Why so many nodes?

Dan Maxwell
US Chess Center
Washington DC, USA
dan.n.maxwell@gmail.com

Abstract

This paper provides an analysis of the representation of various grammatical phenomena in both constituency structure and dependency structure (hereafter c-structure and d-structure), including agreement, case marking, and word order in transitive sentences, as well as three theoretical constructs, and the interface between the form of a sentence and its meaning. There is a crucial structural relationship for all of these phenomena in both constituency grammar and dependency grammar, but only the version used in dependency grammar is fully reliable. This insight evokes the following question: Why do linguists working with constituency grammars think that so many nodes are necessary? Upon examination, the extra nodes succeed only in confusing our understanding of syntactic phenomena.

1 Introduction

The obvious difference between constituency grammar and dependency grammar (for which the seminal work is Tesnière 1959) is that the former has more nodes due to the distinction it makes between lexical and phrasal categories. As first discussed in Hudson 1984:94-95, this distinction has an important consequence: nodes which are related to each other are directly connected to each other in dependency grammar, but only indirectly in constituency grammar. That is, they are **parent** and **child** in dependency grammar but at best **siblings** (the gender-neutral version of the more commonly used 'sisters') in a one-bar constituency grammar. A further problem is that the constituency grammars often use a system of two bars or more rather than a one-bar system. This contribution examines this fundamental difference and its consequences for the treatment of several kinds of linguistic phenomena and theoretical constructs to be treated in more detail below.

2 Agreement

In many languages, the form of one word varies according to the form of some other word in the same construction. These relationships include subject and verb, (more rarely) object and verb, noun and adjective, and noun and determiner. Highly inflected languages like Russian have all of these kinds of agreement. English has only two of them (and then only to a limited extent). So-called isolating languages like Vietnamese do not show agreement at all. The agreement can be in person, number, gender, and (for case-inflecting languages only) case.

English has agreement between the subject and the verb in the third person singular of the present tense, as shown by the contrast between (1a) on the one hand and (1b) and (1c) on the other:

(1) a. John *walks* slowly.
b. John and Sarah *walk* quickly.
c. I *walk* more quickly than they do.

The c-structures of these sentences assume that the subject NP (which is a parent of the noun which determines the form of the verb) is a sibling of the parent VP of the verb, so the structural relationship between this noun and this verb is something more complicated and indirect than that shown in dependency grammar and apparently varies according to the precise details of the construction or perhaps the system of X-bar theory (Jackendoff 1977) chosen by the grammarian, e.g.

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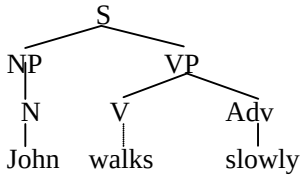

Neither the subject NP nor its child, the N *John* is a sibling of V, although this is the word with which the subject agrees.

In dependency grammar in contrast, there is of course neither an NP node nor a VP node. The verb is simply the parent of the noun, whatever kind it is. The nodes for these two words contain both the phonological information associated with them and, in the

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semantics, the associated words that make up the phrase of the same category.

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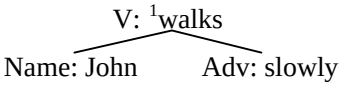


The V *walks* is the parent of the name *John.*

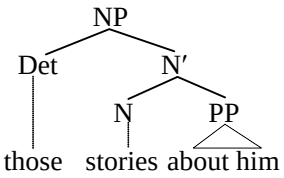
Agreement in number also occurs in English between common nouns and demonstrative determiners, as shown in the contrast between (4a) and (4b):

(4) a. this/that student

b. these/those students

In the most widely accepted analysis of the internal structure of the NP within constituency grammar frameworks, the determiner is a sibling of the N′, but not of the N that it agrees with. This is shown in (5):

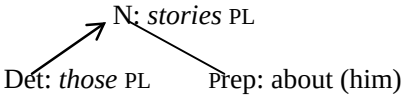
(5)



those agrees with *stories*, but the category Det of the former is a sibling of N′ rather than the category N of the latter.

