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Noncyclic Operations and the LCA in a Derivational Theory

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In *A Derivational Approach to Syntactic Relations* (*DASR*), Epstein et al. (1998) present a derivational theory of syntax incorporating no levels of representation. The aim of *DASR* is to ''advance the hypothesis that the structure building rules Merge and Move (Chomsky 1994) naturally express all syntactically significant relations'' (*DASR:*3). Chapter 5 of *DASR* deduces the ill-formedness of noncyclic concatenation from assumptions needed independently to maintain such an approach to syntactic relations. However, another section of *DASR* (section 2.4) presents a derivational analysis of several binding phenomena that relies crucially on the noncyclic application of Merge. Thus, *DASR* appears to make contradictory assumptions. In section 1 I review *DASR*'s deduction of the ill-formedness of noncyclic applications of concatenation, discussing the Merge/Move algorithm and Kayne's (1994) Linear Correspondence Axiom (LCA) in turn. In section 2 I examine some binding phenomena and the *DASR* account of them. In section 3 I clarify the incompatibility between the *DASR* account of

I am grateful to Diana Cresti and Christina Tortora for helpful discussion and to two anonymous *LI* reviewers for their insightful comments. I am particularly indebted, however, to Sam Epstein for his patience, encouragement, and invaluable comments on earlier versions of this squib. All remaining mistakes are my own.

the prohibition on noncyclic concatenation and the *DASR* account of the binding phenomena discussed in section 2.[1]

1 The *DASR* Model: Concatenation and the LCA

Before we consider the *DASR* approach to excluding noncyclic operations, it is necessary to specify some general assumptions. *DASR* assumes that there are no levels of representation: a fortiori, that there are no levels of representation at which interpretation can take place. Rather, all relations necessary for interpretation are established by transformational operations applying iteratively within the derivation, whereas interpretation (semantic and phonological) is performed on the output of each transformational operation. More specifically, all syntactic relations (particularly c-command) derive from the application of concatenation, which is, informally, the minimal syntactic operation taking A and B and putting them together to form a constituent C. Binary concatenation is a property shared by both Merge and Move (see Kitahara 1995).

(1) *Merge*
Applied to two objects A and B, Merge forms the new object C by concatenating A and B.

(2) *Move*
Applied to the category C with K and α, Move forms the new object C′ by concatenating α and K. This operation, if noncyclic,[2] replaces K in C by L = {g, {α, K}}. (*DASR:*61)

Given these definitions, the derivational definition of c-command is stated as in (3).

(3) *C-command*
X c-commands all and only the terms of the category Y with which X was concatenated by Merge or Move in the course of the derivation.

(4) *Term*
L is a term of K iff
a. L = K, or
b. L is a term of a category concatenated to form K. (*DASR:* 61–62)

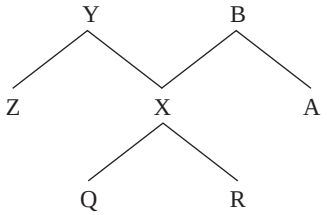
Chapter 5 of *DASR* demonstrates how noncyclic operations are precluded, given that the output of noncyclic concatenation cannot

[1] For a discussion of similar issues in a different framework see Uriagereka 1998.

[2] I assume that *cyclic* operations are those that conform to the Extension Condition proposed in Chomsky 1995. Informally, this condition states that every application of a structure-building operation must target and ''extend'' the *root* node. This definition is not really at issue, however, since this squib discusses a reduction of the cycle to the LCA.

(under a strict derivational interpretation of (4)) be reinserted into the object whose term entered into the operation. *DASR*'s assumptions about noncyclic concatenation are best illustrated by (5).

(5) *DASR's assumption about the output of noncyclic merger of X + A, yielding B: No reinsertion of B (order irrelevant)* (*DASR:*146)



In (5) X and A concatenate noncyclically—that is, after X (X = {X{Q, R}}) and Z were concatenated to form Y. Under the analysis of Merge/Move presented in chapter 5 of *DASR,* the output of the operation (i.e., the projected term B) is not ''reinserted'' into the already created syntactic object (with B immediately dominated by Y, and immediately dominating A and X). Such reinsertion, which is standardly assumed (as in (2)), would destroy the immediate dominance relation between X and Y in (5) and replace it with a new one. This is contrary to the derivational method wherein the syntactic relations into which a term T enters are established only at the point at which T is introduced into a position P. Consequently, under the *DASR* analysis of (5), neither A (the category ''added'') nor B (the category projected) is a term (see (4)) of Y, and thus neither plays a role in computing Y's compositional structure. Given this, such outputs of noncyclic concatenation as (5) are excluded in *DASR* by appeal to the independently motivated LCA, with c-command reinterpreted derivationally.

