence *John writes poems*. The nodes in red are those associated with the verb *writes*. The nodes marked as *v* and V here are unary branching, and the T and V nodes are phonologically null. Dependency syntax rejects the existence of phonologically null nodes as a matter of principle.

Figure 4 contains Reeve's example (14). Concerning Reeve's account of this tree, he states that it "corresponds both to the O-DG and MT analyses" of the sentence (Reeve 2018: 76), although he clarifies that he has "abstract[ed] away from the structure underlying each auxiliary and its inflectional affix for ease of presentation" (Reeve 2018: 75) – note that the example was discussed above in the context of nonfinite VPs (see example 14) .

The second tree (Figure 4) is almost entirely dependency-based. The only points where a measure of phrase structure is arguably present concern the indication of branching underneath V. Observe, however, that there are four instances of unary branching in the tree (at the nodes Perf, Asp_{perf}, Asp_{prog}, Voice). The question I have in this regard concerns the phonologically null nodes that Reeve has suppressed from the tree. Based on the tree in Figure 3, which shows three nodes (T, *v*, V) corresponding to the verb *writes*, there may be one or more phonologically null nodes corresponding to each of the auxiliary verbs. As stated above, most dependency grammars reject phonologically null nodes as a matter of principle, and if they do assume they exist, it is usually in the context of ellipsis.

To summarize my points, I am skeptical that Brody's Mirror Theory has much affinity with dependency syntax. The necessity that all branching be at most binary and the presence of multiple phonologically null nodes are inconsistent with tenets of dependency syntax. To more confidently assess the extent to which Brody's syntax is aligned more with dependency or phrase structure syntax requires more complete tree analyses and/or the use of brackets to indicate how units of syntactic structure are grouped.

4. Scope and meaning compositionality

The discussion above has repeatedly drawn attention to a weakness associated with dependency syntax. This weakness is the perceived inability of the relatively flat dependency structures to account for the manner in which meaning is constructed compositionally. Müller and Reeve both draw attention to this issue. Müller explicitly mentions it, providing an example with the associated tree structures. Reeve references the problem less directly when he points out that

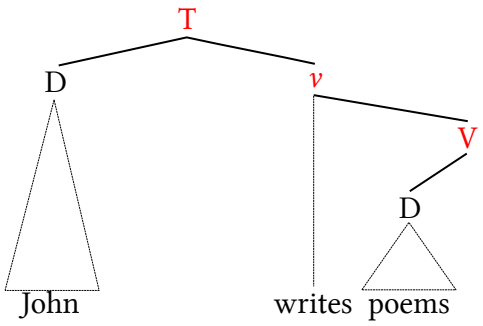


Figure 3. Reeve's (2018: 71) example (4) illustrating the basic architecture of Brody's Mirror Theory

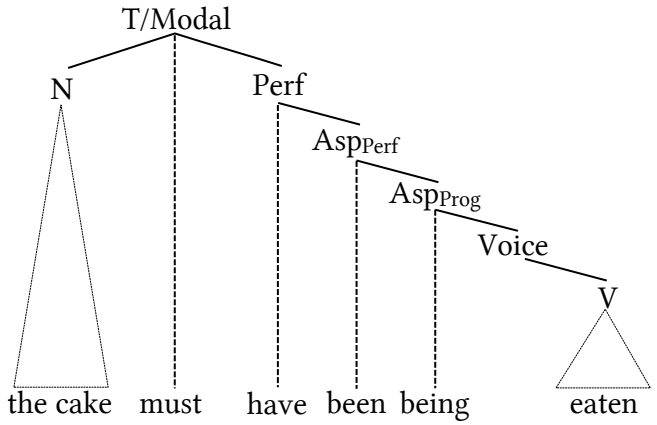


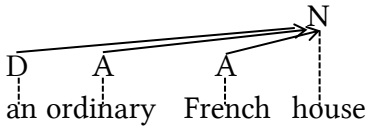
Figure 4. Reeve's (2018: 76) example (14) illustrating the structure of a sentence containing multiple auxiliaries

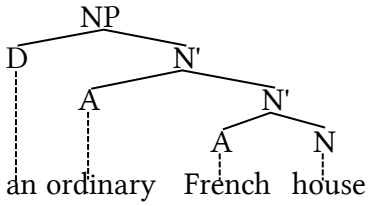
phrase structure is needed to account for the distribution and scope of adverbs. The problem may have been first pointed out by Dahl (1980) when he defended phrase structure against Hudson's (1980a) attack. The key example Dahl produced was *an ordinary French house*, where it is clear that *ordinary* scopes over *French house*, not just over *house*. In this section, I propose that the *colocant* unit is the means by which dependency syntax can, despite its minimal structures, address aspects of scope and ultimately, the manner in which meaning is constructed compositionally.