In dependency grammar, either the N is the parent of the Det, or vice-versa, depending on which analysis is applied to the construction (NP vs. DP). The corresponding two competing treatments are also found in constituency grammar analyses. The more traditional N-as-head analysis is assumed here:

(6)



This shows that for the relationship between nouns and determiners, as between verbs and nouns, the source of the features and their target are directly connected to each other in DG as parent and child. In other words, they form a very restricted kind of *catena* (Osborne and Groβ 2012). A consequence of this is that the features can be expressed for both categories for whatever rule unites them.

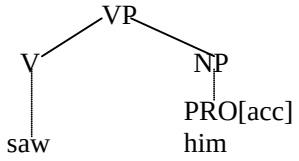
In constituency grammar, on the other hand, the trees in (3) and (4) show that the N that is the source of the features is not always a sibling of the constituent that gets them from it. To allow such non-siblings to nevertheless get the features from the source noun, additional principles have been used. These include the 'head feature convention' in Generalized Phrase Structure Grammar (GPSG, Gazdar, Klein, Pullum, and Sag, 1984), the 'head feature principle' in Head-Driven Phrase Structure Grammar (HPSG, Pollard and Sag, 1994) or the 'projection principle' in Principles and Parameters (P&P, Chomsky and Lasnik, 1991). Lexical Functional Grammar (Bresnan, 2001) has a system of up-arrows and down-arrows to pass the features from the sibling node of the source of the features to the node that needs them. Such devices are not necessary in dependency grammar.

3 Case

Some languages that inflect for features like person, number, and gender, also inflect for case. If they inflect for case, they may also have agreement in case, as noted in the previous section. But how is case assigned in the first place? Unlike for features like person, number and gender, case cannot be inherent in nouns; it is, rather, clearly determined by the syntactic structure of the clause in which the nouns occur. More specifically, the case of a noun is determined by the verb or preposition (or occasionally a combination of both) which governs it. Just as with agreement, government is determined in dependency grammar by the parent-child relationship, but in constituency grammar, government is determined by a sibling relationship which requires some other grammatical device to pass the case feature between the word which ultimately gets case and the node which is the maximal extension of this word, e.g.

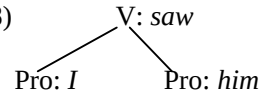
[1] Colons are used in this paper to separate a syntactic category and its associated phonology at a specific node in a dependency tree. On the other hand, the 'AdvP' in the same tree is used to label a parent node for a constituent consisting of more than one word and headed by an Adverb. This corresponds to the use of phrasal nodes to abbreviate a series of words in constituent grammars, when the internal details of these structures are not relevant to the point being made.

(7)



The accusative case of him is assigned by the verb saw. The sibling of the verb is the NP, not the PRO, so the feature must be passed to the PRO by some additional principle. Compare (7) with the direct connection between case assigner and case recipient in DG, as shown in (8):

(8)

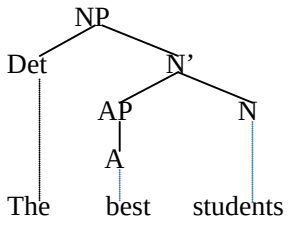


The nominative case of *I* and the case of *him* are both assigned by the parent verb *saw*.

4 Non-branching Phrasal Nodes[2]

Within a c-structure analysis, a PS rule may generate a phrasal node to allow for the possibility of a modifier or optional argument. But if this option is not taken, then the node appears to be superfluous. An example of such a situation is shown in (9).

(9)

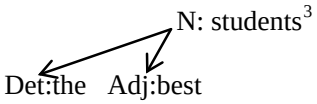


The AP(adjective phrase) does not branch. APs never branch unless they are modified, for example by a degree adverb such as *very* . If there were no adjective, then the N' node would likewise not branch.

