

1 Introduction

The derivation of linear order is often taken to be rather trivial as the physics of speech, it is said, leaves just two options (a head either precedes or follows its complements and modifiers). However, this idea falls short of a number of generalizations concerning linear order; among which are the facts that of all the theoretically possible combinations of n elements only a specifiable subset is ever attested, and more orders are found to the right of a head than to its left (just one). The physics of speech does not help us understand these generalizations. An account of them and the hope of deriving the orders of all languages from one and the same hierarchical structure via the same basic principles through a restrictive theory of linear order, however, may be attained once we have (i) a precise understanding of the fine-grained hierarchies and subhierarchies that underlie the clause and its phrases, (ii) a restriction on movement whereby only the head of each (sub)hierarchy can move (by itself or in one of the two pied piping modes), and (iii) Kayne's Linear Correspondence Axiom (LCA). Here I will try to delineate a possible first implementation of a restrictive theory of linear order along these lines.

The bewildering variation in word order among the languages of the world should not detain us from researching what, if anything, determines which orders are possible (and attested or attestable) and which orders are impossible (and not attested/

nonattestable), both when they maximally conform to the “head-final” or “head-initial” types and when they depart from them to varying degrees. This quest should be pursued, I think, as some results may be within our reach.

A recent influential position takes word order variation not to be part of I-language (internal, individual, intensional language) but of the sensory-motor (SM), or phonetic-form (PF) interface, in other words, as a product of externalization: “There is mounting evidence that linear ordering is not part of I-language, though it is of course required by the sensory-motor system. The I-language therefore provides the hierarchical structure, but externalization to SM has to fix order” (Chomsky in Boechat de Medeiros 2017: 18).¹

If the I-Language (specifically, narrow syntax) creates only hierarchical structures via Merge, how are hierarchical structures linearized?

Chomsky’s current position of Merge as binary set formation yielding unordered sets that are linearized only at PF (Chomsky 2020: 22) was already discussed in Chomsky (1965: 123–126) given proposals in Curry (1961) and Šaumjan and Soboleva (1963) (cf. Hall [Partee] 1964 and Šaumjan 1965) that rewriting rules should yield unordered sets (as in (1)) rather than the ordered strings widely assumed then (cf. (2)).²

(1) a. $S \rightarrow \{NP, VP\} = \{VP, NP\}$

b. $VP \rightarrow \{V, NP\} = \{NP, V\}$

(2) a. $S \rightarrow NP \frown VP$

b. $VP \rightarrow V \frown NP$

At the time Chomsky dismissed that proposal as “no proponents of a set-system has given any indication of how the abstract underlying unordered structures are converted into actual strings with surface structures” (1965: 125).

As also noted in Holmberg (2017: 44), things could now be different because there is one detailed proposal of how hierarchical structures can be converted into actual strings: Kayne’s (1994)

LCA. And the following year, this was Chomsky's position: "we take the LCA to be a principle of the phonological component" (1995: 340), which implied that some meaningless movement in narrow syntax had to be assumed for the correct derivation of word order differences within one language and across languages.

However, as this is incompatible with the idea that meaningless movements (just "to yield the proper hierarchies" [Chomsky 2004: 110]) should be eliminated from narrow syntax, and because asymmetric c-command is no longer always ensured in the bare phrase structure approach, things have more recently become less clear as to what mechanisms are responsible for word order differences.

Absence of an explicit theory of linearization/externalization would thus risk taking us back to Chomsky's (1965) dismissal of set systems.

Although it is perfectly possible that some externalization mechanism distinct from the LCA could be found that accounts for the conversion of the universal set-based hierarchical structure to the variety of word orders found within and across languages, the task is anything but trivial. As noted, what is often assumed (see (3) and (4)) seems in any event far from being sufficient:

- (3) "The physics of speech demand that linguistic units must be pronounced sequentially in time, giving rise, in this case, to just two options: the head either precedes or follows its complements." (Eguren, Fernández-Soriano, and Mendikoetxea 2016: 12)
- (4) "[In Japanese] the VP is linearized with OV order (*John-o sikarta*), whereas a corresponding English VP would surface with VO order (*scolded John*). Interpretation is not affected by this difference, suggesting that the relevant parameter should be a matter of externalization of internally generated expressions alone." (Chomsky, Gallego, and Ott [2017] 2019: 4)

The idea that the linearization of two unordered elements, {XP, Y}, can be trivially obtained by having one to either precede or follow the other (XP > Y or Y > XP) falls short of at least the following generalizations, two of which were already mentioned:

- (5) a. Why, out of all the mathematically possible orders of n elements, only a subset is ever attested.
- b. Why there are more ordering possibilities to the right of a lexical head than to its left.
- c. Why in the same extended projection a head-initial phrase above a head-final one is attested but a head-final one above a head-initial one is never or extremely rarely found.³
- d. Why among the possible, attested, orders some are cross-linguistically frequent and others less frequent, in a decreasing cline.

I assume that a theory of linearization/externalization should be able to say something about these generalizations.