Thus, in chapter 5 the authors of *DASR* reformulate the LCA, rendering it compatible with their derivational theory. In essence, the LCA states that there is some relation that maps the terminals of a hierarchical phrase structure into a linear ordering, where a linear ordering has the following defining properties (Kayne 1994:4):

(6) a. It is *transitive;* that is, $\langle x, y\rangle$ & $\langle y, z\rangle \Rightarrow \langle x, z\rangle$.
b. It is *total;* that is, for all distinct x, y, either $\langle x, y\rangle$ or $\langle y, x\rangle$.
c. It is *antisymmetric;* that is, not($\langle x, y\rangle$ & $\langle y, x\rangle$).

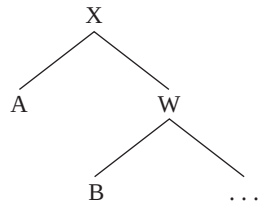
In Kayne's theory the ordered pairs necessary to constitute a linear ordering are read off hierarchical representations through the relation asymmetric c-command. *DASR* adopts the LCA; however, since the *DASR* theory does not have recourse to levels of representation, a linear ordering of terminals must be achieved through some relation other than asymmetric c-command, which is representational. The ob-

vious candidate is derivational c-command (= (3)). Thus, the derivational formulation of the LCA reads as follows:

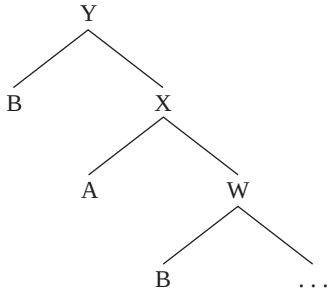
(7) *Linear Correspondence Axiom*
If X [*derivationally*, JG] c-commands Y, then the terminals in X precede the terminals in Y. (*DASR:*151)

With such a definition of the LCA, two salient problems in deriving a linear ordering could arise in the course of a derivation. First, precedence relations could violate the requirement of antisymmetry, as when an XP moves to a c-commanding position, as B does in (8).

(8) a.



b.



When A is merged with W in (8a), it is then established that A c-commands B, a term of W. By the formulation of the LCA in (7), the terminals in A precede the terminals in B; that is, ordered pairs of the form ⟨x, y⟩ (read ''x precedes y'') are formed for all x, x a terminal of A, and all y, y a terminal of B. Once B has moved (i.e., remerged with X) in (8b), it is established that B c-commands A. Thus, by the LCA, the terminals of B precede the terminals of A; that is, ordered pairs of the form ⟨y, x⟩ are formed for all y, y a terminal of B, and all x, x a terminal of A. This, however, induces a violation of antisymmetry. In other words, pairs of the form ⟨x, y⟩ and ⟨y, x⟩ are created by the movement of B in (8); informally, A c-commands B and then B c-commands A. *DASR* proposes that such contradictory inputs to the phonological component are resolved by a Precedence Resolution Principle (PRP), following work by Nunes (1995).

(9) If two (not necessarily distinct) categories symmetrically c-command each other by virtue of some syntactic operation O, ignore all c-command relations of one of the categories

to the terms of the other with respect to establishing precedence via the LCA.[3] (*DASR:*152)