Ross (1969) examines several other cases of non-branching nodes and suggests that such nodes should be removed by a rule of **pruning.** In its most general form, this rule results in all non-branching nodes being deleted. This is in fact Ross' initial proposal, but he goes on to find several problems with this due to the kind of transformational analysis which was in general use at the time of writing.

No such rule is necessary in d-structure grammars, since any node may or may not branch. Non-branching nodes are clearly not superfluous, since each one has phonological and/or semantic information (usually both) associated with a specific word. The d-structure which corresponds to (9) is shown in (10):

(10)



5 Word Oder: General

P&P is the most wide-spread c-structure framework and deals with variation of word order for a given sentence with transformations or some other derivational device. I will not go into this here, since such a solution appears to imply a distinction between 'deep structure' and 'surface structure'. P&P, the related Minimalist Program, Meaning-Text-Mapping (Mel'čuk 1988) and work within the Prague school tradition (Firbas 1992) still make this distinction, but both GPSG and HPSG, which are also c-structure frameworks, as well as Construction Grammar(Goldberg 2006), reject such a distinction. The first two of these, at least, have a different way of dealing with such word order variation. They distinguish between hierarchical structure and linear order and have separate sets of rules for each of these. In cases of discourse driven word order, as in the case of Russian (discussed in section 6) and similar languages, this distinction would allow them, when they deal with such phenomena[4], to create linearization rules which are sensitive to discourse information such as focus and topic.

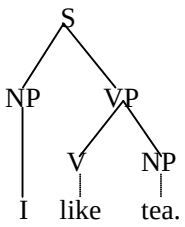
But this is only a partial solution. Suppose we write linearization rules as follows: N1< N2, to mean N1 precedes N2, where N1 and N2 are any two nodes of the tree. As it stands, this needs to be interpreted. How do different rules of this sort interact with each other? What happens to the nodes dominated by N1 and N2?

[2] The essential point of this section is made in Hudson 2007:118

[3] The idea of using arrows as branches when the dependent is an adjunct is introduced in Osborne and Groβ 2009.

[4] Some work along these lines has been done in HPSG, notably Murphy (1995).

(11)



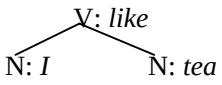
In this tree, the subject NP is the sibling of the VP, but not of the V, so no linearization rule can be written for the sequence of the Subject NP and V. Rather the subject NP must be linearized with respect to the VP. The object NP, on the other hand, is the sibling of the V, so writing a linearization rule is no problem for it: V < NP (V precedes the sibling NP).

To make the constituency grammar approach coherent, it is necessary to interpret these nodes as constituents and thereby include all the nodes they dominate in the linearization process. In the works cited above, their power is restricted to applying only to nodes in a sibling relationship, for example, between any preposition and the sibling NP that it governs, or between any verb and its direct object. One problem with this restriction is that it does not allow us to write a rule which determines the linear relationship between the verb and its subject, because they are not siblings in the tree. The subject NP is a sibling of the VP, not of the verb itself.

The so-called true tree principle (e.g. Schubert 1987:87-90) makes it impossible for different parts of a constituent C1 to be split apart by another constituent C2 which is not a part of C1. The constituent consisting of verb and object (the VP), for example, cannot be split apart by the subject, since the latter is not part of the VP. This has the consequence that in a sentence with VSO order, there can be no VP, at least not in surface structure, and accordingly not at all in any monostratal framework. It is therefore necessary to attach the verb and its arguments to the S node. This makes linearization easier.

The corresponding dependency grammar approach to the problem, shown in tree (12), would be to have linearization rules order the parent node with each of its child nodes.

(12)



The verb is the parent of both the subject N and the object N, so the linearization rules can say that the verb follows one N and precedes the other: $N_{su} < V < N_{ob}$.

It turns out, however, that for languages like English, at least, linearization rules are not necessary at all, as has been shown by Groß and Osborne 2009 and numerous other publications. The linear relationship between the parent and its child in the D-structure tree can be determined by their linear relationship in the rule, assuming the rule corresponds closely to the resulting tree. The direction of the branch which unites parent and child provides this linear relationship. This is seen in the above tree.