4.1 Entailments

The issue at hand is evident when one considers the competing dependency (37a) and phrase structure (37b) analyses of Dahl's example:

(37)





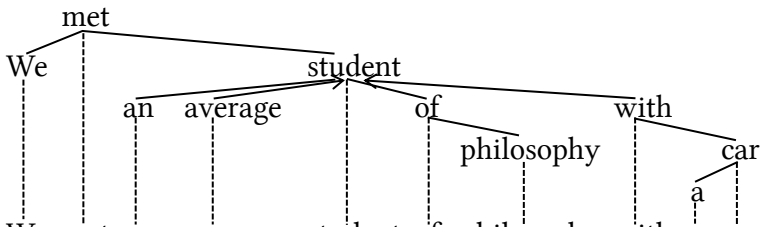
The flatness of the dependency analysis seems to incorrectly predict that the house is both an ordinary house and a French house, whereas the phrase structure analysis does not have this problem because *French* and *house* form a constituent together over which *ordinary* scopes. The issue can be characterized in terms of entailments. The flat dependency analysis seems to incorrectly predict that sentence (38a) should entail both sentence (38b) and sentence (38c):

(38) a. Jean wants an ordinary French house.
b. Jean wants a French house.
c. Jean wants an ordinary house.

While sentence (38a) does entail sentence (38b), it does not entail sentence (38c). The phrase structure analysis appears to predict this entailment pattern, since it views *French house* as a sibling constituent of the adjective *ordinary*, meaning that *ordinary* necessarily scopes over the two words *French* and *house* together.

When a post-dependent appears on the noun, ambiguity can occur, whereby the ambiguity is a function of the scope of the noun's pre-dependent, e.g.

(39)

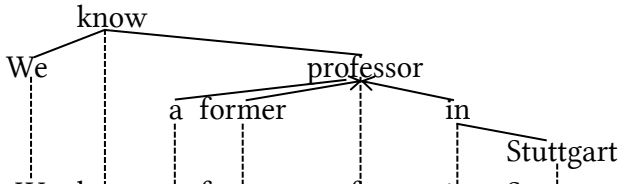


a. We met an average student of philosophy with a car.
b. We met a student of philosophy with a car.
c. We met an average student with a car.
d. We met an average student of philosophy.

Sentence (39a) is ambiguous, the ambiguity being a function of the scope of *average*; it can scope over *student of philosophy*, in which case the student is an average student of philosophy who just happens to have a car, or it can scope over *student of philosophy with a car*, in which case the student is average among those students of philosophy who have cars. Sentence (39a) entails sentence (39b), but it does not entail sentence (39c), and it can be construed as entailing sentence (39d) only on the reading in (39a) where *average* scopes over just *student of philosophy*.

Returning to Müller's example from Section 2.4 above, the ambiguity is of a similar nature, but there is no complement prepositional phrase (PP) present, but rather just an adjunct PP:

(40)

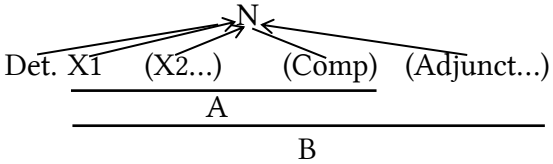


a. We know a former professor in Stuttgart.
b. We know a professor in Stuttgart.
c. We know a former professor.

The ambiguity arises from the potential scope of *former*; it extends either over just *professor* or over *professor in Stuttgart*. Interestingly, sentence (40a) does not entail sentence (40b), but it does entail sentence (40c) on either reading.

To summarize the scope facts in examples (37–40), the ambiguity each time arises from the ability of the attributive adjective to scope over strings of varying length. Each time the adjective necessarily scopes over any material between it and its head noun and, if the noun takes a complement, over that complement as well, and it optionally scopes over any adjunct following the complement. The scope of the relevant attributive adjectives is shown schematically as follows:

(41)



The scope of X1 necessarily extends over the underlined string marked with A, and it optionally includes the additional underlined material marked with B. These strings marked as A and B are colocants.

