A Note on Heads and the Linear Correspondance Axiom

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1. According to the Linear Correspondence Axiom (LCA), asymmetric c-command between nonterminal nodes maps into a linear order of the terminal nodes. As Kayne (1994) has shown, various properties of phrase structure that are stipulated by X-bar-theory can be derived from the LCA. Further, Kayne (1994) has noted that the LCA excludes the coordination of heads. Consider the structure in (1).

\[(1) \quad [_{\text{ ConjP}} X \ [_{\text{ ConjP}} \text{ Conj Y}]]\]

The structure in (1) is excluded, since the coordinating conjunction Conj and the head Y symmetrically c-command each other, and hence no relative order is specified between the terminals that are dominated by these heads. The conclusion that coordination of heads is impossible is probably a desirable result, since on the assumption that a clitic is a head, it would follow immediately that clitics cannot be coordinated:

\[(2) \quad *\text{ Je } [\text{ le } [\text{ et } \text{ la}]] \text{ vois souvent.}\]
\[\text{ I him and her see often}\]

Kayne (1994:61) notes however that "if [...] the LCA applies to all representations, then it must be the case that a clitic does not originate as a pure head that is the complement of the verb [as in (3a)], but rather as a subpart of the complement, as in ([3b])".

\[(3) \quad \begin{align*}
&\quad \quad \text{ a. } \quad \ldots \text{ V } [_{\text{ dp clitic}}] \\
&\quad \quad \text{ b. } \quad \ldots \text{ V } [_{\text{ dp clitic}}] \ [_{\text{ fp pro}}]
\end{align*}\]

If the clitic indeed originates as the determiner of a complex phrase, it is no longer immediately clear why coordination of clitics is impossible. I will therefore follow Chomsky (1995) that clitics do not originate as the head of a complex phrase.

2. Chomsky (1995) suggests that traces are not subject to the LCA. If this is indeed true, the structure in (3a) can be saved by adjoining the clitic to the verb, as in (4):

\[(4) \quad \begin{array}{c}
\text{VP} \\
\text{V} \quad t_1 \\
\text{CL}_1 \text{ V}
\end{array}\]

According to Kayne's (1994) definition of c-command in (5):

\[(5) \quad X \text{ c-commands } Y \text{ iff (i) } X \text{ and } Y \text{ are categories, (ii) } X \text{ excludes } Y \text{ (where } X \text{ excludes } Y \text{ iff no segment of } X \text{ dominates } Y), \text{ and (iii) every category that dominates } X \text{ dominates } Y,\]

the verb V does not c-command the clitic CL in (4), since it includes it. CL, on the other hand, does c-command V, since the first category that dominates CL (= VP) also dominates V. Hence, CL asymmetrically c-commands V, which gives rise to the order of terminals <clitic,v>.
Similarly, the structure in (1) can be saved by adjoining Y to Conj, as in (6). As a result, Y asymmetrically c-commands Conj, which gives rise to the order of terminals \( <y,conj> \).

\[\text{(6)}\]

\[
\begin{array}{c}
\text{ConjP} \\
\text{X ConjP} \\
\text{|} \\
\text{x Conj} \\
\text{|} \\
\text{Y Conj} \\
\text{|} \\
\text{y conj}
\end{array}
\]

Since X asymmetrically c-commands both Y and Conj, the structure in (6) seems to be in accordance with the LCA, so long as the trace does not count.