Of course, it would be possible to eliminate the VP node of c-grammar and attach the verb and all its arguments directly to the S node at the top of the tree. This is the approach taken for all languages discussed in Starosta 1988, but has generally found little support within generative grammar. This approach solves the problem and makes the grammar more like a dependency grammar.

6 Free Word Order

All the data in this section is taken from Kallestinova 2007. From now on, this name followed by one or more numbers refers to a page or pages of this work.

Russian is one of quite a few languages which are often said to allow relatively "free" word order. According to a number of studies cited by Kallestinova, this freedom does not encode grammatical information, and accordingly does not affect truth conditions[5]. What this does mean is best illustrated with an example, which is taken from Kallestinova 1-2:

(13) a. Boris navestil Ivana. SVO
Boris-Nom. visited Ivan-Acc.[6]
'Boris visited Ivan.'

b. Boris Ivana navestil. SOV

c. Ivana navestil Boris. OVS

[5] In case of different word orders affecting the scope of adjuncts, truth conditions may be affected, as in the case of languages like English, but this is not the type of phenomenon under discussion here.

[6] I use the standard abbreviations for case-endings: acc. = accusative, instr. = instrumental, nom. =nominative

d. Ivana Boris navestil. OSV

e. Navestil Boris Ivana. VSO

f. Navestil Ivana Boris. VOS

These sentences show that the same idea can be expressed by more than one arrangement of a fixed set of words, in this case, there are three words in the set, and they can be arranged in any one of the logically possible six sequences of the Subject (S), Verb (V), and Object (O).

Furthermore, the different positions of the sentence are used to distinguish new information or **Foc(us)** from old information, or the **Top(ic**). Old information goes at the beginning of the sentence, and new information at the end. For example, a subject-focus answer using a non-emotive strategy[7] requires an order with the subject at the end of the sentence, that is, either OVS or VOS. In a sentence using the non-emotive strategy, the only word order with a constituent other than the focused one in sentence final position to be found in significant numbers is SVO. The results of the perception experiment show, however, that one of the two orders found in the non-emotive strategy is distinctly preferred over the other. So in response to the question in (14a), (14b) is strongly preferred to (14c).

(14) a. Kto gryzjot kapustu?

Who bite cabbage-acc.
'Who is biting the cabbage?'

b. Kapustu gryzjot zajac.
cabbage-acc bite rabbit-nom
'The rabbit is biting the cabbage.'

c. ?Gryzjot kapustu zajac.

This shows that it is possible to place any of the major constituents of the verb at the end of the sentence, since any of these constituents can be the answer to such a question.

Representing some of the various possible word orders is no problem for a c-structure framework. As long as the verb and its dependents and modifiers are all siblings in the tree, linearization rules can determine their respective order. But in most c-structure frameworks, the subject is not considered to be a sibling of the verb. So if the subject intervenes between any of the constituents in the VP, this is a sequence which cannot be linearized using the assumptions mentioned so far. So of the six possible linear orders of the constituents (subject (S), verb (V), object (O)) of transitive sentences, two of them, namely VSO and OSV show these unlinearizable sequences. Do these orders really exist in Russian speech? The results of Kallestinova's perception experiment show that they are acceptable, although SVO is strongly preferred over VSO as a way of focusing on the O, and OVS is strongly preferred to VOS as a way of focusing on the S. Nevertheless, the two orders VSO and VOS occur often enough in Kallestinova's elicitation experiment that they cannot be attributed to chance.

There seems to be a further problem within constituency grammars of unifying the feature **Foc** with the final position of the sentence, in order to create responses that are appropriate in a given context. Once again, the problem is that transitive sentences in constituency grammars are created by a combination of two different phrase structure rules, one as an expansion of the S node and one as an expansion of the VP node. Either of these rules can be written to include this feature in its final constituent, and either of these rules can be linearized to place its two child constituents in either of the two logically possible orders. Then there needs to be a rule showing that whatever lexical constituent is in final position gets the feature **Foc,** and this rule needs to unify with the final position of the tree created by the above described phrase structure rules.