As movement appears to provide a unified answer to them,⁴ there may be some reason to retain at least *some* apparently meaningless movement in narrow syntax (see section 5.4), which in turn will allow us to retain the LCA (whether at PF, as in Chomsky [1995: 340, 2020], or in narrow syntax, as in Kayne [2018, 2020a]—also see Willer Gold et al. [2018]). Indeed, as I try to argue, we can attain a restrictive theory of linearization that may also derive the generalizations in (5) once we have a precise understanding of the hierarchies and subhierarchies that constitute the clause and its phrases, Kayne's LCA, and, crucially, a condition on movement whereby only the head of each (sub)hierarchy can move (by itself or in one of the possible ways movement can take place). For example, we know that Internal Merge of a *wh*-phrase can take place in one of three ways: (i) by moving just the *wh*-phrase, the minimal relevant target phrase undergoing Internal Merge (see (6a)); (ii) by moving a larger constituent

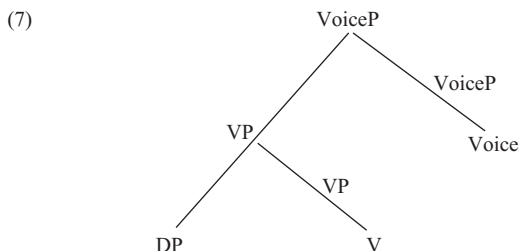
containing the target and lower nontarget material (which we may call [*whose-pictures*] pied piping) (see (6b)); (iii) by moving a larger constituent containing the target and higher nontarget material (which we may call [*pictures-of-whom*] pied piping) (see (6c)).⁵

- (6) a. Aylan, [**who**] you have certainly seen [pictures of [_]],..
 b. Aylan, [[**whose**] pictures] you have certainly seen [_],..
 c. Aylan, [pictures of [**whom**]] you have certainly seen [_],..

In the nominal extended projection, KP, the targets are the nominal heads (e.g., the Noun, the Determiner, the Case head), which move, just like the *wh*-phrase, by themselves, or, in one of the two pied piping modes, dragging along nontarget material within a larger constituent. In the verbal extended projection, Complementizer Phrase, CP, the relevant targets are the verbal heads (e.g., the Verb, the Aspectual Verbs, the Modal Verbs), which move, by themselves or in one of the two pied piping modes.

As we are going to see later, movements of the [*whose-pictures*] pied piping type, as well as those without pied piping (both of which reverse the original order of Merge), underlie head-initial constructions/languages, while movements of the [*pictures-of-whom*] pied piping type underlie head-final constructions/languages.

Whether the following trees are taken to represent just the hierarchical arrangement of constituents (as in Chomsky's 1995 and subsequent works) or already linearized constituents (as in Kayne 1994 and subsequent works), I will assume, still in compliance with Antisymmetry, that complements, like modifiers, are merged in Specifier positions, to the left of the head if linear order is part of narrow syntax.⁶



On top of each projection, Verb Phrase (VP), VoiceP, etc. (given for concreteness in X-bar format, with a null complement position [see section 3.3]), an empty agreement projection, such as $\text{Agr}_{\text{VP}}\text{P}$ or $\text{Agr}_{\text{Voice}}\text{P}$, will have to be assumed to host the movement of the respective head. See below for these agreement projections and for the associated projections that contain the corresponding modifier (e.g., “probably” for $\text{Mod}_{\text{Epistemic}}\text{P}$ in the clause). I keep the notions of segment and c-command as given in Kayne (1994) to allow the LCA to derive the desired word orders. For a brief discussion of how this approach could be cast in a bare phrase structure and labeling approach (perhaps not entirely straightforwardly), see the end of section 3.3.

The reason for having nothing below/to the right of a head is the pervasive left-right asymmetry found in every domain: to the left of a head (e.g., N, V, A) the order of complements and modifiers is unique, while to the right of the head more possibilities exist; among others, either the same order as that found to the left of the head or, more frequently, its mirror image (cf. the generalization in (5b), a particularly clear example of which is Greenberg’s [1963] Universal 20, which is briefly taken up in section 2.1). For more detailed discussion of this point see Cinque (2009) and Abels (2016a).

In my view this left-right asymmetry can be made sense of if the order of the elements found to the right of a head is a function of how the head raises (with or without pied piping) past them, which are merged in hierarchically higher specifiers (preceding

the head if linear order is part of narrow syntax). It is in fact difficult to see how this pattern could be derived otherwise from a *single* universal structure. Under the widespread idea that complements and modifiers to the right of a head are in their external Merge position there, one would have to base-generate the two (or more) orders to the right of the head, as well as the one to the left of the head, independently of the others, even though they are literally the same, or in the case of the mirror order, the same at a more abstract level. If one assumes instead that all complements and modifiers of a head are externally merged higher up (prenominally, preverbally, if linear order is part of narrow syntax), the observed left-right asymmetry necessarily follows from independent properties of movement (movement of the head with or without pied piping). This assumption also has the advantage over a specifier head complement order of dispensing with the necessity of “evacuating” the complements from VP in the derivation of final and certain head-initial orders. The complements start out as already “evacuated.”

To go back to the generalizations governing linear order across languages, chapter 2 begins with the first one, (5a).

Significantly, in each of the subdomains that we consider (the subprojections that make up the nominal, verbal, and so on, extended projections), of all the mathematically possible orders of the elements involved, only a subset is invariably attested. This cannot be an accident, especially if we find that the missing orders are missing for the same reason.

In chapter 2 I illustrate the generalization in (5a) with a number of cases drawn from the nominal domain (returning later to what the reason for the missing orders may actually be, which is not as trivial as it might seem).

