On the disunity of Right-Node Raising phenomena: Extraposition, Ellipsis, and Deletion[*]

Rui P. Chaves

University at Buffalo, The State University of New York

Abstract

The empirical facts about Right-Node Raising (RNR) lead to fundamentally conflicting analytical conclusions. There is strong evidence that RNR does not obey syntactic constraints of any kind, which in turn suggests that RNR is not a syntactic operation, but there is also evidence that strongly favors a syntactic analysis. The idiosyncratic and almost paradoxical nature of the phenomena indicates that no simple unified analysis of RNR can be formulated. In order to resolve this empirical and theoretical impasse, I propose that what is usually called RNR is best seen as the conflation of three completely unrelated kinds of phenomena: VP/N'-Ellipsis, Extraposition, and (Backward) Periphery Deletion. Although they are fundamentally different, these phenomena can yield structures that are superficially similar, and in some cases, apply to the same strings. The latter is one of the major factors that has misled previous accounts. Once this three-way confound between Ellipsis, Extraposition and Deletion is taken into account, the contradictory idiosyncrasies about RNR vanish, and a wide range of cases are obtained as predictions of independently motivated accounts of VP/N'-Ellipsis and ATB Extraposition phenomena. This paper offers an explicit formalization of the phenomena under discussion in Sign-Based Construction Grammar (Sag, 2012), a framework that combines insights from Head-Driven Phrase Structure Grammar (Pollard and Sag, 1994) and Berkeley Construction Grammar (Fillmore and Kay, 1996).

1   Introduction

The phenomenon usually called Right-Node Raising is involves a right-peripheral element which is shared by two or more phrases, as illustrated in (1).[1] Although this is not always the case, usually

[1]The term 'Right-Node Raising' (Postal, 1974:127) is used in a neutral way, without assuming that any kind of raising takes place. RNR has been referred to in a number of ways, such as *backward conjunction reduction* (Ross, 1967) and *shared constituent coordination* (Radford, 1988). None of these is ideal because it is known since Hudson (1976) that RNR is not restricted to coordination. The attested examples in this paper were retrieved from the Brown treebank corpus [BRN], Switchboard [SWB], and Wall Street Journal [WSJ], and were validated by native speakers.

certain elements flanking the RNRaised material are contrasted and convey new information. Thus, (1) is a felicitous answer to *how do John and Mary feel about spinach?* In this work I signal contrastive focus with small caps, and square brackets identify the RNRaised string. This contrast is reflected prosodically as contrastive focus, with a L+H* tone, possibly followed by a pause and an L- tone (Selkirk, 2002, Kentner et al., 2008).

(1) a. John DETESTS and Mary LIKES [spinach].
    (= 'John detests spinach and Mary likes spinach')

    b.*John DETESTS [spinach] and Mary LIKES.

One particularly challenging kind of RNR is illustrated in (2), which I refer to as *additive RNR*. Let us consider (2)a, adapted from Abbott (1976). In one reading, Fred spent $10,000 and Mia lost $10,000 (the non-additive reading). In the second reading however, Fed spent some amount of money and Mia lost some amount of money such that the two amounts total f $10,000 (the additive reading). The same ambiguity arises if *a total of* is omitted, although the non-additive reading is preferred. Similarly, (2)b can be interpreted as meaning that the tunes that John hummed are different from the tunes that Mary sang (the additive reading) or the same ones (the non-additive reading). Finally, in (2)c the context makes the additive reading the felicitous one.

(2) a. Fred SPENT and Mia LOST [(a total of) $10,000].

    b. John HUMMED and Mary SANG [several tunes].

    c. Sue spent her summer in Paris and Ted is relocating to London. I can't imagine why she would VACATION IN and he would MOVE TO [two of the most expensive cities in Europe].

Symmetric expressions like *the same, different, in equal amounts,* and so forth can also give rise to additive readings as in (3). As argued by (Carlson, 1987), such symmetric expressions have an internal reading – in which they are interpreted without appeal to an extra-sentential referent – and an external reading – in which there is no appeal to an extra-sentential referent. It is the former that is relevant here. For example, in the internal reading of (3)a John defeated an opponent x and Mary lost to an opponent y such that $x \neq y$. Crucially, such interpretations cannot be reduced to the non-RNR counterpart *John defeated different opponents and Mary lost to different opponents*. See also Jackendoff (1977), McCawley (1982), and Postal (1998).

(3) a. John DEFEATED and Mary LOST TO [very different opponents].

    b. John HUMMED and Mary SANG [similar tunes].

    c. Tom SHOUTED and Mary CRIED [each other's names].

What is special about additive readings in general is that each verb predicates a different subset of the denotation of the plural RNRaised NP. For example, (2)b means that *John hummed a certain tune x, Mary sang a certain tune y, and x and y are similar*. Hence, independently predicated referents are summed in the same plural phrase. Crucially, data like (2) show that additive RNR is independent from symmetric predicates like *different* and *the same*, and that it can arise in any plural NP RNR structure.

In this work I argue that additive readings can arise various types of construction, including Ellipsis, Extraposition and Deletion. In fact, there is evidence that the additive readings can apply to *any* kind of syntactic dependent, beyond RNR constructions (Chaves, 2012). For example, additive readings arise in leftward extraction, as is shown in (4).[2]

(4) a. What$_{\{x,y\}}$ did [Kim [eat $\_$ $_x$ and drink $\_$ $_y$]]?

b. The leftovers$_{\{x,y\}}$ that the dog ate $\_$ $_x$ and drank $\_$ $_y$ were beginning to turn.

c. Setting aside illegal poaching for a moment, how many sharks$_{\{x,y\}}$ do you estimate [[$\_$ $_x$ died naturally] and [$\_$ $_y$ were killed recreationally]]?

d. The [ships$_{\{x,y\}}$ that [[a U-boat destroyed $\_$ $_x$] and [a Kamikaze plane blew up $\_$ $_y$]]]] were the Laconia and the Callaghan.
(Chaves, 2012)

Additive readings also arise in modification structures, as in (5). For example, the relevant reading of (5)a can be paraphrased as *John tapped his left leg and his right leg*, and (5)b as *the average lifespan was between zero years old and one year old*. Here, the conjunction of two adnominal modifiers that select a singular nominal head yields an adnominal modifier that selects a plural nominal head. Crucially, each conjoined adjective predicates a different nominal entity.[3]

(5) a. John tapped his [[left and right] legs].

b. The average lifespan was between [[zero and one] [years old]].

c. Kowal discovered the [[13th and 14th] [moons of Jupiter]].

d. The production will peak on [days [six and seven]].

e. Bart and Lisa are [players [three and four]].

Drawing from Krifka (1990:173) and Chaves (2012) I model all kinds of additive readings via the generalization in (6), which is formalized in the Non-Boolean conjunction rule formulated in §3.2.

(6) SHARED DEPENDENT CONDITION FOR CONJUNCTION (informal version)

Predication dependencies shared by conjuncts are combined via '⊕'.

This condition requires that the indices of dependents that are shared by conjuncts must be combined with a Linkean i-sum. The '⊕' operator is the join operation in a mereological domain (Link, 1983): $x \oplus y = x \sqcup y$. Because '$\sqcup$' is idempotent (i.e. $\forall x[x \sqcup x = x]$), $x \oplus y$ means that the two indices are either identical or cumulate into a plurality. In the former case we allow the shared dependent to be predicated by both verbs (e.g. *John HUMMED and Mary SANG the same tune(s)*),

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[2]Cf. with Munn 1998, 1999, Postal (1998:136,160), Kehler (2002:125), Gawron and Kehler (2003), Zhang (2007).

[3]Other examples are *I loved the [[Australian and New Zealand] beaches]*, and *We photographed the [[Brooklyn and Peace] bridges]*. In the relevant readings, these do not mean that a set of beaches is located both in Australia and in New Zealand or that there is a set of bridges both called Brooklyn and Peace. It is clear that such cases do not involve RNR and are instead base-generated because they do not operate at longer distances (e.g. **We photographed the Brooklyn and the Peace bridges*). See §2.1 for evidence that RNR is not bounded in this way.

whereas in the later the shared dependents are cumulated into a plurality (e.g. *John HUMMED and Mary SANG similar/different tunes*).

A related type of RNR phenomenon is *summative agreement* RNR, shown in (7); see also Postal (1998:173) and Yatabe (2002). What is remarkable is that the RNRaised VP is plural even though the respective subjects are singular and are located in different clauses. The prosodic contrast must be minimal, and the context must allow for the speaker to have a privileged perspective of the two conjoined propositions.

(7) [Context: in a faculty meeting, two instructors each express their views about their students. One instructor praises John and the other praises Mary. Days later, the former instructor recalls the statements made at the meeting]

I said that John – and you said that Mary – [were wonderful students].

