Our linearization scheme:

1. Constraints on a Linearization Algorithm
   a. If \( x < y \) and \( y < z \), then \( x < z \). (it's Transitive).
   b. For all distinct terminals \( x \) and \( y \) in a phrase marker, either \( x < y \) or \( y < x \). (it's total).
   c. not \( (x<y \text{ and } y<x) \) (it's antisymmetric).

2. a. \( \alpha \) c-commands \( \beta \) iff every phrase that dominates \( \alpha \) dominates \( \beta \), and \( \alpha \) does not include \( \beta \).
   b. \( \alpha \) asymmetrically c-commands \( \beta \) iff \( \alpha \) c-commands \( \beta \), and \( \beta \) does not c-command \( \alpha \).
   c. \( d(X) = \text{def. the set of all terminals dominated by } X. \)
   d. \( d((X, Y)) = \text{def. the set of all ordered pairs } (x, y) \text{ such that } x \text{ is dominated by } X \text{ and } y \text{ is dominated by } Y. \)
   e. \( d((X_1, Y_1), (X_2, Y_2), \ldots, (X_n, Y_n)) = d((X_1, Y_1)) \cup d((X_2, Y_2)) \ldots \cup d((X_n, Y_n)). \)
   f. Let \( A \) be the set of all \( (X, Y) \) in some phrase marker such that \( X \) asymmetrically c-commands \( Y \), and \( X \) and \( Y \) are either maximal or minimal projections.
   g. \( d(A) \) is a linearization.

Why are we doing this? Because if we assume (3), we derive the “c-command=left" correlation.

3. \( \langle \alpha, \beta \rangle = \alpha < \beta \) (where “<" means “precedes")

This correlation has two utilities. It derives (4), if we can find a way of ensuring (5).

4. If something moves from \( a \) to \( b \), then \( b < a \).
5. If something moves from \( a \) to \( b \), then \( b \) asymmetrically c-commands \( a \).

And it derives facts about the linearization of certain scope asymmetries that we’ve looked at. For instance, it tells us why in the double object frame in (6) we get the string in (7) and not (8).

6. \[
\begin{array}{c}
\text{VP} \\
V \quad \text{XP} \\
\text{give} \quad \text{DP} \quad \text{XP} \\
\text{the child} \quad X \quad \text{DP} \\
\text{some toys}
\end{array}
\]

7. give the child some toys
8. give some toys the child

1 Word Order Variation

Let’s now address the issue of word order variation in this framework. Kayne’s view of linearization is that language variation is not found in how the linearization algorithm applies to phrase markers. Instead it is expressed in terms of whatever factors control derivations. This requires derivations for apparently head final word-orders to be fairly complex.

Let’s consider German, for example. This language is interesting because it seems to linearize its constituents in a way that is phrase specific. DP, CPs and PPs, for instance, are much as in English, with the head preceding complements (and other material). But the VPs in German are linearized very differently than in English. In finite clauses with an overt complementizer, the verbs stack up at the right-hand edge in what appears to be the mirror image of English.
(9) Sie sagte ...
   she said ...
   a. daß Johann am Dienstag Bücher kauft.
      that Johan on Tuesday books buys
      (that Johan buys books on Tuesday.)
   b. daß Johann am Dienstag Bücher gekauft hat.
      that Johan on Tuesday books bought has
      (that Johan has bought books on Tuesday.)
   c. daß Johann am Dienstag Bücher gekauft haben soll.
      that Johan on Tuesday books bought have should
      (that Johan should have bought books on Tuesday.)

In finite clauses in which the complementizer is not expressed, however, the finite verb positions itself towards the front edge of the sentence. In addition, another phrase in the sentence is positioned immediately before this verb. Which phrase is placed in initial position depends, it seems, on the topic-focus structure of the sentence. The constituent which refers to the topic of the sentence is generally put into this position. So, alongside the word-orders in (9) we find those in (10).

(10) Sie sagte ...
   she said ...
   a. Johann kauft am Dienstag Bücher.
      Johan buys on Tuesday books
      (Johan buys books on Tuesday.)
   b. Am Dienstag kauft Johann Bücher.
      on Tuesday buys Johan books
      (Johan buys books on Tuesday.)
   c. Bücher kauft Johann am Dienstag.
      books buys Johan on Tuesday
      (Johan buys books on Tuesday.)

