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Grammar Formalisms and Parsing

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Looking at our second TRALE grammar, we discovered that phrase structure rules in TRALE are tied to the feature geometry of phrases in the grammar by an attribute DTRS. This attribute, although specified in the signature, is not used in principles of the grammar. However, TRALE imposes an order on the daughters of signs as given by phrase structure rules by ordering them as members of the DTRS list in correspondence to their phonological realization in signs. We said that this can be viewed as a linearization component of HPSG grammars, which we can also specify directly in their theory. To make that step conceptually clearer to ourselves, we renamed the DTRS attribute and called it WORD-ORDER. Adopting the resulting signature, we can rewrite the linearization effect of the phrase structure rules of TRALE as HPSG linearization principles:

(1) *Two linearization principles*

$$\left[\begin{array}{l} \textit{phrase} \\ \textsc{synsem category subcat} \ \ \textit{elist} \end{array}\right] \rightarrow$$

$$\left[\begin{array}{ll} \textsc{phon} & \boxed{5} \\ \textsc{dtr1} & \boxed{1} \\ \textsc{dtr2} & \boxed{2} \\ \textsc{word-order} & \left\langle \boxed{1}\left[\textsc{phon} \ \boxed{3}\right], \boxed{2}\left[\textsc{phon} \ \boxed{4}\right] \right\rangle \end{array}\right] \wedge \ \texttt{append}(\boxed{3}, \boxed{4}, \boxed{5})$$

$$\left[\begin{array}{l} \textit{phrase} \\ \textsc{synsem category subcat} \ \ \textit{nelist} \end{array}\right] \rightarrow$$

$$\left[\begin{array}{ll} \textsc{phon} & \boxed{5} \\ \textsc{dtr1} & \boxed{2} \\ \textsc{dtr2} & \boxed{1} \\ \textsc{word-order} & \left\langle \boxed{1}\left[\textsc{phon} \ \boxed{3}\right], \boxed{2}\left[\textsc{phon} \ \boxed{4}\right] \right\rangle \end{array}\right] \wedge \ \texttt{append}(\boxed{3}, \boxed{4}, \boxed{5})$$

Since the antecedent of the first word order principle requires an empty SUBCAT list of the phrase, its effect is to make sure that the phonology of subjects precedes the phonology of VPs. Similarly, since the antecedent of the second word order principle requires a nonempty SUBCAT list, its effect is to make sure that the combination of a verbal projection with a non-subject results in a phonological order in which the phonology of the verbal projection precedes the phonology of the complement.

We noted that with more complicated relations than `append` and with non-trivial principles of mapping syntactic daughters to word order lists, very sophisticated word order rules can be specified that do not permit a direct mapping of the resulting HPSG grammar to a phrase structure grammar. This is done in so-called *linearization grammars.*