1.1   Proposal

The main analytical alternatives for RNR that have emerged are across-the-board (ATB) rightward extraction (e.g. Hankamer (1971), Postal (1974), Gazdar (1981), Sabbagh (2007), and related accounts like Steedman (1996)), deletion (e.g. Wexler and Culicover (1980), Napoli (1983), Kayne (1994), Wilder (1997), Hartmann (2000), and Ha (2006) among others), and multidominance (e.g. McCawley (1982), Radford (1988), Moltmann (1992), Wilder (1999), Bachrach and Katzir (2008), and Gracanin-Yuksek (2013)). The survey of RNR phenomena conducted in this work indicates that no single account can explain the full range of phenomena: there is solid empirical evidence in favor and against syntactic accounts of RNR, however defined. These empirical facts lead to conflicting analytical conclusions and therefore hamper the formulation of a simple unitary generalization for RNR. A somewhat similar conclusion is reached by Barros and Vicente (2011), who conjecture that some cases of RNR are best seen as Ellipsis whereas others are best seen as the result of Multidominance. However, Larson (2012) has offered a refutation of Barros and Vicente (2011), showing that the Ellipsis-Multidominance split is not consistent with the facts. In this work I discard the Multidominance account because it faces a number of technical difficulties, discussed throughout this paper.[4] I propose to resolve the analytical impasse created by RNR by assuming that what is usually called RNR falls into three distinct categories. Some data are best seen as cases of VP/N'-Ellipsis rather than RNR proper. In other words, the proper account of VP/N'-Ellipsis and coordination should predict the relevant instances of apparent RNR. Other apparent cases of

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[4]Some of the major problems with multidominance accounts are the following. In multidominance, ATB leftward extraction is viewed as the leftward movement of a multidominated structure. But this is directly challenged by languages like Hausa, which have leftward extraction but lack RNR altogether (Davies, 1992, Beavers and Sag, 2004). The second major shortcoming of multidominance is the fact that it has been unable since its inception to offer an explicit account of the directionality of RNR, illustrated in 1. For example, de Vries (2009) simply conjectures that the directionality of RNR it is due to some kind of interface effect related to contrastive focus. But as shown in §2.2, there are instances of RNR which do not require contrastive focus. Gracanin-Yuksek (2013:10,ft8) offers no explicit account either, and simply stipulates that "a condition that shared material must be linearized in the (second) final conjunct would be specific to sharing in coordinate structures (...)". This stipulation is problematic because it is well-known that RNR is not restricted to coordination (see §2.1). Finally, Bachrach and Katzir (2008) has a number of technical problems as Yatabe (2012) notes. For example, it allows the right edge of a phrase and the left edge of the immediately following phrase to be fused (e.g. *John met ~~Mary~~, Mary laughed, and Bill was surprised* is incorrectly predicted to be a legal RNR). See below for more criticism.

RNR are best seen as resulting from the interaction between coordination and extraposition. Any suitable account of rightward extraction and coordination will predict these apparent instances of RNR as across-the-board (ATB) extraposition. The remainder instances of RNR are what I view as true RNR, and are modeled via a non-syntactic Backward Deletion operation. Interestingly, all instances of RNR allow some additive readings. The proposed analysis is summarized below.

I. *VP/N'-Ellipsis*

VP/N'-Ellipsis is a phenomenon that allows the omission of VPs and N's in certain conditions (Sag, 1976, Sag and Hankamer, 1984, Merchant, 2001, Miller and Pullum, 2013). As is well-known, VP/N'-Ellipsis can occur cataphorically or anaphorically, and is restricted to VP and N' phrases that are controlled by certain heads. When it applies cataphorically, the elision site cannot c-command the antecedent. Cataphoric Ellipsis can have the appearance of a RNR construction, especially if there is prosodic contrast. The present paper claims that some apparent instances of RNR are nothing but VP/N'-Ellipsis, and therefore are predicted by any sufficiently robust theory of VP/N'-Ellipsis that allows for cataphora, however defined. True RNR has none of the VP/N'-Ellipsis properties: it cannot be reversed, it can apply to a much wider range of phrases beyond VP and N', it cannot occur without an overt linguistic antecedent, and it imposes stricter identity conditions than Ellipsis (e.g. Ellipsis allows tense and gender mismatch but true RNR does not).

II. *Across-The-Board Extraposition*

Extraposition is a syntactic phenomenon that allows a restricted set of syntactic constituents (NP, PP, and RelC) to be displaced to the right of their canonical location. Any reasonably robust theory of extraposition and of coordination will necessarily interact and predict the existence of ATB Extraposition. Such cases have the superficial appearance of RNR, but are obtained by Extraposition and coordination for free, without further assumptions. Crucially, ATB Extraposition and true RNR differ in several fundamental ways. First, ATB Extraposition can only apply to extraposable syntactic constituents, whereas true RNR can apply to a much wider range of strings (e.g. immobile elements such as idiom parts, non-constituent sequences, word-parts, and combinations thereof). Second, only ATB extraposed phrases can obtain wide quantificational scope over the coordination. This follows from the fact that ATB Extraposition allows the displaced phrase to reside in a higher structural position, above the extraction sites. In contrast, true RNR does not allow this possibility. In fact, true RNR can be *discontinuous*, in which case the RNRaised string is non-peripherally embedded inside the rightmost conjunct. ATB Extraposed phrases have wide scope over the coordination.

III. *Backward Periphery Deletion*

True RNR can apply in virtually any construction, and target any pair of peripheral strings as long as they have the same morph forms and are prosodically independent (this includes stressed pronouns, word-parts, non-constituents, and even discontinuous strings). Because virtually anything can be deleted in this way, the evidence suggests that this phenomenon is not syntactic in nature, but rather, linearization-based. I argue that true RNR is best modeled as an optional surface-based deletion operation. This form of Deletion allows summative agreement.

Although VP/N'-Ellipsis, Extraposition and Backward Periphery Deletion are different phenomena, the set of strings and constructions that they can apply to is not disjoint. For example, since Extraposition and Ellipsis can target VPs, then certain VP RNRaising structures can be parsed either way. Moreover, since Deletion can apply to a much wider range of strings than Ellipsis or Extraposition, it follows that some RNR cases can be parsed in three different ways. For example, (8)a can be derived by cataphoric N'-Ellipsis as well as by Backward Periphery Deletion. The cataphoric N'-Ellipsis parse is motivated by the existence of an anaphoric parse. This datum contrasts with (8)b, which is an unambiguous case of deletion, since adjectives like *interesting* do not license N'-Ellipsis.

(8) a. The relevant passage is in THE THIRD or in THE FIFTH [line]?
      (cf. with *the relevant passage is in the third line or in the fifth?*)

    b. This is the difference between AN INTERESTING and A BORING [book].
       (cf. with **this is the difference between an interesting book and a boring*)

Similarly, (9)a can be derived by ATB Extraposition or derived by Backward Periphery Deletion. Since this kind of PP complement is extraposable (e.g. *I bought a book yesterday about Quantum Physics*), it follows that it should be extraposable ATB. The example in (9)b, however, involves an idiomatic phrase *X does not play with a full deck* (= 'X is crazy').[5] The PP complement cannot be extraposed or fronted in any way, and therefore there is no available ATB Extraposition parse. Only the Backward Periphery Deletion analysis is possible.

(9) a. I bought A BOOK and you got A MAGAZINE [about Quantum Physics].
      (PP complement is movable)

    b. Robin does NOT PLAY – or PRETENDS not to play – [with a full deck].
       (PP in the idiom phrase is not movable)

1.2   Structure of the paper

This paper is structured as follows. §2 offers an overview of certain key properties of RNR that are usually not recognized in recent literature. First, it argues that RNR data is not restricted to coordinate structures, and can target a wide range of other environments. The degree of flexibility suggests that RNR is not a syntactic operation. Second, it shows that the typical RNR-like prosody is neither obligatory nor a grammatical requirement. Hence, prosody can be used neither as a criterion for identifying RNR, nor a factor for explaining RNR phenomena. I argue that the typical RNR prosody has a functional motivation.

§3 argues that the reason for the lack of a simple analytical generalization for RNR is that three fundamentally different kinds of phenomena have been confounded: VP/N'-Ellipsis, ATB Extraposition, and Backward Periphery Deletion. Once this three-way confound is removed, a simpler interpretation of the conflicting empirical evidence emerges where true RNR boils down to deletion of morphophonological units. All other apparent instances of RNR are obtained for free, as predictions of Ellipsis and Extraposition. The Shared Dependent Condition for Conjunction is argued to permeate all three types of phenomena, and to account for summative agreement and additive RNR.

