Some Arguments for Coordinate Ellipsis in HPSG

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1. Introduction

English 'argument cluster coordination' (ACC) and Right Node Raising (RNR) have been taken as providing strong motivation for analyses couched within Categorial Grammar (CG):

(1) a. We gave [Jan a record] and [Yo a book]. (ACC)

b. We visited [Jan on Monday] and [Yo on Tuesday]. (ACC)

c. [Jan visited and Yo refused to visit] my step-mother's father. (RNR)

CG analyses, developed originally by Dowty (1988) and refined by Steedman (see Steedman 2000 and the references cited there), among others, are based on the notions of 'type raising' and combination by 'functional composition'. Arguments are type raised to composable higher order functions, thus permitting the bracketed elements in (1) to form conjoinable constituents. These are the same mechanisms that license all types of unbounded dependencies in CG, and hence proponents of CG argue for the superior explanatory power of their approach on the grounds that the existence of coordinations like (1) is a direct consequence of the existence of extraction dependencies.

In this paper, we discuss data that are difficult to reconcile with CG accounts. In particular we offer evidence that unbounded dependencies, ACC, and RNR are separate phenomena, and not derivative of one underlying mechanism. We discuss evidence for treating both ACC and RNR in terms of elliptical elements, along the lines suggested in the linearization-based accounts of Yatabe (2002) for RNR and Crysmann (2003) for ACC. We will have cause to reassess certain generalizations about the data, however, in our effort to streamline the linearization-based approach to these phenomena.

2. ACC, RNR and Leftward Extraction

ACC and RNR have different prosodies. The former, like uncontroversial constituent coordination has a 'smooth' characteristic prosodic rendition. RNR, by contrast, involves contrasting foci and near-obligatory phrasal boundaries (pauses):

(2) Jan VISITED, # and Yo REFUSED to visit, # my step-mother's FATHER.

Similarly, there are scoping asymmetries that distinguish ACC and RNR. In particular, ACC systematically allows more scopings than RNR (which requires parallel scoping of subject quantifiers; see Steedman 2003). Also, ACC is strictly local, while RNR is unbounded. On the basis of these and other factors, we argue that an adequate grammar should not provide a unified account of ACC and RNR.

There are other asymmetries distinguishing extraction on the one hand and RNR and ACC on the other. A telling piece of evidence against any theory that makes RNR an immediate consequence of the same mechanisms used to analyze leftward extraction is the fact (Wexler and Culicover 1980) that RNR fails to obey island constraints, e.g. the Complex NP Constraint:

(3) Yo knows a man who buys __ , and Jan knows a man who sells __ , pictures of Qaddafi.

Second, an obvious point of asymmetry between ACC and unbounded dependencies is the inherent locality of the former. Finally, the typological correlation predicted by CG between languages with

leftward extraction and languages with both ACC and RNR is highly questionable. For example, Koutsoudas (1971) lists 15 languages that lack RNR. Of these 15, 9 are SVO; and of these 9 at least 2 are known to have unbounded leftward extraction: Hausa (Davis 1992) and Indonesian (Chung 1976). If leftward extraction is the result of type raising and composition, from which RNR (as well as ACC) automatically follows, then CG erroneously predicts that these languages should have RNR. These observations, together with further evidence provided by Levine (1985) and others, argue that ACC and RNR should not be tied directly to extraction, nor to each other.

3. ACC as Ellipsis

The following data are not analyzed (to the best of our knowledge) by any extant theory of ACC:[1]

(4) a. Jan travels to Rome tomorrow, to Paris on Friday, and will fly to Tokyo on Sunday.

b. Jan wanted to study medicine when he was 11, law when he was 13, and to study nothing at all when he was 18.

c. Yo either visits Jan on Monday, Pat on Tuesday, or else will visit them both at the end of the week.