One problem with this is that few if any of the major c-structure frameworks mentioned earlier makes use of pragmatic features like [Foc].[8] This of course will change if and when they start incorporating more work on pragmatics into their grammars.

Another problem is the need to combine such a feature with a phonological feature such as '#'(clause final, corresponding to a break in the prosody). Because the phonology is generally taken for granted in work on syntax, there are not many examples of formal

[7] The emotive strategy, signaling the focus by prosodic means, allows speakers to use the basic SVO order. This is not treated here, however.

[8] Kallestinova (chapters 3 and 4) cites some analyses within the Minimalist Program which use phrasal nodes with the names FocP or TopP, thus apparently creating a pragmatic category rather than a syntactic one.

treatments involving interactions between it and syntax, semantics, or pragmatics. But cases of such interactions are discussed informally quite regularly, for example in discussions of sentences which are grammatical or have a specific meaning only in the presence of emphatic stress or a specific intonation. Goldberg 2006 postulates that representations of these different aspects of linguistic signs must always be paired together. There have been some attempts to incorporate such ideas into formal analyses, but no general agreement about how this should be done, even within one formal framework.

So far we have discussed word order when the subject, the object or the verb is focused. It is also possible to focus certain non-constituents: verb plus object or verb plus subject. In the following sentences (Kallestinova 60), (15b) shows an example of the former, which typically occurs in response to a question like (15a):

(15) a. Chto delaet devochka?
What does girl
'What is the girl doing?'

b. Devochka [podmetaet pol]-Foc.
Girl-Nom. sweeps-3sg. floor-Acc.
'The girl is sweeping the floor.'

The following data (Kallestinova 17) shows an example of verb-subject focus.

(16) a. What happened to the paintings?

b. Neskol'ko kartin [priobrel mestnyj muzej]-Foc.
a few paintings acquired local museum
'The local museum acquired a few of the paintings.'

c. Who acquired the paintings?

d. Neskol'ko kartin priobrel [mestnyj muzej]-Foc.
A few paintings acquired local museum
'The local museum acquired a few of the paintings.'

(16a) is the kind of question that requires an answer like the one in (16b), in which both the verb and subject are focused. (16c), on the other hand, requires an answer like the one in (16d), in which only the subject is in focus, since only the subject provides new information. The answers to the questions in (17a) and (17c) differ only in focus.

(17) a. Chto s oknom?
What with window-instr.
'What happened to the window?'

b. Okno [razbila Olja]
Window-Acc. broke Olja-Nom.
'Olja broke the window.'

c. ??Okno [Olja razbila].
Window-Acc. Olja-Nom. broke
'Olja broke the window.'

Sentence (17b) is the preferred answer to the question in (17a). Sentence (17c) is a less satisfactory answer, but is nevertheless possible. Both answers show the subject and verb in focus position at the end of the sentence. What is the structural relationship between a subject NP and its verb in a constituency grammar that has a VP? This varies according to the kind of X-bar system being used, but in the simplest kind, namely a one-bar system, the verb would be the niece/nephew of the subject NP. There is no one node which includes both of them and no other part of the sentence. This would appear to make any analysis linking [foc] in one node to the other quite awkward and ad hoc.

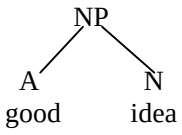
Recognizing such extended focus units as subject-verb and verb-object is also a problem for DG, but it is comforting that whatever solution is used for one of these can also be used for the other.

7 Heads

The head of a syntactic unit such as a phrase or sentence is the word which determines the category of the larger unit. Within a word, the head is the morph that determines the category of the word as a whole. The following examples show how this is represented in c-structure and d-structure. In the former, I will assume that superfluous nodes have been pruned away, as discussed in section 4.

(18) good idea

a.