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[5]The same is true for French, as shown by Mouret and Abeillé 2011.

2 Preliminary observations

2.1 On the lack of syntactic constraints on RNR

There have been many claims that RNR is restricted by various kinds of syntactic conditions. However, none of them are convincing. For example, Hartmann (2000:119) claims that argument structure parallelism is required by RNR. This is refuted by cases like (10), where the argument structures of the matrix verbs are not parallel in any way.

(10) a. Sue GAVE me – but I don't think I will ever READ – [a book about Relativity].

    b. Dale SELLS – and Dana knows a man who REPAIRS – [washing machines].

    c. Never let me – or insist that I – [pick the seats].

Another example of a syntactic RNR condition is Postal (1998:126), in which it is claimed that *Sandra MAY HAVE *exerted and* PROBABLY DID *exert* [*herself*] is odd because of the reflexive. But the sentence is odd because the semantically contrasted verbs are almost synonymous, and therefore do not easily contrast. Note the ameliorative effect that replacing *may* with *might* has on Postal's datum. More recently, Te Velde 2005:496 and others have assumed that RNR is restricted to clausal coordinations. This is not accurate, as originally noted as far back as McCawley (1987:187). The majority of RNR found in the three corpora considered in this study is sub-clausal RNR. The examples in (11) are typical.

(11) a. Will he try to gain A SEAT ON or CONTROL OF [the board] (...)   [WSJ]

    b. The FBI is VERY SUPPORTIVE OF and AN ACTIVE PARTICIPANT IN [Mr. Bennett's initiative].   [WSJ]

    c. (...) it was A SWEET and AN INTELLIGENT [dog].   [SWB]

    d. Holmes rebels against the social conventions of his day not ON MORAL but rather ON AESTHETIC [grounds].   [BRN]

    e. The break-in on Monday was A RARE but not UNHEARD-OF [breach of royal security]. [www.nydailynews.com/news/world/2-arrested-break-in-buckingham-palace-article-1.1448540]

Notably, there are even attested cases of recursive non-clausal RNR. That is, structures where the RNRaised phrase contains yet another embedded RNRaised phrase, as in (12).

(12) Then suddenly we found ourselves in the middle of another fight, AN IRRATIONAL, AN INDECENT, AN UNDECLARED AND IMMORAL [war with our STRONGEST – and some had thought NOBLEST – [ally]].   [BRN]

Furthermore, Wilder (1997), Chaves (2008) and others note that RNR can apply to word-parts in phrasal coordinations, as shown in (13). Crucially, the bracketed strings are not syntactically mobile constituents. To my knowledge, there is no independent evidence for allowing words parts such as these to be accessible to syntax, as would be required by a movement or multidominance account of RNR.

(13) a. Your theory UNDER- and my theory OVER[generates].

b. We ordered the HARD-, but they got us the SOFT-[cover edition].

c. These events took place in PRE- or in POST-[war Germany]?

Another crucial fact about RNR is that it is not circumscribed to coordination structures in any way. This was originally noted by Hudson (1976), and Hudson (1984) with data like (14)a,b, and noted by various other authors since then, although it is often not taken into consideration.[6]

(14) a. I'd have said he was sitting on the EDGE OF rather than in the MIDDLE OF [the puddle].

b. It's interesting to compare the people who LIKE with the people who DISLIKE [the power of the big unions].
(Hudson, 1976:550)

c. Anyone who MEETS really comes to LIKE [our sales people].
(adapted from Williams (1990))

d. Spies who learn WHEN can be more valuable than those able to learn WHERE [major troop movements are going to occur].

e. Politicians who fought FOR may well snub those who have fought AGAINST [chimpanzee rights].
(Postal, 1994)

f. Those who voted AGAINST far outnumbered those who voted FOR [my father's motion].
(Huddleston et al., 2002:1344)

g. If there are people who OPPOSE then maybe there are also some people who actually SUPPORT [the hiring of unqualified workers].

In (15) are various examples of non-coordinate RNR involving adjunction structures. Examples (15)e,f are my own and (15)g,h are attested. For more examples see Phillips (1996:56), and for arguments against the parasitic gap analysis of such data see Levine (2001:165).

(15) a. It seemed LIKELY TO ME though it seemed UNLIKELY TO EVERYONE ELSE [that he would be impeached].
(Bresnan, 1974)

b. John OFFENDED by not RECOGNIZING [his favorite uncle from Cleveland].
(Engdahl, 1983:12)

c. John THROWS OUT whereas Mary EATS [anything that happens to be in the refrigerator].
(Goodall, 1987:97)

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[6]Many recent RNR studies ignore Hudson's finding and simply assume that RNR always targets coordinate structures (e.g. Hartmann (2000:55,141), Velde (2005:496), and Sabbagh (2007), to cite only a few). Goodall (1987:98) noted that RNR could not be treated in terms of his account of union of reduced phrase markers precisely because of such non-coordinate instances. Williams (1990) took the opposite approach, by arguing that (14c) is evidence that Subject+VP structures have a 'coordinate character' and consequently that the concept of coordination, and hence 'across-the-board' extraction, should be extended to these structures as well. However, this move is problematic as shown by Postal (1993) and McCawley (1998:Ch.9).

d. We SUGGEST to our employees – without actually REQUIRING of them – [that they wear a tie].
(Authier, 1989)

e. The volcano is glaciated, making for an INTERESTING while NOT VERY TECHNICALLY CHALLENGING [climb].

f. If you keep AVOIDING then you'll never get TO MEET [your real father].

g. Oncogenes must be present for a cell to become malignant, but researchers have found them IN NORMAL as well as IN CANCEROUS [cells], suggesting that oncogenes do not cause cancer by themselves. [WSJ]

h. (...) the President's decision will finally clarify itself as A MORAL, rather than A MEDICAL [problem]. [WSJ]

As expected, word-part RNR also arises in non-coordinate structures, as illustrated in (16).

(16) a. Explain how signals move from a PRE- to a POST-[synaptic neuron].

b. I'm more interested in FOUR- than in FIVE-[star hotels].

c. You must learn to distinguish NEURO- from PSYCHO[linguistic claims].

d. Alison majored in NEURO-, while Alexis majored in SOCIO-[linguistics].

The data above show that RNR can in principle occur in virtually any kind of construction. RNR is also fairly unrestricted with regard to the kinds of syntactic nodes that it can cross. In particular, it can cross clausal boundaries, as (17) shows.

(17) a. Sally MIGHT BE and everyone believes Sheila DEFINITELY IS [pregnant].
(Ross, 1967:4.2.4)

b. I know that you SAID and I happen to AGREE [that I need a new car], but I just don't have the money for it right now.
(adapted from McCawley (1987:188))

c. I think that I WOULD and I know that John WILL [buy a portrait of Elvis].
(McCawley, 1998)

d. One police officer said that he LIKED and another even boasted that he DEFENDED [vigilante justice].

A well-known property of RNR is that it not constrained by islands, as noted by Wexler and Culicover (1980), Grosu (1981:45), and McCawley (1982). Consider the evidence in (18).[7]

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[7]Steedman (1985 1990 2001) and Dowty (1988:183) claim that RNR is bounded, nonetheless, as predicted by their accounts. For example, Dowty (1988) argues that *an idea that, and a robot which [can solve this problem] is evidence for islands in RNR. But as Phillips (1996:95) points out, this oddness is explained by semantic factors: it is impossible to semantically contrast *that* (which is semantically vacuous) with *which*. This is supported by the acceptability of Bresnan's (18)d,e, where the verbs are contrasted, rather than the complementizers. Steedman (2001:17) argues that RNR exhibits islands effects by claiming that *I hope that I will meet the woman* WHO WROTE *and you expect to interview the consortium* THAT PUBLISHED [*that novel about the secret life of legumes*] is ungrammatical. Many of my informants do not share that judgment.

(18) a. I know a man who SELLS and you know a person who BUYS [pictures of Elvis Presley].

b. John wonders when Bob Dylan WROTE and Mary wants to know when he RECORDED [his great song about the death of Emmet Till].
(Wexler and Culicover, 1980:299)

c. Politicians WIN WHEN THEY DEFEND and LOSE WHEN THEY ATTACK [the right of a woman to an abortion].
(Sabbagh, 2007:382,ft.30)

d. Lucy CLAIMED that – but COULDN'T SAY exactly when – [the strike would take place].

e. I found a box IN which and Andrea found a blanket UNDER which [a cat could sleep peacefully for hours without being noticed].
(Bresnan, 1974)

But the flexibility of RNR goes beyond that. Levine (1985:493) showed that RNR is not generally limited by recursion. In other words, phrases with different levels of recursive embedding can all share the same RNRaised element. This possibility is illustrated by (19), in which completely different coordinate structures RNRaise the same string.