4.2 Colocants

The solution to this problem posed by Dahl's example and the further examples just considered is the *colocant* unit. Meaning is constructed in terms of colocants, whereby the relevant colocant at hand need not be a constituent. A colocant is a particular type of *component*. An understanding of these units is established in terms of a set of similarly defined units of dependency syntax. The presentation that follows is closely similar to what one finds in Osborne et al. (2012: 358–360) and Osborne and Groß (2016: 117–118; 2018: 167):

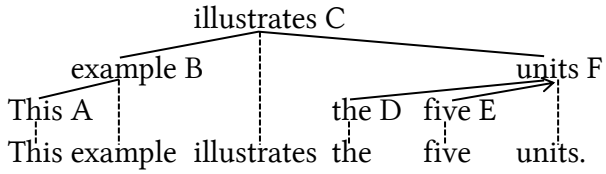
> **String**: A word or a combination of words that are continuous in the linear dimension (precedence, X-axis).
>
> **Catena**: A word or a combination of words that are continuous in the hierarchical dimension (dominance, y-axis).
>
> **Component**: A word or a combination of words that are continuous in both the linear and hierarchical dimensions (precedence and dominance, x- and y-axes)
>
> **Constituent**: A component that is complete

A component is complete if it includes all the words that its root word dominates. Now, for the first time, I propose acknowledging a fifth, similarly defined unit of dependency syntax, the *colocant*:

> **Colocant**: A component that is complete insofar as it includes all the words that its non-root words dominate.

The following dependency tree illustrates these units of dependency syntax. The capital letters serve to abbreviate the words:

(42)



Including the whole each time, all the distinct strings, catenae, components, constituents, and colocants in this tree are listed next:

> **21 distinct strings in (42)**
> A, B, C, D, E, F, AB, BC, CD, DE, EF, ABC, BCD, CDE, DEF, ABCD, BCDE, CDEF, ABCDE, BCDEF, and ABCDEF
>
> **24 distinct catenae in (42)**
> A, B, C, D, E, F, AB, BC, CF, DF, EF, ABC, BCF, CDF, CEF, DEF, ABCF, BCDF, BCEF, CDEF, ABCDF, ABCEF, BCDEF, and ABCDEF
>
> **14 distinct components in (42)**
> A, B, C, D, E, F, AB, BC, EF, ABC, DEF, CDEF, BCDEF, and ABCDEF

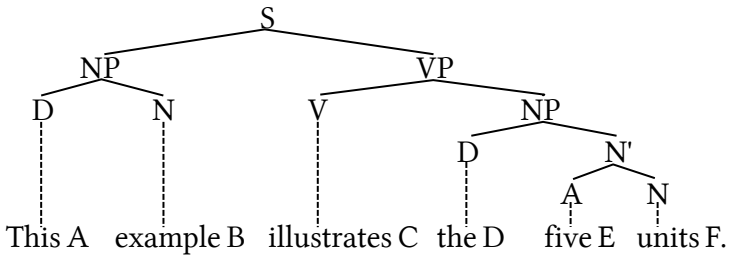
6 distinct constituents in (42)
A, D, E, AB, DEF, and ABCDEF

12 distinct colocants in (42)
A, B, C, D, E, F, AB, EF, ABC, DEF, CDEF, and ABCDEF

To provide some perspective for these numbers, there are all told 63 (=2^6-1) distinct combinations of the words in example (42).[9]

These units of dependency syntax can be compared with the distinct constituents of the phrase structure analysis:

(43)



Including the whole again, the distinct constituents present here are listed as follows:

11 distinct constituents in (43)
A, B, C, D, E, F, AB, EF, DEF, CDEF, and ABCDEF

These phrase structure constituents overlap almost completely with the colocants in (42), the one exception being the string ABC, which is a colocant but not a phrase structure constituent.

The strings present on both analyses, dependency structure and phrase structure, are of course the same ones, strings being unimpacted by hierarchical organization. The constituent unit defined and compared here is the subject of my focus article. The catena unit has been the target of much research (e.g. O'Grady 1998; Osborne 2005; Osborne et al. 2012; Osborne & Groß 2012; Groß 2014), and it plays a role in Sections 7.2 and 7.3 of my focus article, where the distributions of *one* and *do so* are considered. The component unit is the subject of current research efforts (Niu & Osborne 2019).

4.3 Compositionality

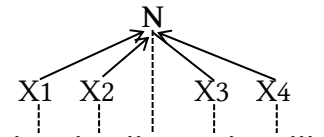
The colocant unit allows dependency syntax to characterize the manner in which meaning is constructed compositionally while the assumed syntactic structures remain minimal and relatively flat. The meaning of a given head node is compositionally determined by its meaning plus the meaning of its dependents. In other words, the meanings of the dependents are added to that of their head word, as Müller (2018: 58) suggests is necessary for dependency syntax to address meaning compositionality. When the meaning of a dependent is added to the meaning of the head word or to the meaning that has accumulated at the head word, the two together form a colocant. Nuanced meaning differences that arise in the area are due to the order in

[9] The total number of distinct combinations of the words in a given sentence is calculated by the formula 2^n-1, where n is the number of words.

which the dependents' meanings are added to the meaning of their head word, giving rise to subtle ambiguities associated with scope phenomena.