3. According to Kayne (1994:section 3.7), a head cannot function as a specifier, which would still exclude the structure in (6). This restriction follows from the assumption that "the highest element of a chain of heads must have a specifier, in the sense of having a phrase that asymmetrically c-commands it within its maximal projection (or within the maximal projection of the head it is adjoined to)\(^\text{a}\), which is merely a stipulation. It must be noted however that the unacceptability of (6) would also follow from the fact that structures such as (6) are always embedded in a larger structure: (6) occurs as the complement of a head Z or as the specifier of a complex phrase ZP. It can be shown easily that this does not give rise to a linear order. Consider the structure in (7), in which (6) is the complement of a verb.

\[\text{(7)}\]

\[
\begin{array}{c}
\text{VP} \\
\text{V ConjP} \\
\text{|} \\
\text{v X ConjP} \\
\text{|} \\
\text{x Conj} \\
\text{|} \\
\text{Y Conj} \\
\text{|} \\
\text{y conj}
\end{array}
\]

In (7), V and X symmetrically c-command each other, since both heads are immediately dominated by the category VP. As a result, no order is specified between v and x. Since the order is not total, the structure is illicit.

Next, consider the structure in (8), in which the structure in (6) acts as the specifier of VP.
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(8)

\[
\begin{array}{c}
FP \\
\begin{array}{c}
F \\
\mid \begin{array}{c}
\text{ConjP} \\
\mid \begin{array}{c}
X \\
\mid \begin{array}{c}
\text{Conj} \\
\mid \begin{array}{c}
Y_1 \\
\mid \begin{array}{c}
y \text{ conj}
\end{array}
\end{array}
\end{array}
\end{array}
\end{array}
\end{array}
\end{array}
\]

The problem that arises is that in (8) X and the first functional head above VP (= F) c-command each other. As a result, no order is specified between f and x, and the structure is illicit. The same result would arise if ConjP is not a specifier but an adjunct to VP. (Note that if each root clause has an abstract beginning node A (cf. Kayne 1994:section 4.3), the same result arises if ConjP is an adjunct or a specifier of the root phrase.)

If the ConjP were adjoined to a higher head Z, as in (9), the structure is illicit, too. Since the structure in (9) cannot be base-generated, it must be the result of movement of ConjP from out of WP, the complement of Z (unless ConjP = WP, a case to which we will return in section 7). Since ConjP asymmetrically c-command everything dominated by WP, the terminals dominated by ConjP should precede the terminals dominated by WP. However, since WP also asymmetrically dominates Conjug and Y (and the trace), the terminals dominated by WP must also precede the terminals dominated by Conj and Y. Consequently, the order is not antisymetric.

(9)

\[
\begin{array}{c}
ZP \\
\begin{array}{c}
Z \\
\mid \begin{array}{c}
\text{ConjP} \\
\mid \begin{array}{c}
X \\
\mid \begin{array}{c}
\text{Conj} \\
\mid \begin{array}{c}
Y_1 \\
\mid \begin{array}{c}
y \text{ conj}
\end{array}
\end{array}
\end{array}
\end{array}
\end{array}
\end{array}
\end{array}
\]

Recall from the discussion of (3) and (4) above, that the structure in (7) would also be illicit if the complement of V is not a complex ConjP but a simple head. Of course, this is a desirable result, since this accounts for the fact that object clitics must be moved. Note that something similar is true if we replace the complex ConjP in (8) by a simple head X, as in (10). In (10), F and X symmetrically c-command each other and consequently no order between f and x is specified. As in (8), the same result would arise.
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if X is not a specifier of VP but an adjunct (which implies that adjunction of a head to a maximal projection is excluded, contrary to what is claimed in Chomsky 1995).

\[ (10) \]

\[
\text{FP} \\
\text{F} \\
\text{VP} \\
\text{X} \\
\text{VP} \\
\text{X} \\
\]

Consequently, it follows as a theorem of the LCA that a head must be adjoined to some higher head not only if it is generated in complement position, but also if it is generated in specifier (or adjunct) position. This indicates that the obligatoriness of movement of clitics can be completely reduced to the LCA, provided that they are not generated as the head of a functional projection but as a head in a regular argument position.

4. The fact that the structures in (7) and (8) do not give rise to a linear order is still not sufficient to exclude coordination of heads. Since traces do not count for the LCA, these structures can in principle be saved by applying further movement that destroys the symmetric c-command relations. This can be done in two ways, viz. (i) by moving the verb V or the functional head F to a higher functional projection or (ii) by adjoining X to V or F. Consequently, if we want to maintain the conclusion that heads cannot be coordinated, saving the structures in (7) and (8) in these ways must be excluded.