(19) [[John gave SILVER $_1$ and Harry gave GOLD $_1$], [but nobody gave PLATINUM $_1$] [to the father of the famous quintuplets]$_1$].
(Sabbagh, 2007:383,ft.31)

Furthermore, Levine (1985) and Postal (1998:155) also argue that a string can be RNRaised out of a RNRaised string. Postal refers to this as *autorecursive* RNR. In (20) the first clausal coordination RNRaises the CP *that Tony could*, which is itself missing a VP complement *hire more workers*. The latter is RNRaised out of *that Tony could*, and out of the *I believe that he should*, in a different and higher coordinate clause.

(20) Frank reported TO LOUISE $_1$ and Mike admitted TO MARION $_1$ [that Tony COULD $_2$]$_1$ and I believe that he SHOULD $_2$ – [hire more workers]$_2$.
(Postal, 1998:155)

Although (20) are fairly artificial, the attested example in (21) is acceptable to all of the native speakers that I consulted. This sentence, and various other like it, are found in the Employment Based Permanent Resident Questionnaire (I-485 Application) that United States green card applicants must fill out.

(21) Have you ever ENGAGED IN, CONSPIRED to engage in, or do you INTEND to engage in, or have you ever SOLICITED membership or funds for, or have you through any means ever ASSISTED any type of material support to any person or organization that has ever ENGAGED or CONSPIRED to engage in [sabotage, kidnapping, political assassination, hijacking, or any other form of terrorist activity]?[8]

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[8][http://www.uscis.gov/files/form/i-485.pdf]; Retrieved January 2012.

In (21) the preposition stranding in the three first conjuncts shows that the RNRaised structure is the bracketed NP at the end of the sentence. However, some of the conjuncts actually RNRaise a PP, not an NP. For example, in the relative clause '*that has ever* ENGAGED *or* CONSPIRED *to engage*' both occurrences of *engage* share the same PP headed by *in*. Here, RNR becomes autorecursive: the NP embedded in this RNRaised PP itself undergoes RNR. It is this NP that the first four conjuncts of (21) share.

The empirical evidence indicates that RNR is not syntactically restricted, contra Dowty (1988), Postal (1998), Hartmann (2000), Steedman (2001), Velde (2005), Sabbagh (2007), Gracanin-Yuksek (2013) and many others. In particular, the data suggest that RNR cannot be seen as involving the same syntactic mechanism that is responsible for leftward extraction. For further evidence that certain RNR cases are not syntactic phenomena see §3.3.

2.2 On the phonology of RNR

Prosody is a criterion frequently used to detect RNR. Selkirk (2002) and Kentner et al. (2008) experimentally established that standard RNR cases (i.e. where an NP is RNRaised from a clausal coordination) typically involve a L-H* pitch accent on the contrasted elements in both conjuncts, followed by a low boundary tone, and sometimes a pause.[9] Contrastive focus, if present, must coincide with semantic contrast as (22) and (23) show.

(22) a.*John GAVE but Bill didn't GIVE [a present to Mary].

   b.*John GAVE a present to Mary but Bill didn't GIVE a present to Mary.

(23) a. John GAVE but Bill DIDN'T give [a present to Mary].

   b. John GAVE a present to Mary but Bill DIDN'T give a present to Mary.

It is obvious that contrastive prosody by itself does not trigger RNR. After all, (23)a is as acceptable as (23)b, and both are felicitous answers to the question *what did John and Bill decide to do about Mary's birthday gifts?* Still, Hartmann (2000:20) proposes that focus triggers a deletion operation called *deletion by focus*, which in turn yields RNR. This position is problematic for two reasons. First, it requires that the elements preceding the RNRaised string must be contrastively interpretable narrow foci (Hartmann, 2000:141). This proposal is at odds with (24), where the focused elements are not adjacent to the putative ellipsis site.

(24) a. My mother blushed at this small lie because SHE knew and WE knew [that the roosters had already been paid for].

   b. They REFUSED to mention and we FAILED to notice [that they are not there].

   c. I find it EASY to believe, but Joan finds it HARD to believe [that Tom is dishonest]. (Postal, 1974:127)

   d. The Fed IS RESPONSIVE to, and CANNOT HELP being responsive to [the more overtly political part of the government].   [WSJ]

---

[9]Selkirk found that in 10% of the cases there was no pause or break, and another 10% contained H* or !H* pitch accents rather than the typical L+H*. Kentner et al. (2008:212) replicated these results.

Second, there are instances of RNR that do not require significant contrastive prosody. In (25)a the RNRaised unit can be realized with neutral intonation. The rightmost unit can be integrated in the preceding structures without major difficulty. Other examples of RNR that do not require especial intonation at a normal speech rate are (25)b,c. This is consistent with Kentner et al. (2008:212), who experimentally show that the phonological boundary between conjuncts is typically *weaker* than the boundary between non-RNR counterparts of the same sentence.

(25) a. Tom took many photographs and Sue painted some portraits [of famous people].

     b. These first magnitude wines ranged in price from $40 to $125 [a bottle].   [WSJ]

     c. (...) said Lonnie Thompson, a research scientist at Ohio State who dug for and analyzed [the ice samples].   [WSJ]

     d. And because of the time difference, the Japanese and the U.S. [markets' trading hours] do not overlap.   [BRN]

Cases like (26)a,b are also instances of RNR where the contrastive prosody can be minimal. McCawley (1987:187) argued that these are not simply cases of adjectival conjunction because although the nominal heads *knowledge* and *food* are singular, there is plural subject-verb agreement.

(26) a. [Historical and scientific [knowledge]] are different in nature.

     b. [Thai and Burmese [food]] are quite similar.

On the other hand, in cases like (27) only the second daughter seems to require prosodic focus. The stranded word in the first daughter can be realized without prosodic contrast.

(27) a. (...) ridiculous may be the only way to describe how the U.S. decides to take – or rather, NOT to take – [covert action].   [WSJ]

     b. (...) 17 other attorneys representing 18,136 claimants in the U.S. and abroad argue that the appeal would delay – and perhaps even DESTROY – [a $2.38 billion settlement fund that is the centerpiece of the reorganization plan].   [WSJ]

     c. To kill an error is as good a service as, and sometimes even BETTER THAN, [the establishing of a new truth or fact].[10]

Finally, in other cases the first conjunct is prosodically contrasted but the second need not be. As noted by Wagner (2010:ft.32), in (28) the RNRaised element can be unaccented and grouped prosodically with the second conjunct.

(28) Thatcher's legacy and image loom large over British psyche for both those who loved and those who hated [her].

---

[10]Charles Darwin, March 5, 1879. *More Letters of Charles Darwin, vol II. Darwin to Wilson* p.422

These data indicate that focus accent and rising intonation are not grammatical requirements of RNR. Instead, they suggest that the peculiar prosody that often accompanies RNR is functionally motivated. The RNR parse for a given sentence often must compete with a non-RNR parse. Sometimes the ambiguity is only temporary, as in *Tom promised me and Mary offered me* [*$100*]. In this example *Tom promised me and Mary* is temporarily a plausible parse. However, sometimes the ambiguity is permanent, as in *Robin is singing and Kim is playing* [*a song*]. Prosody can aid the planning, production and comprehension of such structures, by signaling not only that such structures involve incomplete phrases, but also where the extra computational steps must be taken in order to allow a peripheral string to be shared by multiple phrases. The guiding and preemptive role of prosody in parsing has been noted before, in a variety of constructions (Fodor, 2002a b, Kitagawa and Fodor, 2006). See also Frazier et al. (2006) for arguments that prosodic representations are central in permitting an utterance to be retained in memory while it is processed.

I therefore conjecture that the typical RNR prosody emerges from the interaction of ambiguity-avoidance processing strategies and the semantic contrast that such constructions (as well as their non-RNR counterparts) exhibit. This would explain why the VP RNR parse of (29)a – paraphrasable as *Tom is happy and Fred is happy* – is impossible to accept. There is no way to cue the RNR parse, and therefore it is preempted by the NP coordination parse. It is independently known that the more committed the parser becomes to a syntactic parse, the harder it is to reanalyze the string (Ferreira and Henderson, 1991 1993, Tabor and Hutchins, 2004). Now compare (29)a with the acceptable VP RNR parse of (29)b. Here, a NP coordination parse is not grammatical, and thus it is unable to preempt the RNR parse.

(29) a.*TOM and FRED [is happy].

     b. Today A MAN and tomorrow A WOMAN [is coming to interview for my position].

A similar pattern arguably arises in sentences like *The Police arrived to taser, pepper-spray and arrest me*. If the verbs are not prosodically contrasted, and the pronoun is unstressed, then speakers are more likely to assume that *taser* and *pepper-spray* are being used as intransitive verbs. But if the verbs are contrasted and the pronoun is stressed, then it is more likely that each VP shares the same complement.

