Extraposition and Additive Right Node Raising

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This work argues that there are (at least) two completely different Right Node Raising (RNR) phenomena in English. One is a form of ellipsis, and the other follows from the grammar of extraposition and conjunction. Empirical criteria are proposed to distinguish the two RNR types.

1 Introduction

Vergnaud (1974), Abbott (1976), Jackendoff (1977), and Gazdar (1981, 180) note what is sometimes called *additive* RNR, shown in (1). These sentences have interpretations that are not equivalent to their non-RNR counterparts. For example, (1b) can mean that the amount that Fred spent plus the amount that Mia lost totals $10,000. In other words, the shared 'RNRaised' items are semantically combined.

(1) a. John DEFEATED and Mary LOST TO very different opponents.
b. Fred SPENT and Mia LOST a total of $10.000 (between them).
c. John HUMMED and Mary SANG the same tune

Additive RNR remains problematic for all accounts of RNR including Crysmann 2000, Beavers and Sag (2003), Chaves (2007), although Yatabe (2002) lays out machinery which could be used to model such recalcitrant cases. Yatabe proposes two kinds of ellipsis: one at the level of phonology and another at the level of DOM objects (Reape, 1996). Since the latter kind of ellipsis is argued to interact with semantics, Yatabe moves the representation of semantics and agreement into DOM. A number of special (and fairly complex) relational conditions can intervene and allow the elided domain elements to combine and the intended RNR cases. In (2) I illustrate instances of RNR which would not be captured as DOM object ellipsis, but rather, phonological ellipsis. This is because embedded clauses, relative clauses, NPs, PPs, and complex words must be compatect (or in some cases, *partially compacted* (Kathol and Pollard, 1995)) because of independent linearization reasons. See the discussion in Yatabe (2002, 406) and Beavers and Sag (2004, 67).

(2) a. [I think that I WOULD] and [I know that John WILL] [buy a portrait of Elvis].
(McCawley, 1998)
b. [I know a man who SELLS] and [you know a person who BUYS] [pictures of Elvis Presley].
(Wexler and Culicover, 1980, 299)
c. [Is deforestation THE ONLY] or [is it THE MAJOR] [factor for primate extinction]?
d. These events took place [in PRE-] or [in POST]-[war Germany]?
e. [Your theory UNDER-] and [my theory OVER][generates].
(see Booij (1985); Wilder (1997); Chaves (2007))

The problem is that additive RNR can occur in environments that would otherwise require compaction. For example, take the two long-distance additive RNR examples I provide in (3). As Yatabe (2002,406) notes, one would have to abandon the assumption that sentences are always required to undergo total compaction. The same conclusion is reached by Beavers and Sag (2004, 67). But this raises even more problems, because freer word order languages like German and Dutch arguably rely on clausal compaction (Kathol 2000), and have parallel clausal RNR data (e.g. Neijt (1979, 41) and Booij (1985)).

(3) a. I know a man who LOST and you know a woman who SPENT [a total of $10,000 between them].
b. I know the NY Times WANTED TO PUBLISH and Sue suspects that USA Today MIGHT TRY TO SCOOP [exactly the same scandal].

In this work I explore an alternative in which DOM plays no role, semantic composition operates as usual, and no complex relational constraints for domain manipulation are needed. I propose that RNR has remained challenging for linguistic theory because two different kinds of phenomena have been confounded. One variety of RNR is best viewed as morphophonological ellipsis (e.g. Chaves (2007) shows that (2) can be modeled by the same morphophonological ellipsis process), and the other is best viewed as the result of extraposition (along the lines of Gazdar (1981)). This explains why certain cases of RNR are challenging for an ellipsis analysis while other cases of RNR are challenging for a extraposition analysis. §2 discusses extraposition and argues that some – but not all – instances of RNR can be seen resulting from rightward extraction. §3 distinguishes the two kinds of RNR and §4 offers an analysis.

