## Primitive Asymmetric C-Command Derives $\overline{\text{X}}$-Theory[*]

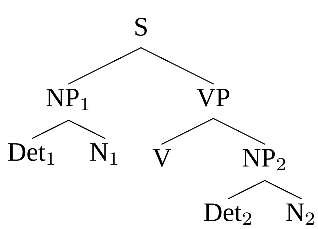
Robert Frank and Fero Kuminiak

Johns Hopkins University

### 1. Seeing the Forest for the Trees

Throughout the development of syntactic theory, it has been widely assumed that sentence structures are represented as a certain type of graph, called a tree. On the basis of a variety of diagnostics, the words in a sentence have been taken to clump together to form hierarchically organized subgroupings, called constituents. Thus, the sentence *every child ate some cabbage* is assumed to have the following tree structure representation.

(1)




Although diagrams like (1) are common currency in theoretical linguistics, the question of what formal object is actually depicted by these diagrams is one that is rarely discussed. Looking through the history of formal syntax, one finds at least two different answers to this question. The first, stemming from Chomsky (1955), sees trees as encoding a sequence of steps in a context-free string rewriting derivation, or more properly an equivalence class of such sequences.[1] On this view, each node in a tree reflects the rewriting

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[1]Proposals that envision the construction of sentence structures through the combination of words, as in the combinatory operations of categorial grammar (e.g., Steedman (1996)) or via the Merge operation

of a single non-terminal, with the children of that node being the elements that rewrite the non-terminal. The tree in (1), then, encodes the following sequence of rewrite steps:

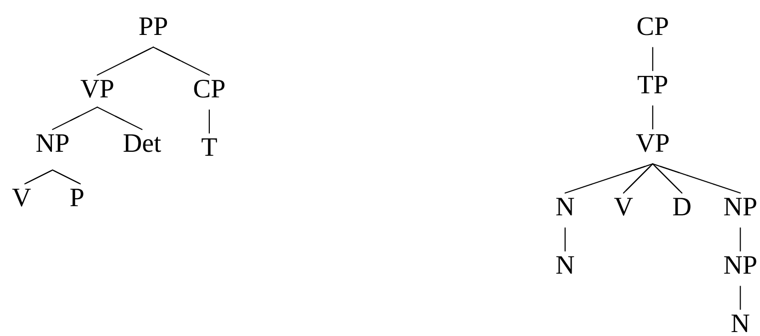
(2) $S \Rightarrow NP^\frown VP \Rightarrow Det^\frown N^\frown VP \Rightarrow Det^\frown N^\frown V^\frown NP \Rightarrow Det^\frown N^\frown V^\frown Det^\frown N$

A second view of trees views them as mathematical structures characterized by two relations, dominance and precedence (McCawley (1968; 1982), Higginbotham (1983), Partee, ter Meulen, and Wall (1993)). The dominance relation directly characterizes the property of subconstituency: X dominates Y if Y is a subconstituent of X. Precedence characterizes the temporal ordering of constituents within the sentence. For the tree in (1), these two relations are as follows:

(3) $D = \{(S,S),(S,NP_1),(S,Det_1),(S,N_1),(S,VP),(S,V),(S,NP_2),(S,Det_2),(S,N_2),$
$(NP_1,NP_1),(NP_1,Det_1),(NP_1,N_1),(Det_1,Det_1),(N_1,N_1),(VP,VP),(VP,V),$
$(VP,NP_2),(VP,Det_2),(VP,N_2),(V,V),(NP_2,NP_2),(NP_2,Det_2),(NP_2,N_2),$
$(Det_2,Det_2),(N_2,N_2)\}$
$P = \{(NP_1,VP),(NP_1,V),(NP_1,NP_2),(NP_1,Det_2),(NP_1,N_2),(Det_1,N_1),(Det_1,VP),$
$(Det_1,V),(Det_1,NP_2),(Det_1,Det_2),(Det_1,N_2),(N_1,VP),(N_1,V),(N_1,NP_2),$
$(N_1,Det_2),(N_1,N_2),(V,NP_2),(V,Det_2),(V,N_2),(Det_2,N_2)\}$

The forest of trees that result from either of these views is a bit too dense, in the sense that there are many formally valid trees that do not constitute the representation for any sentence. The following are examples of such linguistically uninhabited specimens.

(4)




The formal well-formedness of such structures raises the question of why they do not constitute syntactic representations. In the earliest work in generative grammar, the answer to this question derived from the set of phrase structure rules constituting the base. If there is no rule of the form PP $\rightarrow$ VP CP in the base, then the tree to the left in (4) encodes a rewriting sequence that is not licensed by the grammar. Naturally, this line of response raises the puzzle of why only certain types of rules are present in the base. The development of $\overline{\text{X}}$-theory provides an answer to this puzzle. The principle of *endocentricity* requires that the left side of every rule must project the categorial properties of some element on the right, immediately eliminating the putative PP rule. Additionally, $\overline{\text{X}}$-theory postulated that the non-projecting elements on the right side of a rewrite rule must all be phrasal. Together, these two principles give rise to the following schema:

of Chomsky (1995, ch.4)), give rise to an analogous view of trees as the representation of (an equivalence class of) sequences of combinatory operations.