Kentner et al. (2008) reports several perceptual studies where the lack of contrastive prosody in RNR caused processing difficulties in the presence of parsing conflicts. In one experiment, spoken sentences like *Nina is riding and Ian is fixing a bike* were given to subjects. Such items were preceded by a context that biased the RNR reading or the non-RNR reading. The results show that items were judged to be more acceptable faster when the correct prosodic contours were employed. Kentner et al. (2008) conclude that processing obstacles created by syntactic complexity can be neutralized with optimal prosodic phrasing, since comprehenders can use prosodic cues during on-line sentence processing in order to assign the appropriate reading to an otherwise ambiguous string. This makes sense if the prosodic contour of RNR is functionally motivated rather than a grammatical constraint.

Further evidence consistent with the idea that the extra processing difficulty incurred by RNR can be reduced with prosodic cues comes from the fact that RNR is approximately twice as frequent in written corpora as in spoken corpora (Meyer, 1995, Greenbaum and Nelson, 1999, Harbusch and Kempen, 2009). This is to be expected. In a RNR construction comprehenders and producers alike must maintain in working memory incomplete structures which must be later linked to the

RNRaised string. This adds a significant processing load to speech production and comprehension, in which cognitive resources are already strained by real-time communicative pressure. In written text, however, speakers have more time to plan and comprehend more complex and exotic sentence types. Thus, writers less pressured to avoid complex sentences than oral speakers.

Finally, it seems that the presence of a prosodic phrase boundary after the contrasted element depends on the length of the structure (Kentner et al., 2008:210). Thus, as long as this is allowed by the independently motivated phonological rules of the grammar, short RNRaised elements tend to be integrated in the current intonational phrase and larger ones must be able to make up their own. I illustrate this point with the data in (30), in increasing order of minimally required prosodic contrast. For example, (30)a can get by with minimal focus contrast but the sentences in (30)c,d cannot, under penalty of causing the language processor to garden-path and go awry. In other words, I claim that utterances like (30)d are easier to plan, produce and comprehend with strong prosodic cues that signal the presence of a non-standard structure. Crucially, this cline in required focus contrast is not present in the non-RNR counterparts of (30). This is expected in a functional account of RNR prosody, but not in a syntactic account.

(30) a. I specialized in pre- and in post-[Columbian cultures].

   b. Fred STUDIES and Sue SPECIALIZES IN [pre-Columbian cultures].

   c. I met someone who STUDIES and Sue mentioned someone who SPECIALIZES IN [pre-Columbian cultures].

   d. Wait a minute...! You met someone interested in *PRE-* or someone interested in *POST-*[Columbian cultures]?

This is not to say that there are no phonological constraints at work in RNR. Swingle (1995) and McCawley (1998) argue that the RNRaised elements must always be phonological phrases or at least sequences of intonational phrases. However, they hasten to point out that such a proposal is problematic for instances of RNR involving word-parts. A simpler and more general approach is to assume that RNRaised units must adhere to the general prosodic phrasing rules of the grammar. In some cases this means that the RNRaised element can be an intonational or phonological phrase, and in other cases it cannot. In some cases, the RNRaised element must be able to fuse with the preceding string, but not in others. Let us consider some evidence for this. Ross (1967:221), Hankamer (1973), Bresnan (1974), Swingle (1995), Carpenter (1992:196) claim that certain expressions block RNR:

(31) a. He tried TO PERSUADE but he couldn't CONVINCE [THEM] / *[them].

   b.*I think that I'D and I know that PAT'LL [buy those portraits of Elvis].

   c.*They've always WANTED a – and so I've GIVEN THEM a – [coffee grinder].

   d.*I bought EVERY RED and Jo liked SOME BLUE [t-shirt].

Swingle (1995) notes that the oddness of the examples in (31) follows from general prosodic phrasing principles that have nothing to do with RNR. Pronominal RNR like (31)a is only acceptable in one of two scenarios: either the second verb has low contrastive stress and the pronoun can prosodically fuse with it as already seen in (26), or if the pronoun is stressed and thus can create an

independent phonological phrase. In general, unstressed pronouns must form a prosodic unit with their governing head. However, in (31)a the head that the unstressed pronoun would lean on bears strong contrastive stress, which forces a prosodic phrase boundary.[11] As Zwicky (1986) argues, unstressed pronouns must *lean* on the governing host, since they cannot form prosodic phrases in their own right if they do not bear accent. There are at least three sources of evidence for this. First, we have the oddness caused by unstressed pronouns not adjacent to their verbal head, as in *we took in* [*him] / [*the mutt*] *yesterday*. Crucially, Zwicky notes that the oddness vanishes if the pronouns are stressed, or if the pronominal phrase is made heavier, as in *we took in (both) him and her*. Second, unstressed pronouns cannot be stranded in 'non-constituent coordination' structures like *Robin gave the book to my brother, or* [*it] / [*the magazine*] *to my sister?* Third, unstressed pronouns cannot be stranded by parenthetical insertion, as in **they gave my father, who had just turned 60, it* (Ross, 1967:60). Similarly, conjunction markers must prosodify with their hosts. This explains the oddness of (32). The prosodic phrasing that RNR would require is *[(*a monograph on Mesmer and*)] [(*Freud*)], which is not well-formed because of independent prosodic facts.

(32) *Sandy is writing an article on Aristotle and ~~Freud~~, and Sal has just published a monograph on Mesmer and [Freud].
(McCawley, 1982:101,ft.11)

Similarly, the prosodic phrasings needed for (31)b,c are equally ruled out on independent grounds, having nothing to do with RNR. Stressed pronouns, affixes that correspond to independent prosodic words, and compound parts can be RNRaised because they are independent prosodic units in their local domains. Conversely, certain determiners, cliticized verbs and unstressed pronouns must fuse with their respective prosodic hosts, and therefore block RNR. This prosodic account sheds light on various puzzles, such as (33).

(33) *The brother of – and John believes that – Pete slept.
(Dekker, 1988)

The oddness of (33) arguably follows from conflicting syntax-prosody requirements. The string *Pete slept* does not form a constituent in the first conjunct, and therefore cannot form an intonational unit according to the Sense Unit Condition (Selkirk, 1984:291). Basically, two constituents C_x and C_y can form a prosodic unit *iff* C_x modifies or is an argument of C_y. The Sense Unit Condition provides an explanation for, among other things, for why the prosodic phrasing in (34)a is grammatical, but not the phrasing in (34)b. Note that (34)c, attributed to Mark Liberman in Pierrehumbert (1980), would have a pronunciation virtually identical to that of (34)a. For a more sophisticated alternative to the Sense Unit Condition, cast in HPSG, see Taglicht (1998).

(34) a. [Three mathematicians in ten] [derive a lemma].

b. *[Three mathematicians] [in ten derive a lemma].

c. [Three mathematicians] [intend to rival Emma].

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[11]Féry and Hartmann (2005) study German RNR, and offer evidence that when the shared constituent, or part of it, can form its own phonological phrase, it is accented. But if it is integrated into an independently existing phonological phrase, it is unaccented.

In (33) the string *Pete slept* is forced to have a rather awkward prosodic constituency (e.g. ?*[*the BROther of*] [*Pete*] [*slept*]). The opposite occurs in the second conjunct, where *Pete slept* is a constituent and a single intonational phrase, in accordance to the Sense Unit Condition.

Further evidence for RNR targeting prosodically independent units in their local domain comes from a phenomenon observed in Castillian and Portuguese, where the adverbial suffix *-mente* (required to derive adverbs from adjectives) can be RNRaised (Chaves, 2008). This is seen in the Portuguese data in (35). In phrasal coordination, the suffix can be RNRaised as in (35)a, but not in clausal coordination (35)d. The latter is out because such suffixes cannot form an intonational phrase by themselves.

(35) a. O   advogado agiu rapida(mente) e   eficientemente?
        the lawyer   acted rapid(ly)   and efficiently

     b. O   advogado agiu rapidamente e   eficiente*(mente)?
        the lawyer   acted rapidly   and efficient(ly)

     c.*O   advogado agiu rapida / eficiente?
        the lawyer   acted rapid /efficient

     d.*O   advogado agiu rapida(mente) e   o   magistrado agiu eficientemente?
        the lawyer   acted rapid(ly)   and the magistrate acted efficiently

Chaves (2008) notes that although Italian and French also have the same suffix *-mente*, the omission pattern in (35)a is not allowed in those languages. The reason for this is that although the suffix *-mente* is an autonomous phonological word in Romance in general, it has lost some of its independence in Italian and French. In fact, the pattern in (35)a,b was possible in Old French (Grevisse 1986(1936), 255) and in Old Italian (Ashby, 1977:44).