2 Object Extraposition and (some cases of) RNR

It is known that extraposition can in fact cross certain phrasal boundaries. For instance, (4a-e) are from Kim and Sag (2005), Howard Lasnik (2007 course handout), Postal (1974, 92n), Gazdar (1981, 177), and Kayne (2000,251) respectively. My data in (5) support Gazdar's view that extraposition is grammatically unbounded but that performance biases and memory limitations can impose certain restrictions.

(4) a. She [[kept [regretting (it)] [for years]] [that she had not turned him down]].
b. Mary [[wanted [to [go _]] [until yesterday]] [to the public lecture]].
c. I have [wanted [to [know _]] [for many years] [exactly what happened to Rosa Luxemburg]].
d. I have [wanted [to [meet _]] [for many years] [the man who spent so much money planning the assassination of Kennedy]].
e. I've been [requesting [that you pay back _] [ever since May]] [the money I lent to you a year ago].

(5) a. I [told [the story _] [to Miriam] yesterday] [of how I was once stranded for days without food].
b. I [was [sorry _] [for only a few minutes] [about what happened]].
c. Kim edited [a review _] [for us] [of Jamie's article].
d. I ran [into _] [just yesterday] [one of my favorite writers of all time].
e. Post-traumatic stress disorder [[leads [to _]] [unfortunately] [a lot of alcohol and drug abuse]].
f. I talked [to someone _] [yesterday] [who I hadn't seen for many years].
g. I've been [wanting [to [meet [someone who knows _]]] [ever since I was little]] [exactly what happened to Amelia Earhart].
h. Mary sent [a digital copy of [a great book _]] [to my publisher] [about ancient Egypt].

Gazdar (1981) pointed out that once one accepts that unbounded rightward extraction exists, then across-the-board (ATB) extraposition can follow from coordination in essentially the same way as leftward ATB extraction, and that such an analysis offers a better handle on additive RNR than ellipsis. Furthermore, if one accepts that multiple extraposition is possible – as shown in (6a) – then (6b,c) should follow.[1]

(6) a. I gave _ _ [today] [to a policeman] [an extremely pretty flower]. (Steedman, 1996, 70)
b. Smith LOANED and he later DONATED [a valuable collection of manuscripts] [to the library].
c. John SUGGESTED and Mary actually GAVE [the same name] [to different cats].

Semantically, the additive RNR data in (1) seem to be the mirror-image of a phenomenon that occurs in leftward extraction, shown in (7). These are discussed in Postal (1998, 136,160), Munn (1998), Gawron and Kehler (2003), and Chaves (2009). Such data suggest that ATB leftward/rightward extracted dependents can be semantically *cumulated* by essentially the same mechanism.

[1] (6b) is from Abbott (1976, 639). Multiple leftward co-valent extraction is also possible, as in *this is a man* [*to whom*]$_i$ *liberty*$_j$ *we would never grant* $\__j$ $\__i$ (Baltin, 1982). For more data and discussion see also Levine and Hukari (2006, 74).

(7) a. What$_{i+j}$ did you say Kim (alternately) ate $\__i$ and drank $\__j$?
b. Where$_{i+j}$ do you think Mary vacated $\__i$ and Bill decided to live $\__j$?
c. [The ships$_{i+j}$ that a U-boat sank $\__i$ and a Kamikaze plane crashed into $\__j$] were the Laconia and the Callaghan.

Let us assume for the moment that Gazdar (1981) is correct and that RNR is simply ATB rightward extraction. One cannot model rightward/leftward extraction with the same mechanism, since there are fundamental differences between the two. Apart from the obvious directionality difference, RNR allows preposition stranding in languages that usually do not allow it via leftward extraction (McCloskey, 1986), and there are languages like Hausa, which have leftward extraction, but lack RNR (Davies, 1992; Beavers and Sag, 2004). We can model these differences by reserving GAP for leftward extraction and EXTRA for rightward extraction. Different rules determine the value, percolation, and saturation of these features.