(5) $X^i \rightarrow YP^* \; X^{i-1} \; YP^*$

Rather than interpreting this schema as a template for rewrite rules in a phrase structure base, one can also understand it as a well-formedness condition on (immediate) domination relations. In this way, $\overline{\text{X}}$-theory can also be understood to constrain trees when understood as relational structures. Kayne (1984, ch.7) suggests a more abstract constraint on tree structure in which certain types of paths between nodes in a tree that are derived from the dominance relation must be uniquely determined. This condition forces all trees to have a binary branching structure.

All of these approaches to the puzzle of the limited variety in syntactically relevant structures take the form of restrictions that pick out subclasses of the already formally defined class of trees. One might wonder, however, whether there is another way of approaching this problem, by reconceptualizing the original notion of tree itself. That is, is it possible to define an alternative notion of tree structure in such a way that the syntactically irrelevant tree structures that were definable in terms of string rewriting or dominance and precedence no longer constitute instances of trees at all?

The work of Kayne (1994) constitutes one attempt to do just this. Working within the relational conception of tree structures, Kayne proposes that the domination and precedence relations that characterize a tree are not so independent as had been thought. In particular, Kayne proposes that trees must adhere to his Linear Correspondence Axiom which relates dominance and precedence as follows:

(6) *Linear Correspondence Axiom.* $x$ precedes $y$ iff there is a node dominating $x$ that asymmetrically c-commands $y$.

Trees in which the dominance relations that do not give rise to well-formed precedence relations simply do not count as tree structures. Kayne shows that a variety of previously stipulated restrictions on syntactic structure now derive from the need to map dominance to a linear order among terminals.

In this paper, we will pursue another way to limit the forest of trees to syntactically relevant structures, by abandoning the relational primitive of dominance. Since the representation of hierarchical relations is the basis for the utility of tree structures, it is necessary that we replace dominance by some other structural relation. Developing the line of work in Frank and Vijay-Shanker (1998), we propose that the primitive relation that encodes hierarchy in tree structure is *asymmetric c-command* (ACC). Traditionally, c-command and its asymmetric variant have been assumed to be relations that are defined in terms of the more primitive domination relation as follows:

(7) a. A node $x$ c-commands a node $y$ iff every node $z \neq x, y$ that dominates $x$ also dominates $y$ and $x$ does not dominate $y$.

b. A node $x$ asymmetrically c-commands a node $y$ iff $x$ c-commands $y$ and $y$ does not c-command $x$.

We suggest that this traditional conception of ACC as a derived relation is mistaken. To see why, let us ask what we should expect from a representational primitive.

Minimally, a representational primitive should be grammatically relevant: it should play a fundamental role in characterizing linguistically significant structural relations. Clearly, ACC meets this desideratum, as it figures prominently in constraints on anaphoric dependencies, scope, and movement.[2] A second requirement on a hierarchical primitive is that it should be sufficiently rich so as to capture any necessary distinctions among syntactic structures. It is not obvious that this requirement is met by ACC. Indeed, it is not even clear how one could use ACC to define tree structure. In section 2., we demonstrate that this is in fact possible, at least for certain types of structures. The final requirement on a hierarchical primitive, and the one which is the primary focus of this paper, is that it should not be too rich so as to characterize syntactically irrelevant structures.

Before going further, it will be useful to make more precise what we mean when we say that a relation does or does not characterize a certain structure. At the very least, any relation $R$ that can be taken to characterize a structure $S$ should have the effect of distinguishing all of the nodes in $S$. That is, the nodes of $S$ should "look different" under $R$ as specified in the following:

(8) *Extensionality*: A structure $S$ is $R$-extensional iff all nodes in $S$ are distinguishable by the set of nodes with which they stand in $R$.
$\forall x, y \in S[\forall z([xRz \leftrightarrow yRz] \wedge [zRx \leftrightarrow zRy]) \rightarrow x = y]$

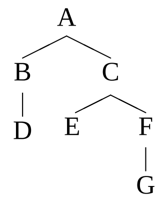
To restate, an $R$-extensional structure is one where the structural context of each node is uniquely determined by $R$. A structure that is not extensional for any structural primitives is in a certain sense unusable, as this means that there are nodes in that structure that are not uniquely identifiable from their structural context. Ideally, given the right primitive relation $R$, the class of trees that are $R$-extensional (i.e., that are "usable" with respect to $R$) will coincide with the class of trees that are linguistically useful. There have been a number of previous efforts along these lines, including Lasnik and Kupin's (1977) monostrings and Frank and Vijay-Shanker's (1998) primitive c-command. In both cases, trees with sequences non-branching non-terminals nodes are eliminated, since distinctions among such structures are lost by the representational vocabulary. Though suggestive, the elimination of non-branching structure still leaves us with a class of trees that is considerably richer than that used as syntactic representations. Our goal in this paper is more ambitious: to demonstrate that the class of ACC-extensional trees is, to a good first approximation, identical with the class of trees that are picked out by the detailed restrictions imposed by $\overline{\text{X}}$-theory and the extended projection principle.