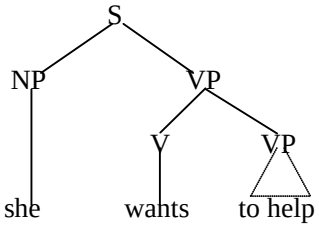
b. N: idea

A: good

On the basis of these examples, there seems to be nothing new to say about the differences between c-structure and d-structure. In c-structure, the head is a sibling of its complement and has the same category as its parent. In d-structure the head is the parent of its complement.

However, a problem comes up for c-structure, if the complement has the same category as the head, as in (19):

(19) She wants to help.



Both *wants* and *to help* have the category **verb.** They differ merely in bar level. How do we determine which one is the head of the higher VP? What formal criterion can be used to automate this selection? One way would be to say that in cases like this the lexical node is always the head. Another response to this question would be that taken in HPSG: the head is designated as H in the PS rule and inherits the category of the parent via the Head Feature Principle mentioned in section 3.

In any case, there is no such problem for d-structure. The head is always the parent of its complement rather than its sibling. So the category of the head is also the category of the entire phrase.

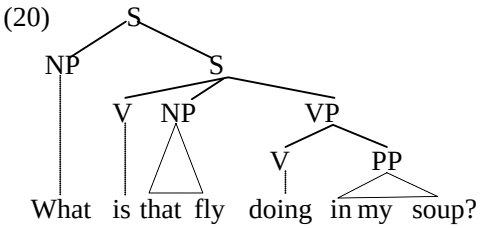
On the other hand, not every parent needs to be considered a head. I believe that the categories of words from small closed classes such as complementizers (*to, that)* do not determine the category of the entire phrase that they are part of and introduce and are therefore not heads. In any case, this question can and should be debated separately from the questions dealt with in this paper.

8 Catenae: a necessary part of Ellipsis and Idioms

Osborne and Groß 2012 provide evidence that ellipsis and idioms always meet a specific structural condition which is easily formulated in dependency grammars, but not in constituency grammars. This is that the missing words of any construction involving ellipsis as well as the idiomatic part of a sentence always form a **catena (**plural: **catenae).** They define this as part of a dependency tree which is "continuous with respect to dominance." In other words, the nodes of a catena are all connected to each other. Osborne and Groß claim that the idiomatic part of any sentence must form a catena.[9]

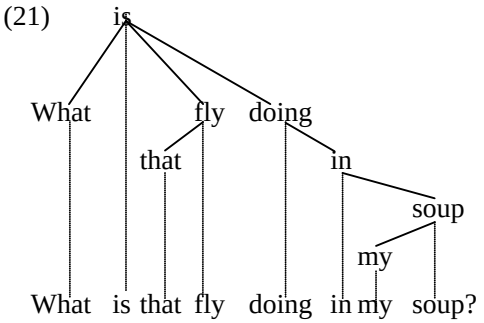
Tree (20) shows a c-structure representation of the WXDY construction (Kay and Fillmore 1999), which as far as I can determine from their discussion would be the one provided by the authors, if they had been using tree diagrams of this sort[10].

(20)



Tree (21) shows the same sentence in a d-structure tree (I have omitted the lexical categories).

(21)



[9] They note that there are a few idioms, such as *spill the beans*, which in their passive form (*the beans were spilled*) do not form a catena due to the intervening auxiliary verb. To get around this, one might suggest that the passive and active forms of the idiom are generated by the same lexical entry, which necessarily is an idiom.

[10] They in fact use matrices, specifically attribute-value matrices.