5. The first option (moving V/F to a higher functional head) can be excluded in the following way. Assume that phrase structures are build by means of GT* (= GT and Move α), and that the LCA applies to all substructures: if a substructure does not give rise to a linear order, an operation REPAIR must apply immediately (i.e., before the subsequent application of GT*). Since movement of V/F can apply only if the structures in (7) and (8) are part of a larger structure created by GT*, REPAIR would not be satisfied by this option.

Note that REPAIR is in accordance with Kayne's (1994) assumption that the LCA applies throughout the grammar but that it is not compatible with Chomsky's (1995) assumption that the LCA applies only in the morphology (i.e., in the PF—wing of the grammar). Provided that we adopt Kayne's position, the present formulation of REPAIR would however be consistent with Chomsky's (1995:432) "basic assumption about reference sets [...] that they are [...] determined step-wise".

If we want to maintain that the phrase structures created in overt syntax are binary branching (without explicitly building this into some operation of the grammar such as GT*), it is clear that Chomsky's assumption about the locus of application of the LCA must be given up. Consider (11).

\[ (11) \]

\[
_{v p} \text{ put } [_{n p} \text{ the book} ] [_{p p} \text{ on the shelf}] \\
\]

In (11), we are dealing with a trinary branching VP: the verb takes both the NP and the VP as its sister. The structure in (11) would give rise to a contradictory order, since NP asymmetrically c−commands the nonterminal nodes dominated by PP and PP
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asymmetrically c–commands the nonterminal nodes dominated by NP. However, if traces
do not count for the LCA, the structure can be saved by moving NP into SpecAgr,P.
Thus, if the application of the LCA is restricted to the PF–wing of the grammar, we
cannot block the structure in (11) by means of the LCA only.

If we assume REPAIR, the structure in (11) can only be saved by applying some
operation to the structure in (11) as such. One option would be adjunction of NP to VP,
as in (12).

(12) [VP [NP the book], [VP put t1 [PP on the shelf]]]

Although the structure in (12) does give rise to a linear order (the PP does no longer
asymmetrically c–command the nodes dominated by NP), it is blocked for other reasons.
If we assume that the external argument of put must be adjoined to the structure in (12),
too, we would be dealing with multiple adjunction to VP, and a contradictory linear
order (which cannot be repaired by an additional adjunction operation) would arise again.
If we assume that the structure in (12) is a Larsonian VP–shell, the structure in (12)
would be blocked by considerations of economy: (12) violates the "fewest steps"
requirement, since we could also have generated the NP as the specifier of the VP–shell
immediately.

6. The second option (adjoining X to V/F) is probably blocked by Checking Theory.
Since the specifier and complement of VP have N–features, they must be moved into the
checking domain of an Agr–head. If the ConjP is split before entering the local domain
of Agr, it might be the case that checking the N–features is no longer possible. Compare
the following parallel case of wh–movement: if the wh-phrase is split, its [+wh]-feature
can apparently not be checked.

(13) *Which boy, did you see [ConJP t1 [ConJP and which girl] yesterday

7. So far, there is only one problem left. Consider again the structure in (9), in which
ConJP is adjoined to a higher head Z. As we have already discussed, this structure is
excluded if ConJP originates in a position dominated by WP, since this would give rise
to a conflicting order. The structure is licit, however, if ConJP = WP, e.g. if (9) is
derived from the structure in (7), repeated here for convenience as (14).