## 2. Defining Trees with Primitive Asymmetric C-Command

As already noted above, the standard relational characterization of trees utilizes the relation of dominance to specify hierarchical information. For the diagram below, the hierarchical structure is encoded in the relation $D$.

[2]Typically, these grammatical relations are specified as necessitating c-command. However, in virtually all the cases of which we are aware, it is only asymmetric c-command relations that play any role (cf. Barss and Lasnik (1986), but *pace* May (1985)). This result can be seen as a consequence of the widespread assumption that syntactic structure is binary branching.

(9)




D={(A,A),(A,B),(A,C),(A,D),(A,E),(A,F),(A,G), (B,B),(B,D),(C,C),(C,E),(C,F),(C,G),(E,E),(F,F), (F,G),(G,G)}

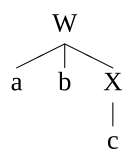
In the sources cited above, the dominance relation has been taken to possess a number of formal properties including reflexivity, antisymmetry and transitivity. In addition, Higginbotham (1983) and Kayne (1994) observe that while dominance is not a total relation, in the sense that every pair of nodes is somehow related by dominance, it nonetheless exhibits a property that Kayne dubs local totality:

(10) *Local totality of* $R$: if a $R$ x and b $R$ x, then a $R$ b or b $R$ a.

What local totality asserts for dominance is that any two nodes which both dominate some third nodes must themselves stand in the dominance relation.

Turn next to the ACC relation. It is interesting to observe that ACC exhibits a set of formal properties similar to those of dominance: it is transitive and asymmetric, though it is irreflexive. Unlike dominance, however, ACC is not even locally total in general.

(11)

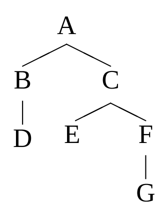



ACC = {(a,c),(b,c)}

In (11), local totality fails since neither a ACC b nor vice versa, in spite of the fact that both a and b ACC c. Interestingly, if we restrict ourselves to binary branching trees, ACC does obey local totality.

Let us return now to the issue of defining trees with ACC, concentrating on the tree whose dominance relation was given in (9). The ACC relation for this structure is as follows:

(12)




ACC={(B,E),(B,F),(B,G),(C,D),(E,G)}

As mentioned in the previous section, a prerequisite to a structure being definable in terms of ACC is ACC-extensionality. In fact, this structure is ACC-extensional: all nodes have distinct ACC profiles. This can be seen clearly by constructing a table in which the columns contain the ACC profile for each node.

(13)

| | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|
| ACCs | | E,F,G | D | | G | | |
| ACCed by | | | | C | B | B | B,E |

We can now understand ACC-extensionality as requiring that no two columns of this table be identical, something that holds in this case.

The fact that the structure in (12) is ACC-extensional tells us that the ACC relation contains enough information to distinguish all of the nodes. In fact, for the class of ACC-extensional structures, the ACC relation is sufficiently rich so as to allow the dominance relations of such structures, which are usually taken to be primitive, to be instead defined in terms of their ACC relations (cf. Frank and Vijay-Shanker (1998) for simple c-command, Kuminiak (1999) for ACC). Thus, ACC-extensionality picks out a class of structures in which we can freely go back and forth between the dominance-based and the ACC-based conceptions of tree structure.[3]

At this point, one might object that the interdefinability of the dominance-based and ACC-based conceptions of tree structure suggests that we are engaged in a mere formal exercise, as neither offers an advantage over the other. Note, however, that such interdefinability is possible only over the class of ACC-extensional tree structures. The issue to which we must turn our attention, then, is that of characterizing the boundaries of this class. We turn to this task in the next section.[4]

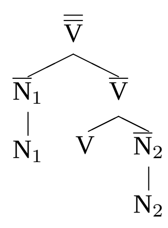
## 3. ACC-Extensionality and $\overline{\text{X}}$-Theory

How, then, does ACC-extensionality serve to restrict the range of possible tree structures? To carry out this task in the context of linguistically interpretable tree structures, we will assume the following $\overline{\text{X}}$-theoretical interpretation of hierarchical configurations (essentially adopting ideas of Kayne (1994)):

(14) a. All terminals are heads.
b. Non-terminals are the projections of one of their daughters (a head, if possible).

Under this convention, the terminal symbols D, E and G in (12) must all be heads. If we take them to be of category N, V and N, respectively, our interpretive convention licenses two $\overline{\text{X}}$ interpretations. One of these can be seen as the simplest instantiation of the X-bar template (under the assumption, taken from Kayne (1994)) that a single level of projection above a head determines a phrasal element).