The next schema illustrates the flexibility of meaning compositionality in noun phrases. X1 and X2 are pre-dependents of the noun (i.e. dependents of the noun that precede it), and X3 and X4 are its post-dependents (i.e. dependents of the noun that follow it). Assume in this case that X3 is a complement of the noun and that X1, X2, and X4 are adjuncts. The meaning of the noun phrase can be composed in three different orders. The {}-brackets are used to mark colocants and the order in which the meaning can be composed in terms of these colocants:[10]

(44)



a. {X1 {X2 {{**N** X3} X4}}}
b. {X1 {{X2 {**N** X3}} X4}}
c. {{X1 {X2 {**N** X3}}} X4}

Since X3 is a complement, its meaning is added to that of the noun N first.[11] Thereafter, there are three distinct orders in which the meanings of the adjunct dependents X1, X2, and X4 are added to the combined meaning at the N node. The flexibility with which the meanings of the dependents of N are added to the cumulative meaning at N gives rise to nuanced ambiguity, in this case potentially to a three-way ambiguity. What occurs is akin to *currying*.[12] Instead of the meanings of the dependents all being added to the head N node simultaneously, they are added one at a time in succession.

This understanding of the compositionality of meaning in dependency syntax should be compared to that of Hudson (2017), which was discussed briefly in Section 3.1 above. The two approaches to meaning compositionality are similar. The difference lies with the number of nodes assumed. Hudson introduces the additional nodes to characterize how meaning is composed, whereas the current account avoids these extra nodes by appealing to the colocant unit instead.

4.4 Scope of adverbs

The dependency trees in (45) are of the noun phrases discussed in Section 4.1. The relevant string that constitutes the scope of the bolded adjective each time is marked with {}-brackets and is a colocant:

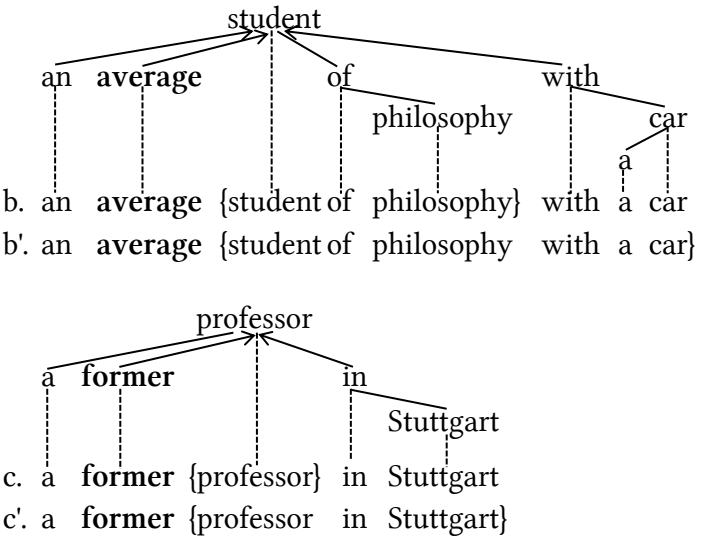
(45)

a. an **ordinary** {French house}

[10] An important distinction is that between {}-brackets to mark colocants and []-brackets to mark constituents. The latter appear above marking constituents, in the manner that is standard in the field of syntax.

[11] This aspect of the account is consistent with the strong lexicalism of most DGs. The meanings of the valents of a given valency carrier are added to valency-carrier's meaning before that of adjuncts.

[12] Concerning currying, see the Wikipedia article on the topic: https://en.wikipedia.org/wiki/Currying



To accommodate the ambiguity of (45b, b') and (45c, c') in terms of constituents, the phrase structure account assumes the structure of such NPs is flexible to an extent. This flexibility allows phrase structure to characterize the scope of the relevant scope-bearing expression as a constituent. In contrast, the current dependency grammar account maintains a single structure and assumes that the flexibility resides with the choice of colocant that the scope-bearing expression takes as its scope. The flexibility is therefore present in one form or another. The advantage that the flexibility of the dependency grammar analysis has is that the structures involved remain minimal and constant.

The colocant is also the means by which Reeve's observations about the scope of adverbs can be addressed given minimal dependency structures. Reeve argues that phrase structure is needed to plausibly address the scope of adverbs such as *already* and *completely*. He produces the following set of examples (Reeve 2018: 77–78):

(46) a. Tom has **already completely** ruined dinner.
a'. *Tom has **completely already** ruined dinner.

b. Tom has ruined dinner **completely already**.
b'. *Tom has ruined dinner **already completely**.