Another way in which the LCA can be violated is that precedence relations can be underdetermined; that is, totality is not satisfied. This is exemplified by the noncyclic operation in (5), where Z is first merged with X (hence, Z derivationally c-commands X, Q, and R) and A is subsequently merged with X (so, A also derivationally c-commands X, Q, and R). Crucially, then, Z derivationally c-commands neither A nor B, and conversely, neither A nor B derivationally c-commands Z. Thus, no derivational c-command relation establishes an ordering of the terminals in Z with respect to the terminals in A. That is, no derivational c-command relation explicitly relates the terminals in Z to the terminals in A. This is a violation of the totality requirement on linear orderings; that is, there are no ordered pairs of the form $\langle x, y \rangle$ where x is a terminal of Z and y is a terminal of A or where x is a terminal of A and y is a terminal of Z. *DASR* proposes that such a syntactic object lacking total precedence relations among its terminals is rejected, naturally enough, at the PF interface for violating the bare output condition Full Interpretation.[4] To sum up, in chapter 5 *DASR* seeks to deduce the ill-formedness of noncyclic concatenation by eliminating reinsertion from the Merge/Move algorithm in accordance with derivational assumptions and by implementing the LCA in a derivational theory.[5]

2 The DASR Binding Theory

In this section I point out an account of certain binding phenomena in *DASR* that utilizes the application of noncyclic operations. *DASR*'s assumptions about binding-theoretic interpretation are as follows:

(10) A: If α is an anaphor, interpret it as coreferential with some c-commanding phrase in D.
B: If α is a pronominal, interpret it as disjoint from every c-commanding phrase in D.
C: If α is an R-expression, interpret it as disjoint from every c-commanding phrase.
(where D is the relevant local domain)

[3] Obviously, more needs to be said than this to guarantee that the correct copy is spelled out. See Nunes 1995 for ideas on this matter.

[4] We will see below that *DASR*'s deduction of the ill-formedness of noncyclic operations is incomplete. Not all derivations involving noncyclic operations can be ruled out as violations of the totality requirement on linear orderings.

[5] Notice that *DASR*'s LCA-based approach to excluding noncyclic operations only applies to operations that involve overt phonetic content.

(11) The application of ''disjoint'' interpretive procedures occurs at every point of the derivation, whereas the application of ''anaphoric'' interpretive procedures occurs at any single point of the derivation. (*DASR:*62)

Particularly important is (11), which makes full use of the derivationality of the *DASR* theory. A theory using a single level of representation for interpretation, like the ones proposed in Chomsky 1995 and Brody 1995, must interpret all binding relations at the sole interpretive level, namely, LF. On the other hand, *DASR*'s derivational theory forces LF to interpret the output of each transformational operation immediately after the operation is performed. Thus, binding relations are interpreted stepwise. To paraphrase (11), Conditions B and C apply to, and must be satisfied by, the output of each operation, whereas Condition A needs to be satisfied at only one particular stage in the derivation.

With this in mind, consider the following data, discussed in Freidin 1986 and Lebeaux 1988, among other works:

(12) a. Which claim [that John was asleep] was he willing to discuss?
b. Which [claim that John made] was he willing to discuss?[6]

In (12a) *John* is disjoint in reference from *he*. In (12b) *John* and *he* may corefer. *DASR* proposes to account for the difference between (12a) and (12b) without reference to copy theory or reconstruction. For *DASR*, traces (or copies) are at best a notational device employed for encoding previous stages of the derivation in an output representation and therefore should be eliminated. *DASR* assumes that the relevant difference between (12a) and (12b) is that in (12a) the phrase *that John was asleep* is a θ-related complement of N, whereas in (12b) the phrase *claim that John made* is a non-θ-related complement of D. *DASR* makes use of this distinction by assuming (13).

(13) The introduction of θ-related elements must be cyclic, whereas the introduction of non-θ-related elements can be noncyclic.

Thus, in *DASR* the derivation of (12b) creates the following syntactic object at some point:

(14) [was willing to discuss which]

A subsequent operation concatenates *he* with (14), establishing once and for all the set of categories that *he* derivationally c-commands. Crucially, at this point in the derivation *John* has not yet been intro-

[6] This relative clause cannot be considered an ''adjunct'' under any theory that adopts the LCA. The reason is that this would require right adjunction, which is prohibited by the LCA. Thus, following Kayne (1994), *DASR* proposes the following LCA-consistent relative clause structure:

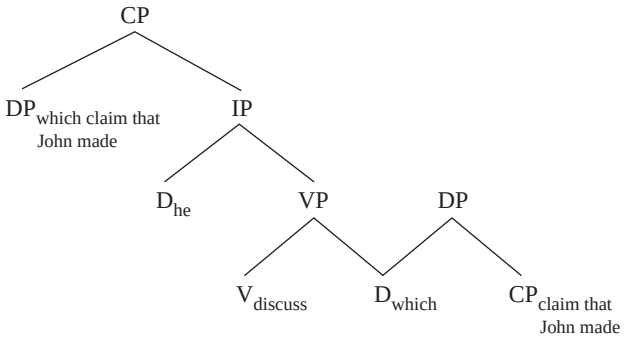
(i) $[_{DP}$ which $[_{CP}[_{NP}$ claim$]$ $[_{C'}$ that $[_{IP}$ John made (t)$]]]]$

duced. Thus, in the derivation of (12b) *he* derivationally c-commands all and only the terms of (14) and does not c-command *John*. Therefore, since no c-command relation is established from *he* to *John* (or vice versa) in the derivation of (12b), the two may be interpreted as coreferential—a correct prediction. The CP *claim that John made* now merges noncyclically with *which* in (14), projecting DP. This operation is permitted by (13). Then, *wh*-movement applies, remerging the newly projected DP as [Spec, CP] of the matrix clause. In the next section I argue that this account of (12) is inconsistent with *DASR*'s assumptions about the LCA.[7]

3 The Inconsistency

Let us now see what is inconsistent in *DASR* with respect to (12). In line with *DASR*'s assumptions about noncyclic operations, as illustrated in (5), the proposed derivation of (12b) yields the structure in (15) (irrelevant structure omitted).

(15)



Recall that *DASR* shows that a noncyclic operation violates the totality requirement imposed by the LCA (see (5)). One might argue, though, that in (15) movement of the DP into [Spec, CP] resolves the violation of totality and that the *DASR* theory therefore allows a

[7] A reviewer notes that other analyses exist that evade Condition C through other devices. Nunes (1995), for example, proposes a cyclic (i.e., Extension Condition–satisfying) derivation of (12b) that uses ''sideward'' movement. (*DASR* (see chapter 3) does not allow sideward movement.) In Nunes's analysis two separate trees are constructed: [he made which claim] & [that John made]. Next, [$_{DP}$ which claim] moves ''sideward'' and merges cyclically with [$_{CP}$ that John made]. Then, the new constituent [$_{DP}$[$_{DP}$ which claim] [that John made]] (an adjunction structure) is merged into [Spec, CP]. *He* never c-commands *John* and Condition C is not violated. There are problems, however: (a) Nunes leaves open the question of how the adjunct is ordered (see footnote 6). (b) To satisfy cyclicity, Nunes merges the relative CP at the DP level (i.e., above the determiner). This causes problems for the compositional semantics. (c) Nunes's ''sideward'' approach will not extend to (16b): to escape Condition C, the relative CP is forced to adjoin noncyclically to a DP contained in the *wh*-phrase. Thus, Nunes's analysis must also confront the problems of noncyclic operations.

derivation of (12b) that both satisfies the LCA and escapes a Condition C violation.[8] And, in fact, it is the case that totality is not violated in the derivation represented by (15). For example, although *he* (= Z in (5)) does not derivationally c-command the original position of the DP (= A in (5)), once the DP has moved into [Spec, CP], a c-command relation is established from DP to *he.* Thus, there is in fact a relation between *he* and the terminals of the DP, satisfying the totality requirement on linear orderings. Note, however, that now there is nonetheless a violation of antisymmetry: *he* c-commands and thereby precedes *which,* by virtue of having been merged with a category of which *which* is a term. Similarly, *which* precedes *he,* by virtue of being a term of a category that c-commands *he,* namely, DP. Thus, antisymmetry is violated: ⟨he, which⟩ & ⟨which, he⟩. One might wish to say that this violation is avoided by means of the PRP (9). The PRP, though, does not apply to (15). The PRP resolves cases of symmetric *c-command.* In (15) no symmetric c-command relations have been formed by the merger of DP into [Spec, CP]. The reason is clear: the moved DP does not c-command its original position (since its original position is not a term of the CP under (4)). So, for example, DP now c-commands *he;* but *he* does not c-command DP. Furthermore, the PRP does not apply with respect to *which. He* c-commands *which;* but *which,* a term of DP, does not c-command *he.* Therefore, the PRP does not apply at all in (15) and there is an unresolvable violation of antisymmetry.