(15)




ACC=$\{(\overline{\text{N}}_1,\text{V}),(\overline{\text{N}}_1,\overline{\text{N}}_2),(\overline{\text{N}}_1,\text{N}_2), (\overline{\text{V}},\text{N}_1),(\text{V},\text{N}_2)\}$

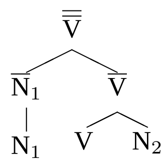
We see here that the verbal head has a phrasal specifier and complement, where phrasal is understood as projected (i.e., anything other than a head). On the basis of our previous

[3]This paper does not touch on the role of precedence in tree structures. Throughout the paper, we ignore the precedence relation; the reader may freely assume that it is defined independently and has its usual properties or that it abides by the constraints of Kayne's LCA.

[4]Note that the entire class of tree structures is dominance-extensional. Consequently, in the usual context, imposing extensionality on the primitive hierarchical relation does not restrict what counts as a possible tree structure. This is in sharp contrast to ACC, as we see below.

observations concerning the structure in (12) then, we can conclude that the basic X-bar template is ACC-extensional: all of its nodes are distinguished by their ACC profile. A second possible $\overline{X}$ interpretation of the structure in (12) takes the non-terminal parent of $\overline{N}_1$ and $\overline{V}$ to be the projection of $\overline{N}_1$. We will return to this possibility below.

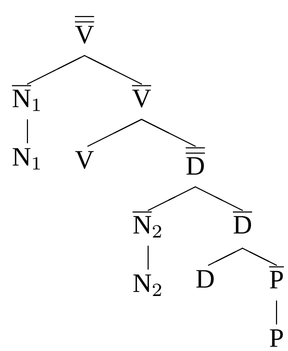
Consider now what happens if we replace the simple non-branching phrasal complement in (15) by an even more minimal structure, one consisting of an unprojected head. By the conventions in (14), either this node (or its V sister) cannot project. Without loss of generality, let us assume that it is the V that projects. This yields the following structure.

(16) 

ACC=$\{(\overline{N}_1,V),(\overline{N}_1,N_2),(\overline{V},N_1)\}$

This structure is no longer ACC-extensional, as V and $N_2$ are not distinguished by ACC: both nodes are asymmetrically c-commanded by $\overline{N}_1$ and neither asymmetrically c-commands anything. ACC-extensionality therefore derives the result that complements must not consist of a single unprojected head.

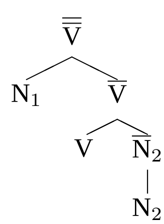
Suppose, on the other hand, that we try to enrich the structure of the phrasal complement in (15), perhaps to an instantiation of the X-bar schema itself:

(17) 

ACC=$\{(\overline{N}_1,V),(\overline{N}_1,\overline{\overline{D}}),(\overline{N}_1,\overline{D}),(\overline{N}_1,D),(\overline{N}_1,\overline{N}_2),(\overline{N}_1,N_2),(\overline{N}_1,\overline{P}),(\overline{N}_1,P),(\overline{V},N_1),(V,\overline{N}_2),(V,N_2),(V,\overline{D}),(V,D),(V,\overline{P}),(V,P),(\overline{N}_2,D),(\overline{N}_2,\overline{P}),(\overline{N}_2,P),(\overline{D},N_2),(D,P)\}$

The reader can confirm that the resulting structure is ACC-extensional. The reason for this is fairly straightforward: all of the structure from (15) has been preserved so that no pre-existing distinctions among the nodes in the projection of the V head have been lost. So long as the additional structure that is embedded within the complement is itself ACC-extensional, the entire structure will be ACC-extensional as well.

Let us now see what happens when modify the structure of the specifier in (15). We start again by reducing the structure of the specifier to a single unprojected head:

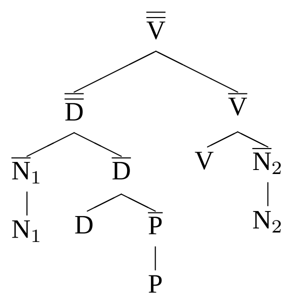
(18) 

ACC=$\{(N_1,V),(N_1,\overline{N}_2),(N_1,N_2),(V,N_2)\}$

Once again, the resulting structure violates ACC-extensionality as $\overline{\overline{\mathrm{V}}}$ and $\overline{\mathrm{V}}$ are non-distinct: neither asymmetrically c-commands anything or is asymmetrically c-commanded by anything. Thus, from ACC-extensionality, we derive the result that specifiers may not consist of unprojected heads.[5]

If we instead insert a fully instantiated X-bar template into the specifier position, the result is ACC-extensional:

(19)