These acceptability judgments are Reeve's. For me, (46b') is at least marginally possible. For the time being, however, Reeve's acceptability judgments are taken at face value. I return to the possibility that such examples as (46b') can be acceptable in the next subsection.

The acceptability pattern shown in (46) suggests that in order for *already* to scope over *completely*, it needs to precede it when the two precede the content verb *ruined* and it needs to follow it when the two follow the content verb *ruined*. Reeve (2018: 78) sees this data set as supporting, for the two sets of sentences, the phrase structures in Figure 5.

On each of these analyses, the adverb *already* appears as a sibling constituent of the constituent containing *completely*. Scope is characterized in terms of these sibling constituents; *already* scopes over *completely* in both structures, but not vice versa, because *completely* is properly contained inside the sibling constituent of *already*.

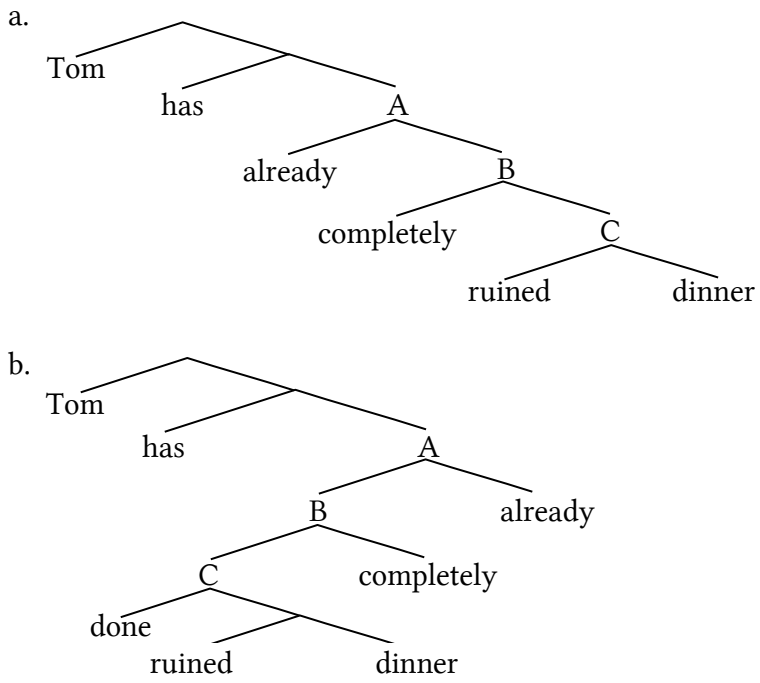
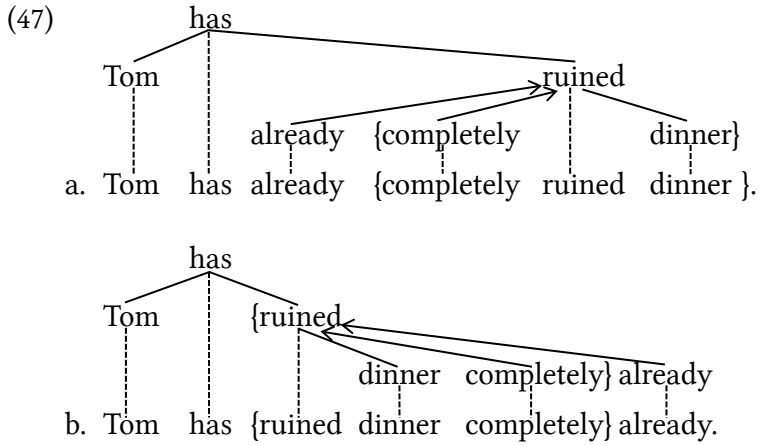


Figure 5. Reeve's (2018: 78) phrase structure analyses showing the scope of the adverbs *already* and *completely*

The colocant unit of dependency grammar can produce an analogous account, but in terms of the relatively flat VPs of dependency syntax:



The {}-brackets mark the scope of the adverb *already*. In each case, the bracketed string is a colocant. There is, as Reeve (2018: 78) points out, hence a mirror effect that characterizes scope in such cases. In order for a pre-dependent to scope over a sibling pre-dependent, it should precede it.