The problem for CG posed by these examples is easily understood. Assuming (with CG) that all conjuncts are constituents and that only like-constituents can coordinate, then the first conjunct's status as a constituent is paradoxical. In (4a), for example, the first conjunct must be just the type raised composed constituent *to Rome tomorrow* in order to be compatible with the second conjunct *to Paris on Friday*, but the first conjunct must be the VP *travels to Rome tomorrow* in order to be compatible with the third conjunct *will fly to Tokyo on Sunday*. It cannot be both simultaneously, hence the paradox. This suggests an analysis that treats all of (4a,b,c) as instances of VP coordination, assuming that ellipsis of redundant material on the left-periphery of the second VP conjunct is possible.

4. An Elliptical Analysis of ACC

Ellipsis and HPSG are not incompatible, as shown by Yatabe and Crysmann. It is possible to formulate HPSG constructions (= 'schemata' = 'rules') that allow some elements present in the daughters' DOM lists to be absent from the mother's DOM list. We assume a theory of constructions like the one sketched by Sag et al. (2003, Ch. 16) and a binary branching coordination analysis. Two relevant constructions are then subject to the constraints formulated roughly as (5) and (6), where (formally and categorially) redundant left-peripheral material in the second daughter's DOM list does not appear in the mother's DOM list:

(5) *final-cnj-cx* ⇒

$$\left[\begin{array}{ll} \text{MTR} & \left[\begin{array}{ll} \text{DOM} & \boxed{A} \oplus \boxed{B} \oplus \boxed{D} \oplus \boxed{C} \\ \text{SYN} & \boxed{0} \\ \text{CRD} & + \end{array}\right] \\ \text{DTRS} & \left\langle \left[\begin{array}{l} \text{DOM } \boxed{A} \left\langle \left[\begin{array}{ll} \text{FRM} & \boxed{F_1} \\ \text{HD} & \boxed{H_1} \end{array}\right] \ldots \left[\begin{array}{ll} \text{FRM} & \boxed{F_n} \\ \text{HD} & \boxed{H_n} \end{array}\right] \right\rangle \oplus \boxed{B} \\ \text{SYN } \boxed{0} \end{array}\right], \left[\begin{array}{l} \text{DOM } \boxed{D} \\ \text{SYN } \textit{cnj} \end{array}\right], \left[\begin{array}{l} \text{DOM } \left\langle \left[\begin{array}{ll} \text{FRM} & \boxed{F_1} \\ \text{HD} & \boxed{H_1} \end{array}\right] \ldots \left[\begin{array}{ll} \text{FRM} & \boxed{F_n} \\ \text{HD} & \boxed{H_n} \end{array}\right] \right\rangle \oplus \boxed{C} \\ \text{SYN } \boxed{0} \end{array}\right] \right\rangle \end{array}\right]$$

[1] The LFG approach of Maxwell and Manning (1996) offers an analysis for such examples, but it involves treating the first two conjuncts as coordinated independently of the third conjunct, crucially requiring a null coordinator (or else assuming the first comma is a coordinator on par with *and*), an assumption whose dire consequences are not properly addressed.