The fact that the $C^0$ position is required to be empty for the finite verb to gravitate towards the front of the sentence led Jan Koster and Hans den Besten to propose (in separate papers in the late 1970’s) that Head Movement relocated the finite verb into $C^0$. They suggested that the topologicized phrase is moved into Specifier of CP. This word-order paradigm is known as “verb second,” as these two movements conspire to put the finite verb in second position no matter how the other constituents of the sentence are placed.

We are interested, then, in understanding how the material within VP is linearized when the effects of V2 are not at play. Let’s do this by concentrating on the word-order that arises in contexts where the complementizer is present. In these contexts what we want is a way of getting the verb to be the last item in its projection. There is one (or two) interesting exceptions to this ordering, however. When a clause is embedded within a VP, depending on the nature of that clause, it may, or must, appear to the right of the verbs. If the clause is finite, for instance, it must appear at the end of the sentence, as the contrast in (11) illustrates.

(11) a. daß Hilda gesagt hat daß Durian ist schrecklich
    that Hilda said that Durian is awful
    (that Hilda has said that Durian is awful.)
   b. * daß Hilda daß Durian ist schrecklich gesagt hat
      that Hilda that Durian is awful said has
      (that Hilda has said that Durian is awful.)

There is evidence that the clause which appears at the end of the sentence gets there by way of movement. It can come from within an embedded infinitival clause, for instance:

1 See Koster (1975) and den Besten (1983).
German VPs are not "rigidly" head-final, then.

An interesting, and perhaps relevant, fact about German is that the word-order of constituents between the complementizer and the verbs is reasonably free.

(13) a. ...weil Hilda auf den Tisch Bücher gelegt hat
   ...since Hilda has put books on the table
   ‘...since Hilda has put books on the table’

b. ...weil Hilda Bücher auf den Tisch gelegt hat
   ...since Hilda books on the table put has
   ‘...since Hilda has put books on the table’

On traditional theories, German is credited with at least two differences when compared to English:

(14) a. German VPs surface with the verbs at the end of their projection, except when there is a finite clause.

b. German has short leftwards movement of the phrases in VP: this is called “Scrambling.”

Now consider what we would have to do in Kayne’s World, where (14a) is not (easily) allowed. Imagine that we adopt a Larsonian method of organizing the complements; this would give an underlying representation like (15) to (13).

Imagine that Scrambling is obligatory, and relocates \textit{auf den Tisch} to XP, as indicated in (16).
Making Scrambling obligatory, then, has the potential of bringing all the complements to the left of the verb that selects them. Now what's necessary is to get a phrase containing the main verb to precede *hat*. This can be achieved by moving vP leftwards. Zwart (1997) argues for something along these lines, and suggests that there is a functional phrase — "Predicate Phrase" — which attracts vP to its Specifier. If Predicate Phrase is immediately above all the VPs, then movement into it will yield something like (17).

One might view this movement as another instance of obligatory Scrambling. Once the subject has merged with the projection of T, we'll get the correct word order, shown in (18).
We could achieve the word order in (13b) by letting Scrambling also apply (optionally?) to DP.

Cases that involve three verbs will require an even more complex derivational history. Here, I think it is useful to abandon Zwart's proposal that the vP moves into a specific position — Predicate Phrase — and adopt a view closer to that in Koopman and Szabolcsi (2000) or Hinterhölzl (1999) in which vP (or the verbal projection that immediately follows) moves into the “Specifier” of the selecting auxiliary verb. We might see an example like (9c) as having the derivation in (19).

(9c) … daß Johann am Dienstag Bücher gekauft haben soll.
…that Johan on Tuesday books bought have should
(…that Johan should have bought books on Tuesday.)
On this view of the verb final nature of German VPs, the surface word-order is the result of two factors:

(20)  
  a. Scrambling to XP is obligatory  
  b. Auxiliary verbs force overt movement of their complements to adjoin to them.