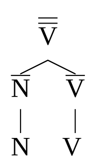
$$\mathrm{ACC}=\{(\overline{\mathrm{N}}_1,\mathrm{D}),(\overline{\mathrm{N}}_1,\overline{\mathrm{P}}),(\overline{\mathrm{N}}_1,\mathrm{P}),(\overline{\mathrm{D}},\mathrm{N}_1),(\mathrm{D},\mathrm{P}),(\overline{\overline{\mathrm{D}}},\mathrm{V}),(\overline{\overline{\mathrm{D}}},\overline{\mathrm{N}}_2),(\overline{\overline{\mathrm{D}}},\mathrm{N}_2),(\overline{\mathrm{V}},\overline{\mathrm{D}}),(\overline{\mathrm{V}},\mathrm{D}),(\overline{\mathrm{V}},\overline{\mathrm{N}}_1),(\overline{\mathrm{V}},\mathrm{N}_1),(\overline{\mathrm{V}},\overline{\mathrm{P}}),(\overline{\mathrm{V}},\mathrm{P}),(\mathrm{V},\mathrm{N}_2)\}$$

The reasoning here is as in the case of complements. Since we haven't eliminated any previously existing ACC distinctions among nodes, the insertion of ACC-extensional templates into canonical structural positions preserves ACC-extensionality.

## 4. Obligatoriness of Specifiers and Complements

$\overline{\mathrm{X}}$-Theory is usually taken to be silent on the necessity of including specifiers and complements within a phrasal projection. Instead the distribution of such elements is usually taken to follow from thematic or featural properties of a projection's head, or conditions like the extended projection principle. Since we have been exploring the relationship between the class of ACC-extensional structures, and those licensed by $\overline{\mathrm{X}}$-theory, we might wonder whether ACC-extensionality is similarly silent on this question. To get at this issue, consider a structure like that in (15), but which lacks a complement entirely:

(20)



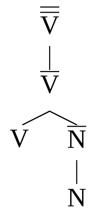
$$\mathrm{ACC}=\{(\overline{\mathrm{N}},\mathrm{V}),(\overline{\mathrm{V}},\mathrm{N})\}$$

This structure is in fact extensional. Like standard X-bar theory, then, ACC-extensionality tolerates structures both with and without complements.

Turn next to the obligatoriness of specifiers. As seen in (21), ACC-extensionality does not permit an $\overline{\mathrm{X}}$ node to project further without the presence of a specifier.

[5] In fact, the $\overline{\mathrm{X}}$-interpretation of the structure depicted in (18) is also ruled out by our interpretive conventions in (14), since they would require the $\mathrm{N}^{\mathrm{o}}$ specifier to project rather than the $\overline{\mathrm{V}}$. This alternative interpretation of the structure is discussed in section 4.. As discussed below, the restrictions that ACC-extensionality imposes on specifiers are relaxed in embedded contexts, so that non-phrasal specifiers, though not non-phrasal complements, might in certain cases be tolerated, leaving aside incompatibility with (14) for the moment. Steve Franks (p.c.) notes that this might suggest a way of thinking about a contrast between subject and object clitics, of which only the former are able to appear in the canonical argument position, at least to a first approximation.

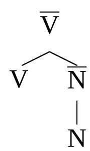
(21)



$ACC=\{(V,N)\}$

Here, $\overline{\overline{V}}$, $\overline{V}$ and $\overline{N}$ are all non-distinct: none enter in any ACC relations. Even if we remove the additional level of (non-branching) $\overline{\overline{V}}$ projection, this specifier-less structure cannot be resuscitated, as $\overline{V}$ and $\overline{N}$ remain non-distinct.

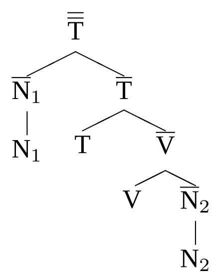
(22)



$ACC=\{(V,N)\}$

Thus, ACC-extensionality posits an asymmetry between specifiers and complements in terms of whether they must appear within every phrasal projection. Strikingly, this asymmetry disappears as soon as the phrases under consideration are embedded: a phrase that is itself a specifier or complement need not include a specifier.

(23)



$ACC=\{(\overline{N}_1,T),(\overline{N}_1,\overline{V}),(\overline{N}_1,V),(\overline{N}_1,\overline{V}),(\overline{N}_1,\overline{N}_2),(\overline{N}_1,N_2),(T,V),(T,\overline{N}_2),(T,N_2),(V,N_2)\}$

Here, the $\overline{V}$ complement to T lacks a specifier, but the entire structure is nonetheless ACC-extensional.