(14)

```
      VP
     /   \
V     ConjP
   /     \
X     ConjP
  /     \
Conj t1
 /     \nX     Conj
 /     \nY1    Conj
 /     \ny    conj
```
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As we have seen in section 3, the problem with respect to (14) is that V and X c-command each other, and hence that the order is not total. We can exclude the operation that creates (9) by assuming an economy condition LEAST CATEGORY that requires that REPAIR (or rather: MOVE in general) select the smallest category possible. In other words, LEAST CATEGORY forces allows REPAIR to adjoin the first conjunct X to V, but excludes adjunction of the complete ConJP to V. As a result, the derivation crashes for the reason indicated in section 6. Note that LEAST CATEGORY cannot be overridden for convergence, given the "basic assumption about reference sets [...] that they are [...] determined step-wise" (cf. section 5).

The economy condition LEAST CATEGORY receives support from various facts in Kayne (1994). Consider the examples (15a,b), which Kayne assigns the base structure in (15c).

(15) a. John collided with Bill  
b. *John with Bill collided  
c. [IP spec I [... collided [ConJP John [ConIP with Bill]]]

According to Kayne, the NP Bill is assigned Case by the conjunction with, but Infl must check the case of the NP John. John must therefore asymmetrically c-command (or, which would be equivalent, be in the checking domain of) Infl. This could be obtained by moving either just the NP John or the complete ConJP John with Bill into SpecIP, as in (15a) and (15b), respectively. LEAST CATEGORY provides an explanation for the impossibility of the latter (cf. Kayne 1994:64 for various parallel cases).

Similarly, LEAST CATEGORY may provide an account for the judgments on the examples in (16a,b). Kayne explicitly relates the unacceptability of (16a) to the fact that English allows for preposition stranding, which amounts to saying that wh-movement as in (16a) is blocked by the fact that wh-movement in (16b) involves a smaller category.

(16) a. *We want to know about what you're thinking  
b. We want to know what you’re thinking about

Of course, LEAST CATEGORY can be overridden for convergence at PF in these cases, i.e., if overt movement of the wh-element is excluded, Pied Piping will apply. This accounts for the fact that languages that do not allow for preposition stranding do have (16a), and for the fact that English allows for (17b).

(17) a. *We know who those are [t₁'s articles]  
b. We know [whose articles], those are t₁

8. REPAIR predicts the correct order of the clitics, at least in far as the object and the subject are concerned. If GT* forms [vp V Cl₁], REPAIR requires that the clitic Cl₁ be adjoined to V before GT* applies again. Thus, Cl₁-V is formed. Subsequently, GT* may form the structure [vp Cl₁ [vp Cl₁-V]], which is in accordance with the LCA. The next application of GT* creates [fp F [vp Cl₁ [vp Cl₁-V]]]. This structure is again not in accordance with the LCA, but can be repaired by movement of Cl₁-V to F, and adjunction of Cl₁ to the cluster Cl₁-V-F thus formed.

Assuming that adjunction is free, three possibilities arise in principle: (i) Cl₁ adjoins to F, (ii) Cl₁ adjoins to V, or (iii) Cl₁ adjoins to Cl₁. The first two options are
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excluded by the LCA, since these would involve multiple head–adjunction: V is already adjoined to F, and Cl₁ is already adjoined to V. This leaves us with the third option, given in (18). The structure in (18) satisfies the LCA, and since Cl₁ is included in F, V and Cl₁ it is able to c-command its trace, thus satisfying the antecedent-“government” requirement.

(18)

\[
\begin{array}{c}
F \\
V \\
\text{Cl}_1 \\
\text{Cl}_0
\end{array}
\]

9. The analysis given in the previous section is not incompatible with Kayne’s (1994) claim that, in at least some instances, clitics adjoin to separate functional heads, if we allow for excorporation of the adjoined clitics. The linear order of the subject and object clitics can be preserved by assuming that the antecedent-“government” requirement must be satisfied at LF: Cl₁ must in that case end up higher than Cl₀, which contains its trace.

10. In this squib, I have demonstrated that coordination of heads can be excluded, even if it is assumed that traces are not relevant for the LCA. Further, I have provided evidence that the LCA applies throughout the grammar and may trigger the application of an adjunction operation REPAIR. Further, the economy condition LEAST CATEGORY has been introduced, according to which movement affects the smallest category possible only.

References