The derivations I’ve given haven’t always reflected (20a); I’ve left the accusative Case marked object within vP on occasion. But having these objects obligatorily Scramble is compatible with the word-orders we hope to achieve, and something of this sort is required for the PPs that originate within VP. I wonder if we might derive (20b) from our system by letting auxiliary verbs value the inflectional features on the verbs they select, and giving them a ●. We can derive the fact that the whole VP must move, and adjoin to the auxiliary verb’s projection, if we can find a way of preventing the lower verb from adjoining directly to the auxiliary verb. Perhaps German morphology does not provide a form for the result of adjoining an auxiliary verb with the verb whose features it values.
That the word-order of VPs in West Germanic, which includes German, Dutch, Afrikaans and various regional dialects, should be factored into two parts — Scrambling of arguments and movement of VPs — is supported by the observation that in some cases they seem to come apart. In Dutch, for instance, the arguments of the verb all appear to the left of the verbal complex, but the arrangement of the verbs in that complex is not rigidly head final. For instance, in some dialects, when the auxiliary verb is *have*, the participle selected by *have* may come to either the left or the right.

(21)  
   a. dat Anna hem een CD gegeven heeft  
       that Anna him a CD given has  
       (that Anna has given him a CD)  
   b. dat Anna hem een CD heeft gegeven  
       that Anna him a CD has given  
       (that Anna has given him a CD)

(21b) might have a representation like (22).
To ensure this word-order, and in particular that the accusative Case-marked object gets positioned to the left of the *heeft* (‘has’), we should see Scrambling as being obligatory for direct as well as indirect objects in this language.

Sometimes even this requirement on Scrambling seems to be modulated. In West Flemish, for instance, there are certain cases where the accusative Case-marked object appears within the string of verbs, as in (23), whose representation might be (24).

(23) da Marie Jan wilt nen boek geven
    that Marie Jan wants a book give
    (that Mary want to give Jan a book)

(24)

It’s a modulation of the requirement that things Scramble that might be responsible for the word-order that arises when there are (finite) clausal complements. These always appear to the right of the verbal cluster in German. Here we’d need a derivation that creates (25b), perhaps.

(25) a. 

\[
\text{TP} \\
\text{T} \quad \text{VP} \\
\text{V} \quad \text{vP} \\
\text{hat} \quad \text{CP} \\
\text{DP} \quad \text{vP} \\
\text{delta Hans mude ist} \quad \text{DP} \\
\text{er} \quad \text{v} \quad \text{VP} \\
\text{gesagt} \\
\]

b. 

\[
\text{TP} \\
\text{DP} \quad \text{TP} \\
\text{er} \quad \text{vP} \\
\text{V} \quad \text{vP} \\
\text{gesagt} \\
\]

The difference in these derivations, then, involves the size of the verbal phrase that moves to merge with a higher VP.

These are the sorts of derivations that would be required for the Heavy NP Shift word-orders in English as well. For instance, we might see the word-order in (26) as being achieved through the derivation indicated in (27).
The salient difference between English and the other West Germanic languages is what verbal projection moves to what verbal projection. Whereas in the "verb final" languages, I have speculated that vP moves to a projection of the auxiliary verb that selects it, in English I have speculated that VP merges to a projection of the v that selects it.

Kayne puts the burden of word order variation wholly into the set of conditions that control combinations of movement operations. I doubt that this can be employed to characterize rigidly head final phrases. Japanese and Korean VPs, for instance, show none of the word-order freedom that we saw evident in West Germanic VPs: their verbs are always final in their VPs. Moreover, unlike German or Dutch, it is not just the VPs that surface with head final word order in Korean and Japanese. The phrases appear to be head final across the board in these languages. Importantly, this is true of phrases — postpositional phrases and DPs, for instance — in which there is not evidence of complex derivational histories. Neither of these phrases have evidence for Scrambling, for instance. I suspect that this means there must be another way of getting the head final word order.