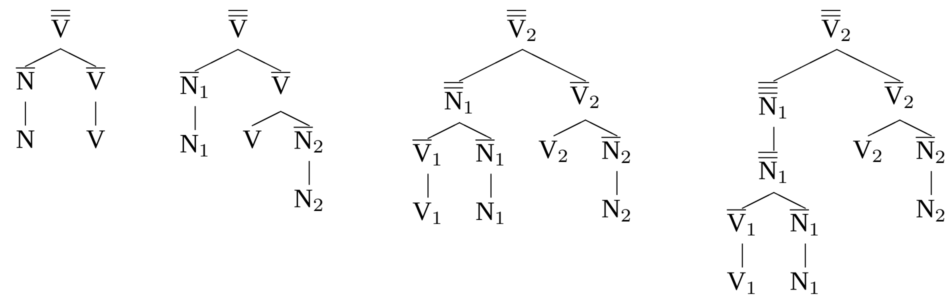
This selectivity in specifier obligatoriness brings to mind the currently puzzling grammatical requirement embodied in the extended projection principle (EPP), which demands that clauses have subjects, to put it roughly. If we adopt a view of grammar that builds phrase structure derivationally in a clause by clause fashion (Chomsky, 1955; Kroch and Joshi, 1985; Frank and Kroch, 1995; Chomsky, 1998; Uriagereka, 1998) and we assume that each such clausal unit must respect ACC-extensionality, we can understand the EPP as the result of the formal requirement that a specifier appear at the root of each clause. Though we leave this proposal in its current speculative form, we note that it provides a potential line of explanation for the fact that even thematically rich DPs do not show EPP effects, as they would not constitute derivationally independent structural units.[6]

## 5. Characterizing ACC-Extensional Structures

In the last section, we saw that the class of ACC-extensional structures is closely related

[6] Developing this proposal in the context of any of the derivational approaches cited in the text is by no means a trivial task. The main obstacle we see is the need to posit domain boundaries at the TP level. For reasons that vary across the different frameworks, it has been assumed instead that CPs constitute the basic domains (kernel sentences/elementary trees/phases) out of which phrase structure is built.

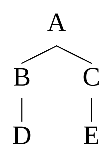
to the class of well-formed $\overline{X}$ structures. Thus, the very simple assumption that ACC is the syntactic primitive allows us to derive what had previously been a rich set of structural stipulations. Let us now turn to the problem of characterizing exactly the class of ACC-extensional structures. One way to get some sense of the richness of this class is to enumerate the ACC-extensional structures from the smallest upwards. The minimal ACC-extensional structure is that consisting of a single node. From there, the next smallest ACC-extensional structures include the following (some of which have been encountered above):

(24)


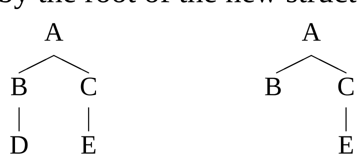
If we limit ourselves to binary-branching structures (a restriction that can be imposed by requiring that ACC be locally total), we can give a simple top-down generative procedure that generates exactly the ACC-extensional structures (Kuminiak, 1999).[7]

(25) Start with a tree consisting of a single node. Then, apply the following two operations in arbitrary order an arbitrary number of times:

**Add Operation** To any leaf node, append the following structure (the leaf node is replaced by node A, the root of the structure appended):



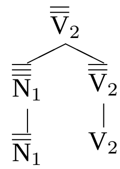

**Replace Operation** If a non-branching node X is the parent of a leaf node, then replace X and its daughter by either of the following two structures (the node X is replaced by the root of the new structure.):




As an example of this generative procedure in action, consider a derivation of the rightmost structure in (24). (Labeling is arbitrary in the application of this procedure, but we keep it consistent with (24).) We start with a tree consisting of a single node, $\overline{\overline{\overline{V}}}_2$. Applying the Add operation yields the following:

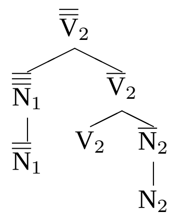
[7] A characterization of the same kind can be given for ACC-extensional structures with branching factors more than 2. The only change required is an expansion in the choice of structures available to the Add and Replace Operations.

(26)



Next, we apply the Replace operation at node $\overline{V}_2$ to yield the structure in (27).

(27)



One further application of the Add Operation at node $\overline{\overline{N}}_1$ produces the desired structure. Generating the other structures in (24) using this procedure is similarly straightforward. We refer the reader to Kuminiak (1999) for the proof that this procedure generates exactly the class of ACC-extensional structures.[8]

## 6. Divergences from $\overline{X}$-Theory

The characterization of the class of ACC-extensional structures from the last section points to a couple of structural configurations that are not usually taken to be licensed by $\overline{X}$-theory. In this section, we briefly consider these configurations along with their linguistic import. We conclude with a suggestion on how the link between ACC-extensionality and $\overline{X}$-theory could, if desired, be tightened.

As seen in the rightmost structure in (24), ACC-extensionality allows for the presence of a single non-branching node immediately above an X-bar schema in the specifier position. The ACC relation for that structure is given below in tabular form, so that the reader can easily confirm ACC-extensionality.