However, there are good reasons for not viewing all instances of RNR as rightward extraction.[2] For example, units that are usually not leftward extractable can be RNRaised, as in (2c) and (8a).

(8) a. The difference between [an INTERESTING and a TEDIOUS teacher] is this.
b.*Teacher, the difference between [an INTERESTING $\_$ and a TEDIOUS $\_$] is this.
c.*I mentioned [an interesting $\_$] [to my brother] (yesterday) [teacher].

Similarly, sub-lexical cases of RNR like (2d,e) do not have a single-extraposition counterpart, e.g. **pre-$\_$ was interesting* [*war Germany*]. None of these cases is unexpected for an ellipsis analysis of RNR. An ellipsis also predicts – without further assumptions – that RNR allows sloppy identity of the RNRaised element, e.g. (9) is true even if Kim tried to sing *Help!* and Robin sang *Eleanor Rigby*.

(9) Tom tried to SING and Fred actually SANG [his favorite Beatles song] / [a Beatles song].

On the other hand, ellipsis cannot explain quantier merge phenomena like (10), discussed by McCawley (1982, n.12) and others, without stipulations (as in Yatabe (2002) and Beavers and Sag (2003)).

(10) Karsh took photographs and Wyeth painted portraits [of many famous persons].

The RNR data discussed so far suggest that some cases of RNR are best seen as ellipsis, while others are best seen as ATB extraposition. This analysis is explored in more detail below.

3 Two kinds of RNR and how they differ

Let us assume that there are two kinds of RNR, one due to morphophonological ellipsis and another due to ATB extraposition. Both kinds of RNR overlap, but do not coincide exactly. The elliptical kind of RNR – as defined in Chaves (2007) – elides prosodically independent morphophonological units[3] (and thus can elide non-phrases as in (2c,d,e) and (8a)), predicts sloppy readings (9), and can occur in *any* construction as in (12a) (Hudson, 1976; Goodall, 1987; Postal, 1994). The ATB extraposition-based RNR, on the other hand, has none of the above properties. Rather, it can only RNRaise phrases that are extraposable, does not impose morphophonological identity, does not allow sloppy readings (and allows quantier merging as in (10)), can cumulate ATB extracted dependents (like leftward extraction can; cf. (1) with (7)), and is restricted to conjunction as in (11) from Beavers and Sag (2004, ft.5) and (12).

[2]RNR's insensitivity to islands (Wexler and Culicover, 1980, 299) is not a knock-out argument against extraction accounts of RNR. Leftward extraction islands have many acceptable exceptions and arguably result from processing and pragmatic factors (see Levine and Hukari (2006) and Hofmeister and Sag (2010) for overviews). It is possible that the interaction between cognitive processing limitations and extraction yields different results depending on the extraction directionality.

[3]I.e., morpheme identity is required **Robin* SWUNG ~~*an unusual bat*~~ *and Leslie* TAMED *an unusual bat* (Levine and Hukari, 2006, 156), and phonological identity **Tom said that* I ~~*am the best swimmer*~~ *and Ann claimed that* SHE *is the best swimmer*.

(11) John HUMMED or Mary SANG ?the same tune / ??different tunes.

(12) a. John DESTROYED – before his brother could SELL – the stolen music player.
b.*John DESTROYED – before his brother could SELL – exactly the same music player.

Any ellipsis-based RNR account that is extended to handle additive RNR would wrongly predict that (13) is as good as (8a), unless extra stipulations are added. In the present account the contrast is explained as follows. (13) is not licensed by ellipsis (because phonologic identity is violated), nor by ATB object extraposition (because teachers is not an extraposable object, and hence, there is nothing extraposed that could be cumulated).

(13) *The difference between an [INTERESTING and a TEDIOUS teachers] is this.

4 An account of extraposition and of extrapositional RNR

Kim and Sag (2005) and Kay and Sag (2011) take extraposition to be a form of rightward extraction rather than a matter of valence alternation. This is motivated by the fact that an extraposed clausal complement cannot be extracted, as noted by Van Eynde (1996) with data like (14).