Kay and Fillmore consider the following words to be the idiomatic part of this sentence: *What, is, doing*. In other versions of this idiom, *is* can be replaced by any finite form of the verb *be*, depending on what is required for agreement with the subject. *This fly* and *in my soup* are the non-idiomatic parts of the construction. The idiomatic words are all connected to each other as a catena in the d-structure. It is clear from a glance at (20) that no two of the three nodes corresponding to *what, is*, and *doing* in the c-structure are in a sibling relationship. This apparently removes the justification for connecting these nodes directly. The alternative is to connect them by going through the three phrasal nodes. It is necessary to go through both S nodes and the VP in order to connect *What* to the other two words of the idiom. But once we allow catenae to go through any number of phrasal nodes as well as the required lexical nodes, it appears that any combination of words can be considered a catena. This would make the concept meaningless. This is not the case in d-structure trees. For example, the combination of *what* in (21) with any word in the sentence except *is* does not form a catena.

Note that the extended focus units (verb-subject and verb-object) discussed in the previous section do form catenae, thus perhaps providing the basis for a solution to the problem discussed there. This is not the place to go into details of this, however.

The significance of catenae for ellipsis is that the elided material, no matter how many words it consists of, always forms a catena. This is dealt with in detail in Osborne and Groβ 2012. I summarize this point with the following examples, taken from Osborne and Groβ 2012:

(22)
a. Fred will attempt to help you, and
b. Tom [will attempt to help] me
c. Tom [will attempt] to help me

(23)
a. she may take a picture of me, and
b. he [may take a picture] of me
c. he [may take] a picture of me

(24)
a. Mom intends to require me to mow the front lawn this week, and
b. Dad [intends to require me to mow the front lawn] next week
c. Dad [intends to require me to mow] the back lawn next week

The a clauses show the first clause of a coordinate structure. The b and c clauses show various forms of the second clause. The bracketed material can be omitted in each case. And in these cases, the words of the omitted material form a catena.

9 Interface with Semantics

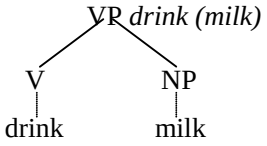
Words in a sentence combine with each other to create meanings of larger units such as propositions. Within a constituency grammar, this is thought to happen (Partee 1975) by combining meanings of the lexical nodes at the bottom of the tree to form the meanings of the constituent(s) represented by the immediately dominating phrasal node(s). The meanings at such nodes then combine with each other to create the meanings of the phrasal nodes that dominate them, and so on, until the meaning at the top of the tree is created. Given this situation, it appears that the way nodes combine depends on the nature of these nodes. So for every different phrase structure rule, there would be a specific rule combining the meanings of each constituent. The view that meanings combine this way is known as the rule-to-rule hypothesis.

The rule-to-rule hypothesis works differently in dependency grammar, since the parent node has its own contribution to the meaning of the sentence and this meaning needs to combine with the meanings of the child or children. If the child nodes are complements of their head, they combine with the parent as its arguments. So the parent node in DG would generally serve a double function as both the head child of the construction and place where the meanings of this head and the children are shown.

These two scenarios are shown in the following two figures:

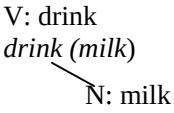
(25)

a.



In c-structure, the italicized words show how the SEM (semantics) of the verb combines with the SEM of the NP to create a predicate-argument structure.

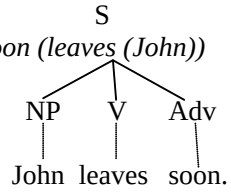
b.



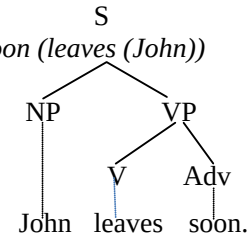
In d-structure, the same node is used both to store the predicate *drink* and the combination of the SEM of this word with that of its complement noun. The d-structure in (b) shows one general pattern found in many specific d-structures: the head node is the predicate, and the complements its arguments. The other general pattern is the one used for adjuncts or adjunct phrases: they take their head (and its complements, if it has any) as their argument. The c-structure version of this is shown in (26a) without a VP and (26b) with a VP.

(26)

a. *soon (leaves (John))*



b. *soon (leaves (John))*



In the predicate-argument structures which must result from both of the above trees, the adjunct *soon* takes the meaning of the rest of the sentence as its argument.