(28)

| | $V_1$ | $\overline{V}_1$ | $N_1$ | $\overline{N}_1$ | $\overline{\overline{N}}_1$ | $\overline{\overline{\overline{N}}}_1$ |
|---|---|---|---|---|---|---|
| ACCs | | $N_1$ | | $V_1$ | | $V_2,\overline{N}_2,N_2$ |
| ACCed by | $\overline{N}_1,\overline{V}_2$ | $\overline{V}_2$ | $\overline{V}_1,\overline{V}_2$ | $\overline{V}_2$ | $\overline{V}_2$ | |

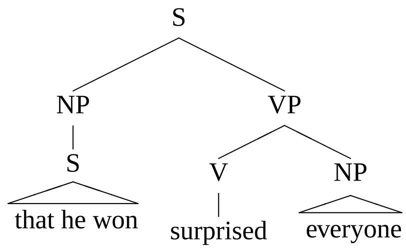
| | $V_2$ | $\overline{V}_2$ | $\overline{\overline{V}}_2$ | $N_2$ | $\overline{N}_2$ |
|---|---|---|---|---|---|
| ACCs | $N_2$ | $V_1,\overline{V}_1,N_1,\overline{N}_1,\overline{\overline{N}}_1$ | | | |
| ACCed by | $\overline{\overline{\overline{N}}}_1$ | | | $\overline{\overline{\overline{N}}}_1,V_2$ | $\overline{\overline{\overline{N}}}_1$ |

Such non-branching specifiers, while not in current use, have been exploited at an early stage of theoretical development. In particular, sentential subjects were argued to have NP over S structure, as in the following representation:

[8] Kuminiak shows that the set of ACC-extensional structures is also characterized as those structures obeying the following two properties:

(i) No two leaf nodes are sisters.
(ii) Any node that has no sisters must either be a leaf or else have at least 2 daughters that themselves have daughters.

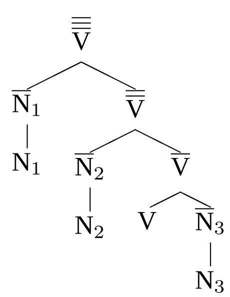
(29)




Such structures were motivated by the fact that these sentential subjects exhibit the external distribution of NPs, taking part in raising, passive, etc. If we take seriously the idea that ACC-extensionality characterizes syntactically relevant tree structures, we might conclude that this old analysis ought to be dusted off.

A second place in which ACC-extensionality divergence from $\overline{\text{X}}$-theory as it is currently understood (in which XP = $\overline{\overline{\text{X}}}$) is its tolerance of additional levels of projection. Thus, the following structure is ACC-extensional:

(30)

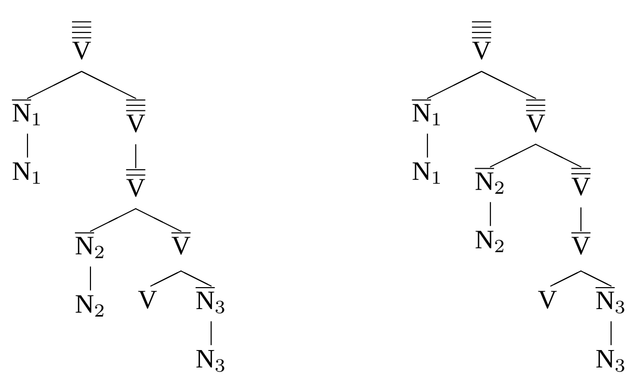


$$\text{ACC}=\{(\overline{\overline{V}},N_1),(\overline{N}_1,\overline{V}),(\overline{N}_1,V),(\overline{N}_1,\overline{N}_2),(\overline{N}_1,N_2),(\overline{N}_1,\overline{N}_3),(\overline{N}_1,N_3),(\overline{N}_2,V),(\overline{N}_2,\overline{N}_3),(\overline{N}_2,N_3),(\overline{V},N_2),(V,N_3)\}$$

Such additional layers of projection have in fact been exploited in much recent work, under the guise of multiple, iterated specifiers. (Note that local totality rules out multiple specifiers at a single level.) Thus we can conclude that this consequence of ACC-extensionality is a welcome one.

In addition to structures like (30), ACC-extensionality also tolerates structures in which a chain of two non-branching nodes occurs between such multiple specifiers as in the structure on the left of (31), though not below the lowest specifier as in the structure on the right.

(31)



In the right structure, $\overline{V}$ and $\overline{N}_3$ are not distinguished by their ACC profile as neither ACCs anything but both are ACCed by $\overline{N}_1$ and $\overline{N}_2$. This leads us to expect that inner specifiers will in general be especially tightly linked to the head, in a way that is distinct from the relation between the head and other specifiers. A certain amount of empirical evidence shows that this is borne out.

The Japanese multiple subject construction has often been analyzed as involving multiple specifiers of a single clausal projection. In the standard language, all such subjects are uniformly marked with nominative case:

(32) Nippon-ga otoko-ga zyumyoo-**ga** nagai (Standard Japanese)
Japan-nom man-nom life span-nom long
'It is Japan in which men's life span is long.'