In sum, RNR does not impose any prosodic constraints. Rather, RNR must obey the independently motivated prosodic phrasing rules of the grammar. The prosodic contour typically observed in RNR depends on the size of the remnants and may be functionally motivated by the need to reduce ambiguity. Without it, sentences that appear to be missing a complement would be assumed by the parser to be incomplete, and therefore ill-formed. With prosodic cues, however, it becomes clearer that the sentence is not complete and that the remainder is expected downstream. Hence, the longer the RNR, the stronger the prosodic cues, as in (30).

3   RNR as the conflation of three distinct phenomena

3.1   VP/N'-Ellipsis

Barros and Vicente (2011) argue that some cases of RNR are best viewed as instances of VP/N' Ellipsis than RNR proper, based on inflection mismatches and vehicle change effects, originally noted by Höhle (1991). As such, these putative RNR cases are obtained for free, as predictions of any sufficiently robust theory of VP/N' Ellipsis. Any cataphoric ellipsis has the potential to resemble RNR, especially if there is contrastive prosody. In what follows I add various empirical arguments in favor of this view.

Bošković (2004) argues that examples like (36) show that RNR is transparent with regard to tense, and concludes that RNR is similar to VP-Ellipsis.

(36) a. John will (sleep in her house) and Peter already has slept in her house.

b. John won't (negotiate his salary) but Susan already has negotiated her salary.

But this conclusion seems problematic. RNR environments that cannot be derived via VP-Ellipsis impose stricter identity conditions. This is shown in (37), where the RNRaised VP must be compatible with both conjuncts.

(37) a. Tom let MIA and Mary let BILL [play outside].

b. Tom allowed MIA and Mary allowed BILL [to play outside].

c. Tom let MIA and Mary allowed BILL TO [play outside].

d.*Tom let MIA and Mary allowed BILL [to play outside].

If (36) involve cataphoric VP-Ellipsis, then the oddness of (37)d is explained. Of course, (36) can have a RNR-like prosody, but so can non-RNR constructions (moreover, I show in §2.2 that prosody is not a reliable criterion for identifying RNR). Further support for the cataphoric VP-Ellipsis view comes from the fact that (36) has anaphoric counterparts, as (38) illustrates.

(38) a. John will sleep in my house, and Peter already has.

b. I certainly would clarify the situation but you already have.

This point is important because true RNR phenomena cannot be reversed as shown in (39).

(39) a. *Chris likes [his bike] and Bill loves.
(cf. with 'Chris LIKES and Bill LOVES [his bike]')

b. *Fred sent Mary [a love poem] and Tim handed Sue.
(cf. with 'Fred SENT Mary and Tim HANDED Sue [a love poem]')

c. *Did Kim become a periodontist or an ortho-?
(cf. with 'Did Kim become a PERIO- or an ORTHO[dontist]?')

Vehicle-change phenomena are also to be expected if some cases of RNR are VP-Ellipsis, as Barros and Vicente (2011) argue. This is borne out in (40), adapted from Larson (2012).

(40) a. Tom didn't ~~pass his math exam~~ but I'm sure Alice will [pass her math exam].

b. John will ~~make his bed~~ and Sue already has [made her bed].

But this argument is not a strong one, since sloppy readings can also arise in RNR structures that do not allow a VP-Ellipsis analysis, as illustrated in (41)a. In §3.3 I argue that such cases are an instance of Backward Periphery Deletion, not Ellipsis. This is supported by the fact that *gender* mismatches block sloppy readings in NP RNR as in (41)b, but not in VP-Ellipsis as (40) shows. In sum, the contrast between (40) and (41) indicates that (40) is due to Ellipsis but that (41)a is not.

(41) a. Chris$_x$ LIKES ~~his$_x$ bike~~ and Bill$_y$ LOVES [his$_y$ bike].
(Höhle, 1991, Jacobson, 1999)

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  b. #Chris$_x$ LIKES ~~his$_x$ bike~~ and Sue$_y$ LOVES [her$_y$ bike].

  As a reviewer notes, a clearer prediction emerges from the well-known fact that cataphoric VP-Ellipsis requires that the elided material not be c-commanded by the constituent containing the antecedent (cf. *You never do _ when you say you will help me* with *You never help me when you say you will _*). As predicted, cases like (42) are not licensed by VP-Ellipsis because the c-command condition is violated. Moreover, (42) is not licensed by Backward Periphery Deletion either because gender morph form mismatches are not tolerated in general. Moreover, note that replacing *Tom* with *Ann* causes (42) to become acceptable, as expected, as an unambiguous instance of Backward Periphery Deletion.

(42) *Tom COULDN'T even though Sue COULD save herself.

Other examples that are arguably also instances of Ellipsis are shown (43). Their reversal indicates that these cases can parsed as backward sluices (Giannakidou and Merchant, 1998).

(43) a. WHY and HOW [do scientists study climate change]?
    (cf. with 'why do scientists study climate change, and how?')

   b. It's not clear IF or WHEN [Mary bought the book].
    (cf. with 'it's not clear if Mary bought the book, or when')

Examples like (44), on the other hand, are not reverse sluices, and therefore are probably not instances of Ellipsis. Rather, these cases are unambiguous cases of Backward Periphery Deletion. Thus, it is plausible that (43) can either be parsed as Ellipsis or as Backward Periphery Deletion.

(44) a. WHERE and WHO [is the cheapest cosmetic dentist in Manchester]?
    (cf. with *where is the cheapest cosmetic dentist in Manchester, and who?)

   b. The people OF whom and TO whom [George speaks] are specially selected.
    (cf. with *the people of whom George speaks and to whom are specially selected)

   c. (...) that is to say, the protection of a woman's right to choose, WHETHER, WHEN and WITH WHOM [to have sexual intercourse].
    (cf. with *when / with whom to have sexual intercourse and whether)
    [books.google.com/books?isbn=9004202633]

  As expected, examples like (45) are impossible because they cannot be parsed as sluices or as deletion. The clausal coordination counterparts that would feed the sluice or the deletion operations are not grammatical to begin with, since the verbs are missing complements.

(45) a.*Who and what found?
    (cf. with *Who found and what found?)

   b.*Who and whom saw?
    (cf. with *Who saw and whom saw?)

  Ellipsis can also explain other puzzling cases of apparent N' RNR. Cases like (46) – (49) are best seen as N'-Ellipsis (Jackendoff, 1971). This is motivated by the fact that such cases can be reversible and have extra-sentential antecedents.

(46) a. I've never owned any, but I've always wanted diamonds.
(cf. with 'I've always wanted diamonds but I've never owned any')

   b. [Speaker A]: I need to buy some diamonds.
[Speaker B]: I don't have any.

(47) a. Fred got most – but not all – of Sue's letters.
(cf. with 'Fred got most of Sue's letters – but not all.')

   b. [Speaker A]: I read most of Sue's letters.
[Speaker B]: I read all of them. And I still read them now.

(48) a. One or more boys may continue to live at the boarding home.
(cf. with 'One boy or more may continue to live at the boarding home')

   b. [Speaker A]: I invited a boy to our party.
[Speaker B]: You should invite more.

(49) The annual lease payment increases in the third or in the fifth [year]?
(cf. with 'The annual lease payment increases in the third year or in the fifth?')

But not all nominal RNR is due to N'-Ellipsis. Consider the contrast in (50). None of these cases can be reversed or have extra-sentential antecedents. Hence, these must be analyzed as the by-product of a different mechanism from N'-Ellipsis. In §3.3 I view such cases as instances of Backward Periphery Deletion.

(50) a. This is the difference between an INTERESTING and a TEDIOUS [teacher]$_{N'}$.
(cf. with *this is the difference between an INTERESTING teacher and a TEDIOUS)

   b. We relied on a NEURO- and on a PSYCHO[linguistic]$_A$ [claim]$_N$.
(cf. with *we relied on a NEURO-linguistic claim and on a PSYCHO)

   c. Do you usually collaborate with an ORTHO- or with a PERIO[dontist]?
(cf. with *do you usually collaborate with an ORTHOdontist or with a PERIO?)

In sum, there is evidence that some apparent cases of VP/N' RNR are best viewed as VP/N'-Ellipsis rather than RNR proper. Whereas VP-Ellipsis is a semantic dependency that (anaphorically or cataphorically) targets exclusively VP and N' phrases, RNR is not.

RNR phenomena also allows internal readings for symmetric predications, like (51), as noted by Larson (2012:147). In these data there is a verb form mismatch that is characteristic of VP-Ellipsis, contra the predictions of Barros and Vicente (2011), that internal readings cannot occur in VP-Ellipsis.