The problem for c-structure is shown in (26b). What meaning is stored at the VP? It should be just the combination of the two SEMs which are in its child nodes, that is *soon (leaves*); *leaves* still has not combined with its argument *John*, which becomes available only in the next step up the tree. But *John* is also a complement of *leaves*. So it seems to be necessary to leave a placeholder slot in the argument position of the V to signal that just the subject does not immediately fill the V's argument slots, allowing it to remain empty until the next step up the tree is made. This empty slot is then filled by the subject in that next step. This can be done, but it seems to be an unnecessary complication. In the d-structure, or in the c-structure without the VP, all of the argument slots are immediately available.

10 Conclusion

I have argued that c-structure faces problems that d-structure does not face in the areas of agreement, case marking, word order (especially free word order), eliminating or otherwise dealing with superfluous nodes, defining catena, and combining meaningful parts to create predicate-argument structures. It is true that these problems could be reduced by eliminating an intermediate level of the phrasal projection (the VP node and the N' node), but the fact these intermediate levels have become firmly entrenched in frameworks based on c-structure militates against this happening. In fact, in the Minimalist Program the trend has been in the opposite direction – to more nodes and more structure, making their representations of sentence structure still less like those provided by dependency grammars. These additional nodes guarantee further complications in creating meaning representations in ways which have been shown in this paper.

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References

Joan Bresnan. 2001. *Lexical Functional Syntax*. Oxford: Blackwell.

Noam Chomsky and Howard Lasnik. 1993. "The theory of Principles and Parameters". In Jacobs, J.; von Stechow, A.; Sternefeld, W. et al. *Syntax: An international handbook of contemporary research*. Berlin: de Gruyter.

Jan Firbas. 1992. *Functional Sentence Perspective in written and spoken communication.* Cambridge University Press. republished in 2006, edited by John Alges and Bas Aarts.

Gerald Gazdar, Evan Klein et al. 1985. *Generalized Phrase Structure Grammar*. Oxford: Basil Blackwell.

Adele Goldberg. 2006. *Constructions at Work: The Nature of Generalization in Language.* Oxford University Press.

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

Richard Hudson. 1984. *Word Grammar*. Oxford University Press.

Richard Hudson. 2007. *Language Networks: the New Word Grammar*. Oxford University Press.

Ray Jackendoff. 1977. *X-bar Theory*. MIT Press.

Elena Kallestinova. 2007. *Aspects of Russian Word Order.* University of Iowa Dissertation. http://ir.uiowa.edu/etd/165.

Paul Kay and Charles Fillmore. 1999. Grammatical Constructions and Linguistic Generalizations. *Language*: 75:1-34.

Igor Mel'čuk. 1988. *Dependency Syntax: Theory and Practice.* Albany: State University of New York Press.

Patrick Murphy. 1995. Word Order, Themes and Discourse in Head-Driven Phrase Structure Grammar. www.unc/~murphy/research

Timothy Osborne and Thomas Groß. 2012. Construction Grammar meets Dependency Grammar of syntactic analysis. *Cognitive Linguistics* 23.1: 364-396.

Barbara Partee. 1975. Montague grammar and transformational Grammar. *Linguistic Inquiry* 6 (*1975*): 203-300.

Carl Pollard and Ivan Sag. 1994. *Head-driven Phrase Structure Grammar*. Chicago University Press.

John Robert Ross. 1969. A Proposed Rule of tree Pruning. 288-299. In Modern Studies in English. *Readings in Transformational Grammar*. Edited by David A. Reibel and Sanford Schane. Prentice-Hall:Englewood cliffs, New Jersey.

Klaus Schubert. 1987. *Metataxis: Contrastive dependency syntax for machine translation.* Dordrecht: Foris Publications.

Stanley Starosta. 1988. *The case for lexicase: an outline of lexicase grammatical theory*. Open Linguistics Series, ed. by Robin Fawcett. London: Pinter Publishers Limited; Cassell.

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