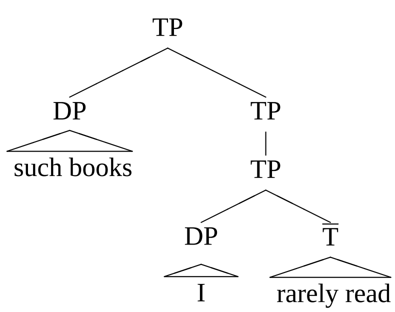
Koizumi (1995, pp.161-3), citing examples from Yoshimura (1992), points out that in Kumamoto Japanese, the innermost subject/specifier is distinctively case marked.

(33) Nippon-ga otoko-ga zyumyoo-**no** nanka (Kumamoto Japanese)
Japan-nom man-nom life span-gen long

We interpret this fact as suggesting that the inner specifier establishes a distinct type of relation with the head from the other specifiers. Data from honorific agreement points to the same conclusion.

Data from English provide evidence that inner specifiers must not be "distant" from the head, in the sense of the structures in (31). Suppose that topicalized elements are attached as distant specifiers, with the non-branching node below the topicalized element the structural correlate of the characteristic intonation contour and discourse function.

(34)




Let us assume that a phrase cannot occupy multiple specifier positions of the same projection. From this, the impossibility of a "structural gap" below the lowest specifier leads us to predict a difference in acceptability between object and subject topicalization (Prince, 1998), as topicalization of the subject would leave nothing to fill the inner specifier.

(35) a. THAT BOOK, I can't ever find the time to read.
b. ??? THAT BOOK, is much too difficult to read.

In support of the claim that local topicalization of subjects is impossible, Lasnik and Saito (1992, pp.110-1) note the contrast between the examples in (36) and (37). In the examples in (36), topicalization allows the object to escape (at least marginally) a local binding domain or avoid subject condition effects. No analogous increase in acceptability is possible with subjects, as seen in (37), suggesting that the subjects in (37) cannot occupy the same structural position as the objects in (36).

(36) a. $\text{John}_i$ thinks that $\text{himself}_i$, Mary likes.
b. ?? Which athletes do you think that pictures of, Mary bought?

(37) a. * $\text{John}_i$ thinks that $\text{himself}_i$, likes Mary.
b. ?* Which athletes do you think that pictures of, are on sale?

This line of analysis correctly predicts that left dislocation of a subject should be unproblematic, since a pronoun could be left in the inner specifier position. Prince (1998, pp.295-6) indeed suggests that speakers sometimes use such left dislocation structures in discourse contexts appropriate for topicalization, as in the following example:

(38) "Lucky for Cap, Ike was easygoing and soon went away, while **the shah—he kept coming back**." (Wall Street Journal, 2112.arg)

This suggests an analogy between resumptive pronouns that are inserted in order to amnesty island violations and pronouns that are inserted in an inner specifier position to avoid a violation of ACC-extensionality.

If one takes the possibility of the structures described in this section to be empirically undesirable, it is possible to further restrict the structures so that these peculiarities are eliminated. One natural way to do this involves a strengthening of extensionality that we call *left extensionality*. Left extensionality requires that no two nodes be ACCed by the same set of nodes (which we label the ACCers of a node).[9]

(39) *Left extensionality of ACC*: $\forall x, y[\forall z(z\text{ACC}x \leftrightarrow z\text{ACC}y) \rightarrow x = y]$
Or alternatively: $\forall x, y[\text{ACCers}(x) = \text{ACCers}(y) \rightarrow x = y]$

Left extensionality as stated is, however, too strong as any two sister nodes will always have the same ACCers. We can, however, weaken left extensionality so that it allows no group of 3 nodes to have the same set of ACCers.

(40) $\forall x, y, z[(\text{ACCers}(x) = \text{ACCers}(y) = \text{ACCers}(z) \neq \emptyset) \rightarrow (x = y \vee y = z \vee z = x)]$

Condition (40) together with ACC-extensionality eliminates non-branching specifiers of the sort depicted in (28) as well as non-branching structures between multiple specifiers, as in (31), though does not affect branching multiple specifiers or the structures from section 3.. (In (28), nodes $\overline{\text{W}}$ and $\overline{\text{Y}}$ and $\overline{\overline{\text{Y}}}$ are ACCed by the same set of nodes – namely, the node $\overline{\text{X}}$. In (31), it is V, $\overline{\text{N}}_3$ and $\overline{\text{V}}$.) Together with extensionality, then, (40) yields an even tighter match between X-bar structures and those definable with ACC.

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[9]Compare this with extensionality in (8), which allows identical ACCers so long as the nodes are distinguished by what they ACC.

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Department of Cognitive Science
Johns Hopkins University
3400 N. Charles Street
Baltimore, MD 21218

rfrank@cogsci.jhu.edu
fero@cogsci.jhu.edu