(6) *nonfinal-cnj-cx* ⇒

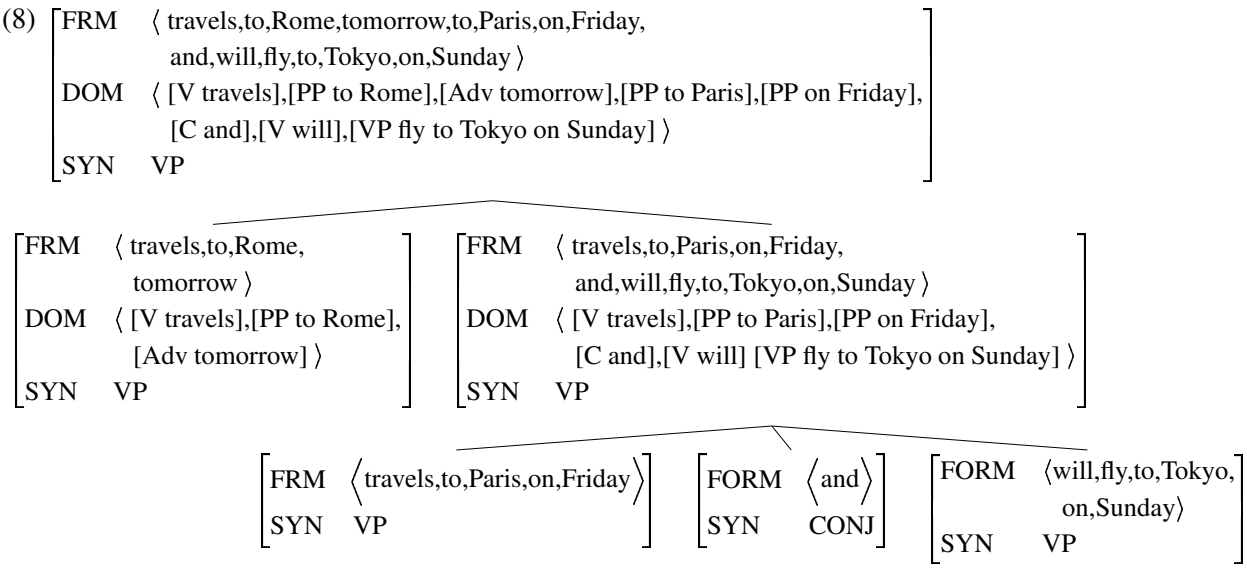
$$\left[\begin{array}{ll}\text{MTR} & \left[\begin{array}{ll}\text{DOM} & \boxed{A}\oplus\boxed{B}\oplus\boxed{C}\\ \text{SYN} & \boxed{0}\end{array}\right]\\ \text{DTRS} & \left\langle\left[\begin{array}{ll}\text{DOM} & \boxed{A}\left\langle\left[\begin{array}{ll}\text{FRM} & \boxed{F_1}\\ \text{HD} & \boxed{H_1}\end{array}\right]\ldots\left[\begin{array}{ll}\text{FRM} & \boxed{F_n}\\ \text{HD} & \boxed{H_n}\end{array}\right]\right\rangle\oplus\boxed{B}\\ \text{SYN} & \boxed{0}\end{array}\right],\left[\begin{array}{ll}\text{DOM} & \left\langle\left[\begin{array}{ll}\text{FRM} & \boxed{F_1}\\ \text{HD} & \boxed{H_1}\end{array}\right]\ldots\left[\begin{array}{ll}\text{FRM} & \boxed{F_n}\\ \text{HD} & \boxed{H_n}\end{array}\right]\right\rangle\oplus\boxed{C}\\ \text{SYN} & \boxed{0}\\ \text{CRD} & +\end{array}\right]\right\rangle\end{array}\right]$$

($\boxed{A}$ may be the empty list.) We make the normal assumptions about the relation between DOM values and phonology, though we assume (see below) that this relation is mediated by the feature F(O)RM.

Notice that rule (6) requires its second daughter to be [CRD +], which ensures that it contains a conjunction. Since (5) specifies that the mother must be [CRD +], a phrase licensed by this construction may serve as the final daughter of a phrase licensed by (6). And a phrase licensed by (6) can be resolved to [CRD +] and hence can serve as the final daughter of another phrase licensed by (6). But since words and non-coordinate phrases (e.g. head-complement and head-specifier constructs) are all [CRD −], they cannot serve as the final daughter in (6), thus predicting contrasts like (7):

(7) a. Jan [walks [talks and [chews gum]]]. b.*Jan [walks [chews gum]].

Neither of these examples involves ellipsis, i.e. the variable $\boxed{A}$ in both (5) and (6) denotes the empty list. To see the derivation of one of our original examples motivating the ellipsis analysis of ACC, consider the derivation in (8) (which assumes no compaction of the post-conjunction VP).

(8)


As noted by Crysmann, constructions like (5)-(6) also provide an alternative, arguably preferable solution to the foundational problems addressed by Sag (2002), since 'unlike category' coordinations like *is a Republican and proud of it* can now be constructed as simple VP coordinations. Note also that an ellipsis analysis may account for the distributed interpretation of well-known data like (9a) and (9b):

(9) a. Every man and woman was upset by the Enron scandal.

b. Old men and women are eligible for this benefit.