The goal of the LCA is to express a connection between asymmetric c-command and linear order. When we look just at phrases, that connection does have some empirical teeth. It accounts for a trend about moved wh-phrases. Dryer (2005b), for instance, reports only a few languages with an obligatory final position for interrogative phrases, while, out of his sample of 803 languages, 241 require that interrogative phrases be initial, and 542 optionally position interrogatives in initial position. It is responsible too for the prevalence of topics and sub-
jects coming initially in the sentences they are topics or subjects for. Of the 1344 languages sampled in Dryer (2005a), 1060 of them put that subject before the verb in canonical orders. So I want to back away from the LCA carefully, and in a way that tries to preserve that connection.

The first step I suggest we take is to drop (28).

(28) $\langle \alpha, \beta \rangle = \alpha < \beta$.

Let us maintain the connection between asymmetric c-command and a linear ordering, but let us not let that translate into precedence. Instead, let us see precedence as emerging from something else that will interpret the orderings that the LCA delivers. So, we'll adopt (29).

(29) $\langle \alpha, \beta \rangle = \{ \alpha < \beta, \beta < \alpha \}$

This will let asymmetric c-command influence linearizations, but it won't yet translate that influence into precedence. We'll look for something else to do that. I suggest that we search for output constraints that make choices between $\alpha < \beta$, and $\beta < \alpha$.

We should design these output constraints to capture word order typology. It appears that the forces that produce word order typology separate the force that positions specifiers and the force that positions heads. This is reflected, for instance, in the fact that the subject initial order seems independent of, and much more prevalent than, the verb initial order. It is also reflected in the fact that the VO/OV orderings correlate with the placement of heads in other phrases, while the subject initial or subject final position is not known to correlate with anything cross-categorial. Moreover, whether a verb follows or precedes a direct object correlates with whether that verb follows or precedes a manner adverbial, and whether that verb follows or precedes an adpositional phrase. The ordering of phrases within a VP correlates with how direct objects are ordered with respect to the verb, and not with how the subject is ordered. All of this speaks on behalf of separating how specifiers are ordered from how other phrases are ordered. (See Dryer (1992) for the evidence behind some of these claims.)

So an account of word order typology should strive to capture the two statements in (30), and to keep them independent.

(30) a. Irrespective of language, subjects tend to precede the rest of the material in their sentence.

b. Languages choose to order heads so that they either precede or follow the rest of the material in their projections.

When we consider that wh-phrases and topics also tend to come initially in their clauses, and that this does not appear to be language dependent, we can see (30a) as a special case of our asymmetric c-command=precedence correlation.

(31) a. If $\alpha$ is in the Specifier to $\beta$, then $\alpha$ precedes $\beta$.

b. Languages choose to order heads so that they either precede or follow the rest of the material in their projections.

What we need to understand is what makes Specifiers special. One idea is to define Specifiers as those positions into which phrases have moved. That would translate (31) into (32).

(32) a. Phrasal movement is leftward.

b. Languages choose to order heads so that they either precede or follow the rest of the material in their projections.

The idea that there is a constraint on movement that makes it leftwards has been suggested in the literature now and again. And that this should replace Kayne's suggestion that we find a constraint that places Specifiers on the left has been suggested in an unpublished paper by Abels and Neeleman, and by Takano (2003). The Abels and Neeleman paper reaches this conclusion by showing that replacing Kayne's LCA with a system that only embraces (32a) can correctly capture the word order typology of constituents within a nominal that Cinque (2005) examines. Their argument that a system based on (32a) is superior to one based on the LCA (which Cinque 2005 champions) amounts to observations about the discouragingly capricious constraints on movement that would be required of the LCA account.

Takano (2003) has a more direct argument on behalf of an account based on (32). His argument involves the contrast between (33) and (34).

(33) a. Jay tells jokes with any gusto only occasionally.

b. John paints pictures at all well only rarely.

(34) a. * John paints at all well none of the pictures which he sends to this gallery.

b. * Jay tells with any gusto none of the standard jokes about a duck in a hat.

The NPIs in (33) are licensed by being in the scope of the phrases that follow them. But the NPIs in (34) are not. The phrases that follow the NPIs in (33) are base-generated there, whereas the phrases that follow the NPIs in (34) are moved there.
This contrast has an explanation if movement is always leftwards. The examples in (34), but not the examples in (33), will be required to have a derivation like that sketched in (35).