4.5 Reeve's counterarguments

Reeve (2018: 78) acknowledges that the sort of account of adverb scope just presented is possible, that is, an account that appeals to linear order as primitive and to the position of sibling dependents in relation to each other and their common head, which I have now formulated more concretely in terms of the colocant unit. He produces a couple of counterarguments against such an approach, counterarguments based on the extent to which pure linearity can or cannot

be a basis for predicting scope patterns. Addressing his counterarguments appropriately would necessitate some dense discussion of the opaque examples he produces from Italian and of the overall reasoning he appeals to based on the configurational template of mainstream phrase structure syntax (think T, TP, *v*, *v*P, V, VP, etc.). I have decided not to attempt such a discussion of his data and reasoning in this area and will instead draw attention to the fact that the data he points to are diverse, and that conclusions about the scope of adverbs are difficult to draw definitively.

My comment about example (46b') above alluded to a scope pattern that should not be sanctioned according to the reasoning employed in the previous subsection. The next examples draw further attention to the sort of scope pattern that is problematic for the reasoning employed above:

(48) a. Frank sneezes intentionally loudly.
b. Frank sneezes intentionally.

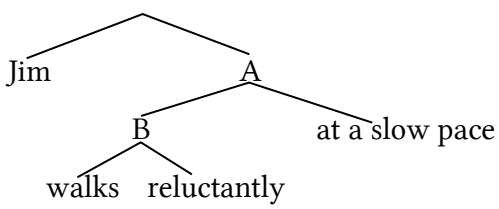
(49) a. Jim walks reluctantly at a slow pace.
b. Jim walks reluctantly.

(50) a. Jill sacrifices readily only when she is forced to do so.
b. Jill sacrifices readily.

The natural reading of each of these a-sentences is such that the adverb immediately following the verb scopes over the following adverb/adjunct. That this reading is indeed preferred is evident from the fact that in each of these pairs, the a-sentence does not clearly entail the b-sentence – see Section 4.1 concerning the use of entailment to identify scope. These examples are therefore contrary to the reasoning based on the colocant unit.

The difficulty examples (48–50) pose is not limited to the account in terms of colocants, but rather it also challenges Reeve's preferred analysis in terms of layered phrase structures. Based on the type of analysis Reeve gives for sentence (46b) with the b-tree in Figure 5, the following phrase structure analysis for sentence (49a) seems likely:[13]

(51)

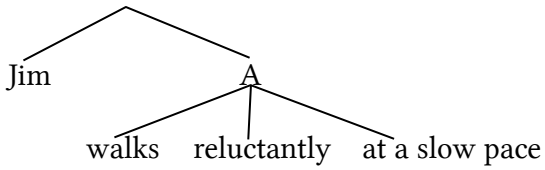


Left branching of this sort is the traditional analysis in phrase structure syntax assumed to accommodate post-verb adjuncts. This analysis does not allow for the scope pattern revealed in (49a–b), where the absence of entailment suggests that *reluctantly* scopes over *at a slow pace*.

[13] In personal communications, Reeve has commented that he might not assume the analysis shown in (51), but rather he might adjoin *reluctantly* to *at a slow pace* or assume a VP-shell type analysis. On either of these alternative analyses, the string *reluctantly at a slow pace* is a constituent in surface syntax. The problem in this regard is that it does not behave like a constituent, e.g. *??Reluctantly at a slow pace, John walks. How does John walk - ??Reluctantly at a slow pace*; *??It is reluctantly at a slow pace that John walks.*

Concerning example (49a) more broadly, note that its meaning remains consistent when the order of the adjuncts is reversed: *Jim walks at a slow pace reluctantly*. This fact suggests that *reluctantly* can scope forwards or backwards over *at a slow pace*. In order to accommodate this flexibility, the phrase structure analysis would also have to sanction a structural analysis in which *reluctantly* and *at a slow pace* are sibling constituents. The following analysis would suffice:

(52)



The flat analysis in this case is anathema to most modern versions of phrase structure syntax. It is, however, consistent with the sort of flat analysis that dependency syntax necessitates.

In sum, Reeve points to difficulties facing an approach to the scope of adverbs based on the colocant unit. When one examines a fuller data set, however, there are also difficulties facing the sort of phrase structure approach to scope he espouses. The conclusion I draw from all this is that at present the one or the other approach to the scope of adverbs can hardly be preferred due to the diverse nature of the data that are to be addressed.

5. Conclusion

This contribution has defended the main message in my focus article in *Language Under Discussion* (Osborne 2018) concerning the simplicity and accuracy of dependency syntax. This defense has involved conceding certain counterarguments (echo questions and fronting in German), although the concessions made are not clear refutations of the plausibility of the dependency analyses, but rather they reveal that the data delivered by tests for constituents are not always straightforward. Addressing one of the main counterarguments has necessitated bringing in aspects of dependency syntax that were not included in my focus article, such as the status of adjuncts and the nature of scope. Addressing this latter matter required the introduction of new material, in particular, the *colocant* unit. My claim now is that meaning is composed in terms of colocants, not in terms of constituents.