(14) a. That Kim would lose to Pat, nobody had expected _.
b.*That Sandy snores, it bothers Kim more and more _.

Following Kay and Sag (2011,229), I capture extraposition via the rule in (15). This construction licenses binary trees composed of a head [0] and an extraposed constituent [1].[4] For simplification, I follow Kim and Sag (2005) in assuming that the Generalized Head Feature Principle (Ginzburg and Sag, 2000) percolates to the mother node all consitent SYN information, by default.

(15) HEAD-EXTRAPOSITION CONSTRUCTION

$$\textit{hd-extra-cxt} \Rightarrow \begin{bmatrix} \text{MTR} \left[\text{SYN}\left[\text{EXTRA } \boxed{2}\right]\right] \\ \text{DTRS } \langle \boxed{0}, \boxed{1} \rangle \\ \text{H-DTR } \boxed{0}\left[\text{SYN}\begin{bmatrix}\text{COMPS } \langle\,\rangle \\ \text{EXTRA } \langle \boxed{1} \rangle \oplus \boxed{2}\end{bmatrix}\right] \end{bmatrix}$$

As discussed in §2, I assume that objects can be extraposed. This move also accounts for the patterns in (16), where a prosodically independent adverbial expression intervenes between a lexical head and an object. For more on such examples see Stucky (1987), McCawley (1987), and Pollard and Sag (1987).

(16) a. I talked _ on Tuesday [to a policeman].
b. John gave a book _ yesterday [to Mary].
c. I gave him _ yesterday [my entire record collection].
d. I donated _ to the library yesterday [all my Stephen King books].
e. I took [a picture _] yesterday [of the front of the building].
f. [A review _] came out yesterday [of this article].
g. He said _ several times [that I would get the books I ordered by June].
h. I am unwilling _ when sober [to sign any such petition].

[4]Following Kim and Sag (2005), other rules create the various kinds of extraposition dependencies found in English. E.g. one rule allows a (sometimes optional) dummy *it* to be inserted as a valent while the respective clausal valent is put in EXTRA instead. Another rule must take nominal expressions and be able to add an adnominal modifier to their EXTRA feature.

The extrapositions in (4b–e), (5), (6) and (16) obtain via a lexical rule allowing objects to be in EXTRA:[5]

(17) COMPLEMENT EXTRAPOSITION CONSTRUCTION (closely following Kay and Sag (2011,232))

$$\textit{comp-extrap-cxt} \Rightarrow \left[\begin{array}{l} \text{MTR} \left[\begin{array}{l} \textit{word} \\ \text{SYN} \left[\begin{array}{l} \text{COMPS } \boxed{2} \\ \text{EXTRA } \boxed{3} \oplus \langle \boxed{2} \rangle \end{array}\right] \end{array}\right] \\ \text{DTRS} \left\langle \left[\begin{array}{l} \textit{word} \\ \text{SYN} \left[\begin{array}{l} \text{COMPS } \boxed{1} \bigcirc \langle \boxed{2} \rangle \\ \text{EXTRA } \boxed{3} \end{array}\right] \end{array}\right] \right\rangle \end{array}\right]$$

Further research is needed to establish which extrapositions are disallowed by competence and which are ruled out by performance. For example, prepositions resist being stranded in ditransitive phrases, e.g. **I talked* [*to* $\__i$] [*about love*] [*the tall woman in the black dress*]$_i$. Thus, it follows that the RNR counterpart is also unacceptable (e.g. **Mike may have talked to* $\__i$ *about love and certainly talked to* $\__i$ *about marriage* [*the tall woman in the black dress*]$_i$; Levine (2001,163)).

However, P-stranding in certain cases is more acceptable, as (5d,e) suggest, and therefore the additive RNR counterpart is predicted to be good:

(18) Tom RAN INTO and Fred SPOKE WITH different cast members of the Daily Show.