(35) a. 

```
  μP
  /
  μP
   /  
DP    μP
```

none of the standard jokes about a duck in a hat

```
  μ
  /
  μP
   /  
VP    μP
```

with any gusto

```
  VP
  /
  PP
```

b. 

```
  μP
  /
  μP
   /  
VP    μP
```

none of the standard jokes about a duck in a hat

```
  VP
  /
  μP
   /  
```

paints

```
  V
```

paints with any gusto

If the licensing condition on NPIs looks only at the output of the transformational component, (34) will not have a licensing environment.

For these reasons, I'll adopt the characterization of word order trends in (32). To express the leftwardness of moved phrases, let us provisionally adopt the stipulation in (39d).

(36) If α moves and merges to β, then the left edges of d(β) and d(α) must align.

(37) If α immediately contains β, and α is not a projection of β, then the left, or right, edges of d(β) and d(α) must align.

I’ve adopted the view the relevant output conditions take the form of alignment constraints, following Grimshaw (1997). Now we can re-engineer Kayne’s system to take into account the effects of (39d) and (39e).

(38) Revised LCA

a. Let A be a set of ordered pairs, (X,Y), such that X asymmetrically c-commands Y in a phrase marker.

b. d(A) is a linearization.

(39) Well-Formedness Conditions on a linearization for x, y, z distinct terminals:

a. If x < y and y < z, then x < z. (Transitivity).

b. For all x and y in a phrase marker, either x < y or y < x. (Totality).

c. not (x < y and y < x) (Antisymmetry).

d. Leftwards

   If α moves and merges to β, then the left edges of β and α must align.

e. Headedness

   If α immediately contains β, and α is not a projection of β, then the left, or right, edges of β and α must align.

Unlike Kayne’s system, I will not require A to contain all asymmetric c-commanding nodes in a phrase marker. Instead, I’ll let A be any set of asymmetric c-commanding nodes. Totality will ensure that A contains enough pairs to put all terminals into the linearization.

Let’s look at how this system works in a concrete example.
For A and d(A) we get the following values, if we let (39d) convert the ordered pairs that it applies to. (I’ve ignored T, just so that it’ll be a little less to look at. As T is silent in this example, nothing untoward will emerge if we were to include it.)

\[
A = \begin{cases} 
(D^a, N^a) & (D^a, v) & (v, V) & (D^b, v) & (v, D^b) & \{D^a, N^b\} \\
(D^a, VP) & (v, D^b) & (V, N^a) & (V, N^b) & \{D^a, N^b\} \\
(D^a, V) & (v, V) & (V, N^b) & (V, N^b) & \{D^a, N^b\} \\
(D^a, DP^a) & (v, NP^a) & (V, N^a) & (V, N^b) & \{D^a, N^b\} \\
(D^a, D^b) & (v, N^b) & (v, N^b) & (v, N^b) & \{D^a, N^b\} \\
(D^a, NP^a) & (v, N^b) & (v, N^b) & (v, N^b) & \{D^a, N^b\} \\
\end{cases}
\]

\[
d(A) = \begin{cases} 
\{\text{the, cats}\} & \{\text{the, like}\} & \{\text{like, some}\} & \{\text{some, mice}\} \\
\{\text{cats, v}\} & \{\text{v, some}\} & \{\text{like, mice}\} \\
\{\text{cats, like}\} & \{\text{the, some}\} & \{\text{cats, some}\} \\
\{\text{the, mice}\} & \{\text{cats, mice}\} \\
\end{cases}
\]

What this has done, then, is to linearize the terminals of the moved phrase so that they precede everything else. For all the remaining terminals, it imposes an ordering, but not one that has been interpreted as a linearization yet.

For heads, we need to consider how (39e) applies to English. English is left-headed, so we can let (39e) be set to align left edges.

(42) Set (39e) to “right” for DP, VP, vP, TP, CP, ...

We could then see the \(\alpha, \beta\) pairs in (41b) as being interpreted in a way that would best satisfy these constraints. Because English sets the alignment constraints so that it is the left edges that are aligned, this will have the effect of making each of the \(\alpha, \beta\) pairs be interpreted as \(\alpha < \beta\).
References