On this approach the distributed reading of the subject quantifiers results from left-peripheral ellipsis in the second conjunct as proposed above for ACC, thus reducing these examples to simple NP coordination rather than $\bar{N}$ coordination. The analysis of RNR is similar to ACC, except that it involves right-peripheral ellipsis in the first conjunct (and stipulates, it seems, intonational boundaries).[2]

5. Further Issues

A number of additional issues remain, some of which lead Yatabe or Crysmann to propose unwanted constraints of considerable complexity. Crysmann assumes that quantifiers cannot be distributed in ACC, but this seems incorrect in light of examples like (10), where 'quantifier duplication' is the favored interpretation (i.e. there is no sense in which the presents involve a single quantification):

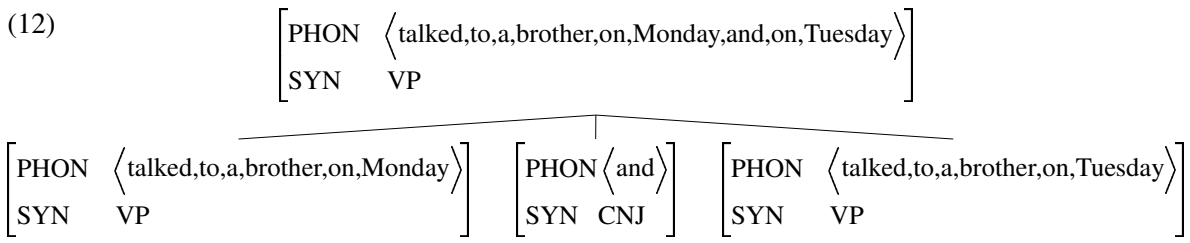
(10) They found a present/one for Jan on Sunday and for Yo on Wednesday.

Contra Crysmann, we do not impose semantic equivalence constraints in ACC, yielding a simpler analysis allowing broader interpretations of examples like (10). And referential identity of ellided proper names, etc. in examples like (1a,b) reflects a more general constraint that governs nonelliptical examples as well. However, to avoid the more clearly grammatical prohibition against quantifier duplication in (11), we simply assume that elliptical coordination must not apply at the S-level:

(11) Few people read the *WSJ* and vote Communist.

In addition, our treatment in terms of FRM identity responds to the observation that mere phonological identity of the elided material in ACC is too weak a condition. For example, without a stronger identity condition, derivations like the following might allow an interpretation where the subject('s denotation) talked to an immediate kin on Monday and a member of a religous order on Tuesday:

(12)



The resolution of this problem, which rests on adopting a more modular approach to the organization of signs (similar to that urged by Haji-Abdolhosseini (2003)), is already incorporated into the previous discussion. In particular, if we assume that phonological structures are one step removed from the forms that they realize, then PHON values can be replaced by hierarchical prosodic structures of the sort incorporated into HPSG by Klein (2000) and Haji-Abdolhosseini (2003). With such a revision in place, the coordination rules can make reference to the list values of the feature FRM, rather than the parallel PHON lists. Though exact phonological identity is not required in ACC (or

[2] Yatabe's (2002) example of cumulative agreement in RNR is here treated as an ungrammatical, but acceptable, 'replanned' sentence. This arguably better fits its apparently intermediate acceptability status.

RNR), homophonous elements are properly distinguished, as they arguably should be if irregular morphology is to be properly analyzed (e.g. *ring*$_1$/*rang* vs. *ring*$_2$/*ringed*; *strike*$_1$/*stricken* vs. *strike*$_2$/*striked*, *mouse*$_1$/*mice* vs. *mouse*$_2$/*mouses*, etc.).

In sum, the analysis sketched here accounts for a wider range of data than any previous non-HPSG analysis of non-constituent coordinations and includes a treatment of the seemingly paradoxical coordinations in (4). In addition, this analysis simplifies the approaches of Yatabe (2002) and Crysmann (2003). Furthermore, on the basis of considerable empirical evidence, our approach severs the connection between ACC, RNR, and unbounded dependencies that is inherent in the CG approach, thus making correct predictions about the cross-linguistic typology of coordination.

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