(51) a. Mary MUST and Iris WILL BE [working on exactly the same topic].

   b. Alice MUST and Iris OUGHT TO [be working on different topics].

   c. She thinks that she absolutely MUST and Bill fears that he WON'T [present different topics to Alice's supervisor].

Note that further evidence that these data are instances of Ellipsis comes from the fact that such readings can span different sentences, as in (52).

(52) A: Alice and Iris were asked to [work on different topics].
B: Alice is happy to, but I don't think Iris is.

Finally, certain readings also arise in N'-Ellipsis, as shown in (53)a,b. In the relevant interpretations, the RNRaised nominal is plural even though its adjectives are singular. This is arguably cataphoric N'-Ellipsis because *third* and *fifth* allow anaphoric dependencies (e.g. *the second year was hard but the third was even harder*). Additive N' readings are not allowed by any other type of RNR. This is illustrated by (53)c,d. Adjectives like *real* and *interesting* cannot license N'-Ellipsis (e.g. **the tedious book was expensive, and the interesting was cheap*), and therefore the additive readings are unavailable.

(53) a. The relevant passage is between THE THIRD and THE FIFTH [lines].
(= 'the relevant passage is between the third (line) and the fifth line')

b. This increases the annual lease payment in THE THIRD and in THE FIFTH [years].
(= 'this increases the annual lease payment in the third (year) and in the fifth year')

c.*This is the difference between THE REAL and THE FICTIONAL [worlds].
(= 'this is the difference between the real (world) and the fictional world')

d.*This is the difference between an INTERESTING and a TEDIOUS [teachers].
(= 'this is the difference between an interesting (teacher) and a tedious teacher')

Furthermore, as expected from N'-Ellipsis, the plural antecedent of such readings can reside in a different sentence, as in (54) and (55).

(54) A: I know the relevant passage is somewhere in the first [lines of the paper].
B: I think it is between the third ~~line~~ and the fifth ~~line~~.

(55) A: Most people [have gall bladders].
B: Well, I don't ~~have a gall bladder~~ and Robin doesn't ~~have a gall bladder~~ either.

There are several approaches to the analysis of Ellipsis: deletion (Sag, 1976, Merchant, 2001), LF-copying (Williams, 1977), or direct interpretation (Ginzburg and Sag, 2000, Culicover and Jackendoff, 2005, Jacobson, 2008)). In the latter, the remnant phrase is generated 'as is' and assigned an interpretation based on the surrounding context. For example, in Ginzburg and Sag (2000), Sag and Nykiel (2011), a VP containing an elliptical object is licensed by a rule along the lines of (56). The feature VAL(ENCE) lists the subcategorized phrases of a given head, SEM(ANTICS) contains semantic content (i.e. set of semantic restrictions) and C(ON)T(E)XT contains information structure.

(56) VP ELLIPSIS CONSTRUCTION

$$
\text{VP}\begin{bmatrix} \text{SEM} & \begin{bmatrix} \text{RESTR } \{Q(P)\} \end{bmatrix} \\ \text{CTXT} & \begin{bmatrix} \text{SAL-UTT} & \langle \text{VP} \rangle \\ \text{MAX-QUD} & P \end{bmatrix} \end{bmatrix} \rightarrow \text{Aux}\begin{bmatrix} \text{SEM} \begin{bmatrix} \text{RESTR } \{Q\} \end{bmatrix} \end{bmatrix}
$$

More specifically, MAX(IMAL-)Q(UESTION) U(NDER) D(ISCUSSION) records objective facts of the dialogue and is constantly being updated as discourse progresses, whereas SAL(IENT)-UTT(ERANCE) contains categorial information about the (sub)utterance that receives the widest scope in MAX-QUD. Crucially, such information need not correspond to overt discourse, which accounts for remnants that do not have sources (e.g. sluices like *What floor?* or *What else?*, and VP Ellipses like *Don't!*, *Do I have to?* and *I can't.*). Since the MAX-QUD is part of the Dialogue Game Board, where the objective facts of the dialogue are recorded, the denotation of any given referring expression is grounded objectively, rather than from the perspective of any single dialogue participant. This accounts for the constraints on indexical resolution in ellipsis noted by Sag and Hankamer (1984). In this base generation account, elliptical constructions are taken to be a subset of a larger class of constructions including those of sentence fragments, short answers to *wh*-questions and reprise structures.

Basically, (56) allows an auxiliary to project a VP, combining the semantics Q of the auxiliary with the semantics of missing the VP complement P. I refer the reader to Sag and Nykiel (2011) and Culicover and Jackendoff (2005) for an overview of the various empirical facts supporting the direct interpretation analysis: (i) ellipsis need not have overt antecedents; (ii) ellipsis is immune to island constraints; and (iii) the category of the remnant must match that of the antecedent (which includes case matching effects like those observed in Hungarian). All of these properties follow straightforwardly from the direct interpretation analysis, without any need for further modifications to the theory.

Due to space limitations I cannot discuss Ellipsis phenomena in detail, but a sketch of cases like (51) and (52) is illustrated in Figure (1). In a nutshell, such cases arise when both auxiliaries undergo the complement ellipsis rule in (56).
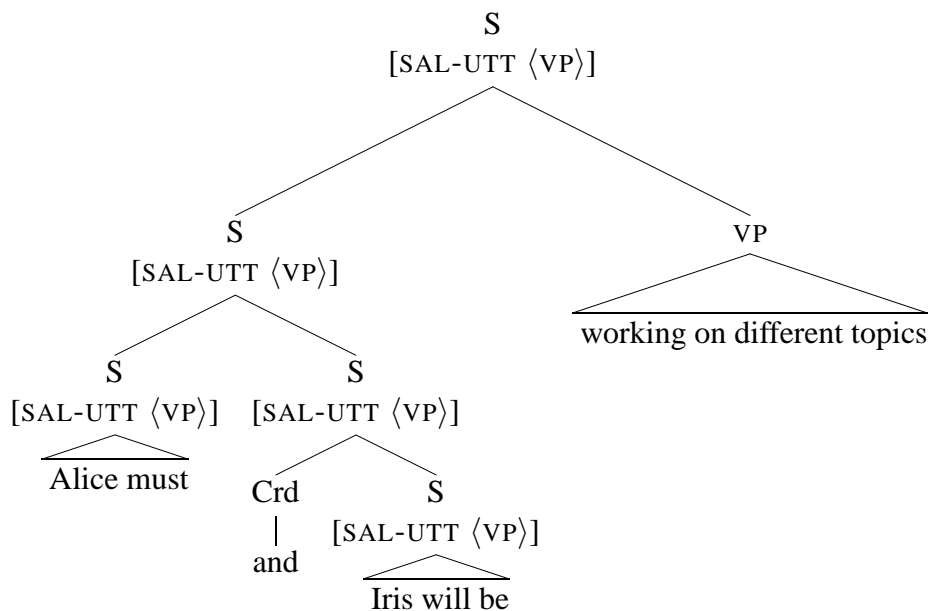

Figure 1: Multi-clausal VP Ellipsis

Note that I am assuming that a binary branching rule of the form S → S[SAL-UTT⟨X⟩] X. This allows an utterance S with a [SAL-UTT ⟨X⟩] specification to be juxtaposed with a phrase that instantiates X. In the case of the structure in Figure (1), X corresponds to the VP *working on*

different topics. Such a rule is independently motivated as (57) shows. The complement of the auxiliary *do* is the VP in SALL-UTT, which is resolved by the continuation *try to quit*.

(57) A: Tom is trying to quit smoking.

B: I did [too]. (I mean,) try to quit.

This account predicts that cataphoric cases like (58) are impossible, since the VP *work on different topics* is combining with the first conjunct rather than with the entire coordination.

(58) *Alice MUST work on different topics and Iris will be.

Whatever the best formal analysis of ellipsis may be, the evidence above indicates at least some instances of RNR are best seen as instances of Ellipsis. Below I discuss symmetric predicates, additive readings and extraposition in more detail.

3.2 ATB extraposition

Various authors have argued that RNR is a rightward syntactic dependency (Ross, 1967, Hankamer, 1971, Postal, 1974, Gazdar, 1981, Postal, 1998, Sabbagh, 2007). Although these accounts are technically very different from each other, they all rely on the assumption that RNR involves a structurally distinct syntactic constituent linked to multiple daughters. In a sense, this is the mirror-image of ATB leftward extraction, like *it is* [*chocolate bagels*]$_x$ *that Kim likes* $\_x$ *and Mia hates* $\_x$, in which one filler is linked to two gaps.[12]

In this section I discuss evidence that *some* apparent instances of RNR are predictions of rightward extraction and coordination. The first such type of evidence comes from the different extraction patterns induced by symmetric and asymmetric coordination, in the terminology of Levin and Prince (1986). As is well-known, coordinations with an asymmetric interpretation do not require across-the-board leftward extraction (Ross, 1967, Schmerling, 1972, Goldsmith, 1985, Lakoff, 1986, Levin and Prince, 1986).[13] Similarly, asymmetric coordination does not impose ATB rightward extraction either, as Lakoff (1986:153) shows with (59). In this example the conjunction has an asymmetric interpretation, and therefore RNR need not be ATB. This is expected if (59) involves extraposition.