Similarly, the difficulty in extraposing indirect objects (e.g. ?**Fred offered* $\_$ [*a new hat*] [*my youngest brother*]) can either be forced by the grammar or explained by garden-path-like processing difficulties.

Chaves (2009) proposed that GAP values can be cumulated by the conjunction construction, as seen in (7). In that account, the construction responsible for conjunction phrases combines GAP values with a '$\approx$' relation, which either unifies or cumulates ATB-extracted signs. The following definition suffices:

(19) $(\boxed{1} \approx \boxed{2}) := \boxed{3}$ *iff* $(\boxed{1} = \boxed{2} = \boxed{3}) \vee (\boxed{1} = \text{XP}_i \wedge \boxed{2} = \text{XP}_j \wedge \boxed{3} = \text{XP}_{i+j})$, where '+' is a Linkean sum.

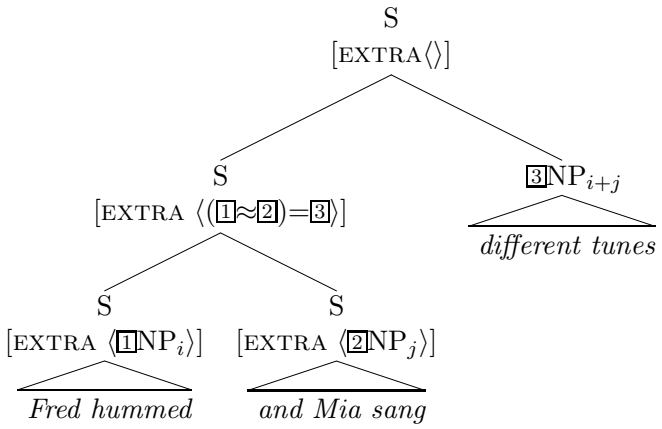
If we assume that EXTRA values shared by conjuncts also combine via '$\approx$', then we obtain additive RNR, and capture both GAP and EXTRA ATB cumulation phenomena with the same basic mechanism. I thus propose that the conjunctive coordination construction (*conjunctive-coord-cxt* $\sqsupseteq$ *coord-cxt* $\sqsupseteq$ *non-headed-cxt* $\sqsupseteq$ *phrasal-cxt*) includes at least the constraints in (20). Due to space limitations, I omit from (20) '$\approx$' constraints on GAP and syntactic/semantic constraints specific to conjunctive coordination phrases.

(20) CONJUNCTIVE COORDINATION CONSTRUCTION (for $n \geq 0$)

$$\textit{conjunctive-conj-cxt} \Rightarrow \left[\begin{array}{l} \text{MTR} \mid \text{SYN} \mid \text{EXTRA} \ \langle\ \boxed{X_0} \approx \boxed{Y_0}, \ldots, \boxed{X_n} \approx \boxed{Y_n}\ \rangle \\ \text{DTRS} \left\langle\ [\text{SYN} \mid \text{EXTRA} \ \langle\ \boxed{X_0}, \ldots, \boxed{X_n}\ \rangle]\ ,\ [\text{SYN} \mid \text{EXTRA} \ \langle\ \boxed{Y_0}, \ldots, \boxed{Y_n}\ \rangle]\ \right\rangle \end{array}\right]$$

The HEAD-EXTRAPOSITION CONSTRUCTION in (16) now allows a coordinate mother node to combine with a plural or symmetric nominal phrase as shown in the tree below. Conjunction thus allows ATB-extracted GAP/EXTRA dependents to be equated or cumulated as Linkean sums.

[5] Multiple complement extrapositions like (6) obtain via multiple applications of this lexical rule.



5 Conclusion

This work proposes that there are two kinds of RNR phenomena. One is a syntactically unrestricted and semantically inert form of (morphophonological) ellipsis and the other is the result of independently motivated extraposition and conjunction phenomena, which can cumulate shared extracted dependents.

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