Let it be stated that the desire on my part in producing my focus article and defending its message here is to raise awareness of the potential of dependency to serve as the basis upon which theories of syntax can be constructed. Hopefully, beginning texts on syntax will no longer overlook the alternative interpretation of sentence structure that dependency brings to the table. Hopefully, they will instead include a discussion of dependency as an alternative way to interpret the results of tests for constituents and acknowledge dependency's potential to serve as a basis for theory building.

References

Baum, Richard. 1976. *Dependenzgrammatik: Tesnières Modell der Sprachbeschreibung in wissenschaftsgeschichtlicher und kritischer Sicht* (*Beihefte zur Zeitschrift für Romanische Philologie*, Bd. 151). Tübingen: Max Niemeyer Verlag.

Brody, Michael. 2000a. Mirror theory: Syntactic representation in Perfect Syntax. *Linguistic Inquiry* 31, 29–56.

Brody, Michael. 2000b. Word order, restructuring and Mirror Theory. In: Peter Svenonius (ed.), *The derivation of VO and OV*, 27–43. Amsterdam: John Benjamins

Brody, Michael. 2003. 'Roll-up' structures and morphological words. In: *Towards an elegant syntax*, 232–251. London & New York: Routledge.

Burton-Roberts, Noel. 1997. *Analysing sentences: An approach to English syntax*, 2nd edition. London: Longman.

Chomsky, Noam. 1957. *Syntactic Structures*. The Hauge: Mouton.

Culicover, Peter & Ray Jackendoff. 2005. *Simpler Syntax*. Oxford, UK: Oxford University Press.

Dahl, Osten. 1980. Some arguments for higher nodes in syntax: A reply to Hudson's 'Constituency and dependency'. *Linguistics* 18, 5/6, 485–488.

Engel, Ulrich. 1994. *Syntax der deutschen Gegenwartssprache*, 3rd ed. Berlin: Erich Schmidt Verlag.

Eroms, Hans-Werner 2000. *Syntax der deutschen Sprache*. Berlin: de Gruyter.

Groß, T. 2014. Clitics in dependency morphology. In *Linguistics Today Vol. 215: Dependency Linguistics*, ed. by E. Hajičová et al., pp. 229–252. Amsterdam: John Benjamins.

Groß, Thomas and Timothy Osborne 2009. Toward a practical dependency grammar theory of discontinuities. *Sky Journal of Linguistics* 22, 43–90.

Hudson, Richard. 1980a. Constituency and dependency. *Linguistics* 18, 3/4, 179–198.

Hudson, Richard. 1980b. A second attack on constituency: A reply to Dahl. *Linguistics* 18, 489–504.

Hudson, Richard. 1984. *Word Grammar*. Oxford, UK: Basil Blackwell.

Hudson, Richard. 1988. Coordination and grammatical relations. *Journal of Linguistics* 24, 303–342.

Hudson, Richard. 1990. *An English Word Grammar*. Oxford: Basil Blackwell.

Hudson, Richard. 2007. *Language networks: The new Word Grammar*. Oxford, UK: Oxford University Press.

Hudson, Richard. 2016. Dependency Grammar. In Andrew Hippisley & Gregory Stump (eds.), *Cambridge Handbook of Morphological Theory*, 657–682. Cambridge: Cambridge University Press.

Hudson, Richard. 2017. Pied piping in cognition. *Journal of Linguistics* 54, 1, 85–138.

Hudson, Richard. 2018. Dependencies are psychologically plausible, not more parsimonious (Comments on Osborne, Timothy 2018. Diagnostics for constituents: What they really reveal about syntactic structure). *Language Under Discussion* 5, 1, 42–44.

Idiatov, Dmitry & Johan van der Auwera. 2004. On interrogative pro-verbs. In Ileana Comorovski & Manfred Krifka (eds.), *Proceedings of the Workshop on the Syntax, Semantics and Pragmatics of Questions, ESSLLI 16, August 9–13, 2004, Nancy, France*, 17–23. Nancy: The European Association for Logic, Language and Information.

Jung, Wha-Young. 1995. *Syntaktische Relationen im Rahmen der Dependenzgrammatik*. Hamburg: Helmut Buske Verlag.

Kahane, Sylvain & Timothy Osborne. 2015. Translators' introduction. In Lucien Tesnière (1959), *Elements of Structure Syntax*. Translated from French to English by Timothy Osborne and Sylvain Kahane. Amsterdam: John Benjamins.

Lobin, Henning. 1993. *Koordinationssyntax als prozedurales Phänomen*. Series: *Stuiden zur deutschen Sprache* 46. Tübingen: Gunter Narr Verlag.