One could attempt to reformulate the PRP to handle this case; but there are other problems with the *DASR* account of the contrast in (12). Specifically, (13) must be supplemented with the further stipulation that an NP is a θ-related D-complement whereas a relative clause CP is a non-θ-related D-complement. Otherwise, one might assume that all D-complements are non-θ-related. This would incorrectly allow (12a) to escape a Condition C violation by introducing the D-complement *claim that John was asleep* noncyclically.[9]

Finally, even if both of these problems are resolved, this account of (12) cannot be extended to cover the minimally different data in (16), which involve an additional embedding and exhibit the same asymmetry with respect to Condition C.

(16) a. *Which version of the claim [that $John_i$ was asleep] was he_i willing to discuss?
b. Which version of the [claim that $John_i$ made] was he_i willing to discuss?

[8] In fact, *DASR* makes a similar argument (pp. 73ff.), claiming that movement has rendered the trace ''phonetically irrelevant,'' as a reviewer notes. However, traces are ill-defined concepts in *DASR,* and the PRP, which I will show does not apply here, is the device that generally prevents the lower position of a moved element from being pronounced.

[9] This argument was suggested to me by an anonymous reviewer. Note, however, that this argument applies not just to *DASR* but to any theory that adopts such a structure for restrictive relatives.

Consider a derivation of (16b). Whatever principle guarantees that *claim that John was asleep* is introduced cyclically in (12a) also guarantees that *version* is introduced cyclically as the complement of *which* in the derivation of (16b). Furthermore, (13) guarantees that *the*, an argument of *version*, is introduced cyclically. Thus, in order for (16b) to escape a Condition C violation, the relative clause *claim that John made* must merge with *the* noncyclically, crucially after *he* has merged into the subject position. Notice that in the course of this derivation no c-command relations, and therefore no precedence relations (see (7)), are established from *which* to the terms of the relative clause (or vice versa). Therefore, even if the DP, *which version of the claim that John made*, merges into [Spec, CP] and antisymmetry is not violated, there is still a violation of the totality requirement on linear orderings internal to the DP.[10]

4 Conclusion

In sum, an inconsistency exists in *DASR* concerning noncyclic operations. This inconsistency makes clear a consequence, noted by Chomsky (2000:138), of adopting both a completely derivational theory and the LCA:

> (17) Combined with Kayne's Linear Correspondence Axiom (Kayne 1994) . . . the derivational approach entails that the Extension Condition is inviolable.

In a theory that makes use of levels of representation, the cycle can be circumvented by stipulation without further consequences with respect to the LCA. This is so in the case of noncyclic concatenation, for example, since the representation formed through reinsertion will satisfy the representational version of the LCA. By contrast, *DASR*'s derivational approach to c-command and its dynamic perspective on interpretation (attractively) prevent similar appeal to stipulation. That is, the close link in *DASR* between the relations that a term T enters into in position P and the point at which T is introduced into P ensures that the noncyclic introduction of a term will produce a set of relations that violates the LCA, derivationally construed. As argued here, this leads to a serious empirical problem, stemming from an unnoted inconsistency in *DASR*.

The theory presented in *DASR* makes significant advances in the explanation of syntactic relations by showing how these might be deduced from independently motivated ''virtually conceptually necessary'' structure-building operations. Much, however, is left to further

[10] Another argument against the derivation in (15) has been suggested to me by Samuel Epstein (personal communication). In chapter 3 of *DASR* the effects of the Proper Binding Condition (PBC) are derived from *DASR*'s assumptions about feature checking. Thus, the PBC, as a corollary of the *DASR* theory, rules out the derivation in (15), since the DP in [Spec, CP] does not c-command its original position, as noted above.

research. It was the intent of this squib to reveal one particularly thorny and exciting area to be explored.

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Indefinites and Choice Functions

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1 Introduction

The idea of analyzing indefinites with the help of choice functions is not new; it even has a venerable tradition in mathematical logic (see von Heusinger 1997 for details). What is new is the claim that, with the help of choice functions, specific indefinites can be interpreted without being moved about. That is, choice functions make it possible to construe specific indefinites in situ—or so it is claimed by Reinhart

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