Mackenzie, J. Lachlan. 2018. Testing for constituents: A response from Functional Discourse Grammar. *Language Under Discussion* 5, 1, 45–51.

Mackenzie, J. Lachlan. 2019. The Functional Discourse Grammar approach to syntax. In András Kertész, Edith Moravcsik & Csilla Rákosi (eds.), *Current approaches to syntax: A comparative handbook*, 291–316. Berlin: Walter de Gruyter

Müller, Stefan. 2016. Grammatical Theory: From Transformational Grammar to Constraint-Based Approaches (Textbooks in Language Sciences 1). Berlin: Language Science Press. DOI: 10.17169/langsci.b25.167.

Müller, Stefan. 2018. Evaluating theories: Counting nodes, and the question of constituency. *Language Under Discussion* 5, 1, 52–67.

Niu, Ruochen & Timothy Osborne. 2019. Chunks are components: A dependency grammar approach to the syntactic structure of Mandarin. *Lingua* 223, 60–83.

O'Grady, William. 1998. The syntax of idioms. *Natural Language and Linguistic Theory* 16. 279–312.

Osborne, Timothy. 2005. Beyond the constituent: A dependency grammar analysis of chains. *Folia Linguistica* 39, 3–4, 251–297.

Osborne, Timothy. 2006a. Parallel conjuncts. *Studia Linguistica* 60, 1, 64–96.

Osborne, Timothy. 2006b. Shared material and grammar: A dependency grammar theory of non-gapping coordination. *Zeitschrift für Sprachwissenschaft* 25, 39–93.

Osborne, Timothy. 2006c. Gapping vs. non-gapping coordination. *Linguistische Berichte* 207, 307–338.

Osborne, Timothy. 2008. Major constituents: And two dependency grammar constraints on sharing in coordination. *Linguistics* 46, 6, 1109–1165.

Osborne, Timothy. 2013. A Look at Tesnière's Éléments through the Lens of Modern Syntactic Theory. *Proceedings of the Second International Conference on Dependency Linguistics,* August 27– 30, 2013, Prague, Czech Republic, 262– 271.

Osborne, Timothy. 2018. Tests for constituents: What they really reveal about the nature of syntactic structure. *Language Under Discussion* 5, 1, 1–41.

Osborne, Timothy. 2019. *A Dependency Grammar of English: An Introduction and Beyond*. Amsterdam: John Benjamins.

Osborne, Timothy & Thomas Groß. 2012. Constructions are catenae: Construction Grammar meets Dependency Grammar. *Cognitive Linguistics* 23, 1, 163–214.

Osborne, Timothy & Thomas Groß. 2016. The *do-so*-diagnostic: Against finite VPs and for flat non-finite VPs. *Folia Linguistica* 50, 1, 97–135.

Osborne, Timothy & Thomas Groß. 2017. Left node blocking. *Journal of Linguistics* 53, 641–688.

Osborne, Timothy & Thomas Groß. 2018. Answer fragments. *The Linguistic Review* 35, 1, 161–186.

Osborne, Timothy, Michael Putnam & Thomas Groß. 2011. Bare phrase structure, label-less structures, and specifier-less syntax: Is Minimalism becoming a dependency grammar? *The Linguistic Review* 28, 315–364.

Osborne, Timothy, Michael Putnam & Thomas Groß 2012. Catenae: Introducing a novel unit of syntactic analysis. *Syntax* 15, 4, 354–396.

Quirk, Randolph, Sidney Greenbaum, Geoffrey Leech, and Jan Svartvik. 2010. *A comprehensive grammar of the English language*. Dorling Kindersley: Pearson.

Reeve, Matthew. 2018. Beyond constituency tests: A reply to Osborne. *Language Under Discussion* 5, 1, 68–82.

Sobin, Nicholas. 2011. *Syntactic analysis: The basics*. Malden, MA: Wiley-Blackwell.

Tarvainen, Kalevi. 1981. *Einführung in die Dependenzgrammatik*. 2. unveränderte Auflage. Series: *Reihe Germanistische Linguistik* 35. Tübingen: Max Niemeyer Verlag.

Tesnière, Lucien. 1959. *Éléments de syntaxe structurale*. Paris: Klincksieck.

Tesnière, Lucien. 2015 (1959). *Elements of structural syntax*, translated by Timothy Osborne and Sylvain Kahane. Amsterdam: John Benjamins.

Uzonyi, Pál. 2003. Dependenzstruktur und Konstituenzstruktur. In Vilmos Ágel et al. (eds.), *Dependency and valency: An international handbook of contemporary research*, vol. 1, 230–247. Berlin: Walter de Gruyter.