(59) I went to the toy store, bought, came home, wrapped up, and put under the Christmas tree [one of the nicest little laser death-ray kits I've ever seen].

A second source of evidence in favor of viewing some apparent cases of RNR as simply predictions of ATB extraposition comes from semantic scope attributable to the RNRaised phrase being in a higher structural position than its *in situ* counterparts. The simplest cases are (60). The relevant interpretation being one where the RNRaised phrase outscopes material embedded in the coordination.

---

[12]It is unlikely that the two phenomena are due to one and the same mechanism, however. First, RNR allows preposition stranding in languages that usually do not allow preposition stranding via leftward extraction, such as Irish and Romance languages (McCloskey, 1986). Second, as Davies (1992) and Beavers and Sag (2004) note, languages like Hausa clearly have leftward extraction but lack RNR altogether. If leftward and rightward extraction are due to the one and the same mechanism, then these asymmetries are unexpected.

[13]For detailed discussion about extraction in symmetric/asymmetric coordination see Kehler (2002:ch.5).

(60) a. John tells A JOKE and Mary tells A FUNNY STORY [to every person they meet].
($\forall$ *person* $>$ ($\exists$ *joke* $\wedge$ $\exists$ *funny-story*))

    b. They either CAPTURED or SHOT [every escaped inmate].
($\forall$ *escaped-inmate* $>$ (*captured* $\vee$ *shot*))

More complex cases were originally noted by Geach (1972) and McCawley (1982, n.12). Although (61)b is not ambiguous, (61)a can either mean that 'there are many famous persons such that Kim took photographs of them and Sam painted portraits of them' or that 'there are many famous persons such that Kim took photographs of them, and there is a possibly different set of many famous persons such that Sam painted portraits of them'.

(61) a. Kim took PHOTOGRAPHS and Sam painted PORTRAITS [of many famous persons].

    b. Kim took photographs of many famous persons and Sam painted portraits of many famous persons.

Sabbagh (2007:365–371) makes a similar observation for cases like (62)a. In one reading the nurse will determine on a patient-by-patient basis how each patient will be treated (same may be given flu shots, others may be administered blood tests, for example). In another reading all patients will be treated the same. However, the non-RNR counterpart in (62)b only seems to have the second reading.

(62) a. The nurse will either give A FLU SHOT or administer A BLOOD TEST [to every patient admitted last night].

    b. The nurse will either give a flu shot to every patient admitted last night, or administer a blood test to every patient admitted last night.

These scope asymmetries are readily explained in an extraction account: the RNRaised phrase is structurally higher than the coordination and therefore it can take wide scope. An ATB Extraposition also predicts cases with strict identity readings such as (63).

(63) Tom LOVES and Robin ADORES [a girl from school].
(= 'Tom and Robin respectively love and adore the same girl from school')

As Sabbagh (2007:367) shows, the wide scope reading is available even when RNR crosses clausal boundaries, as in (64). Like the data above, this example is scopally ambiguous: (i) $\exists$ *someone* $>$ $\forall$ *Germanic language* and (ii) $\forall$ *Germanic language* $>$ $\exists$ *someone*.[14]

---

[14]Sabbagh (2007:367) claims that there are scopal differences between sentences with and without RNR. For example, *John knows someone who speaks every Germanic language* is claimed to only have the '$\exists > \forall$' scoping, where the quantifier does not scope outside the relative clause. The robustness of this empirical claim is doubtful. My informants report that *John knows someone who speaks every Germanic language* can have the '$\forall > \exists$' reading, as do the informants of Abels (2004), and even some of Sabbagh's own informants (Sabbagh, 2007:367,ft.15). Further counterevidence to the claim that quantifier scope is clause-bounded as claimed by Sabbagh (2007:367) and assumed by the multidominance account of Bachrach and Katzir (2008) is (i) and (ii).

    i. We were able to find someone who was an expert on each of the castles we planned to visit.
($\exists > \forall$; $\forall > \exists$, due to Copestake et al. (2005:304))

    ii. John was able to find someone who is willing to learn every Germanic language that we intend to study.
($\exists > \forall$; $\forall > \exists$)

(64) John knows someone who SPEAKS and Bill knows someone who WANTS TO LEARN [every Germanic language]

As Gazdar (1981) and Sabbagh (2007) observe, ATB Extraposition is fully compatible with cases like (65) because the RNRaised phrase is in a higher structural position than the conjuncts, and therefore outscopes the conjunction.[15]

(65) a. Robin SPENT and Mia LOST [(a total of) $10,000 (between them)].

    b. Tom SHOUTED and Mary CRIED [each other's names].

    c. My colleague FAILED and I PASSED [our respective examinations].

    d. Robin sent A LETTER and Kim wrote A POSTCARD [to a girl in the same class as theirs].

    e. Fred bought A BOOK and Mary got A MAGAZINE [about exactly the same topic].

    f. Fred spoke to A MAN and Mary spoke to A WOMAN [who are interested in similar activities].

    g. The Red Sox BEAT and the Giants WERE BEATEN BY [different teams].

Other RNR cases that are consistent with the ATB Extraposition analysis are seen in (66). Again, these are expected if the RNRaised phrase obtains wider scope over the coordination.

(66) a. Ernest sold COCAINE and George sold HEROIN [to the first nurse and to the second dental assistant] (respectively).
(Postal, 1998:136,178),

    b. I bought travel guides for Paris and London yesterday. Mary VACATIONED and Bill decided TO LIVE [in these two cities] (respectively).
(Gawron and Kehler, 2003)

Further support comes from the existence of similar readings in extraposed relatives like (67). This suggests that at least some instances of additive RNR are ATB Extraposition.

(67) a. I met the ONLY MAN and Sue spoke with the ONLY WOMAN [who saw exactly what happened].

    b. Tom bought A CAN OPENER and Alice bought A DICTIONARY [that were once owned by Leonard Bloomfield].
(McCawley, 1982:100)

In sum, the evidence suggests that many apparent RNR sentences can be obtained for free, as the consequence of Extraposition and coordination. In what follows I show how an account of extraposition and coordination can obtain the ATB Extraposition phenomena discussed above, including additive RNR. To be clear, this is not intended to be a comprehensive account of extraposition. Rather, the goal is to illustrate the workings of an account that obtains the relevant set of data.

---

[15]Hartmann (2000:79) claims that data like (65) are in fact ungrammatical, and therefore pose no problem for a phonological deletion account of RNR. This is untenable, in my view. All my informants accept (65).

A FORMALIZATION OF EXTRAPOSITION, COORDINATION, AND DEPENDENT CUMULATION. Additive and non-additive extraposition will be modeled in a uniform way, as sketched in Figure (2). Basically, if two dependents are extracted ATB out of the coordinate structure, then their indices are combined as '$x \oplus y$'. As a consequence, either both conjuncts predicate the same referent ($x = y$), or each conjunct predicates a different referent (in which case $x \oplus y$ forms a plurality).
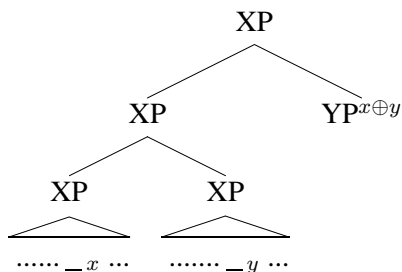

Figure 2: A unified view of additive and non-additive ATB Extraposition (informal)

I adopt the account of English extraposition proposed by Kim and Sag (2005) and Kay and Sag (2012), cast in Sign-Based Construction Grammar, a formally well-defined construction-based variant of Head-Driven Phrase Structure Grammar (Pollard and Sag, 1994). The present formalization follows Sag (2012), with minimal simplifications. Let us start by considering an example of a verbal lexical entry, given in (68). The feature M(ORPHO)P(HONOLOGY) contains linearized phonological and morphemic information. Mixed morphophonological representations of this kind are motivated by morphologically conditioned phonological alternations.[16] The feature PHON(OLOGY) records phonological units such as prosodic words (ω), phonological phrases, syllable structure, metrical information (the latter are omitted for perspicuity), and so on, along the lines of Höhle (1999). The feature FORM lists morph forms, and is used to distinguish between homophonous forms with different morphological paradigms. For example, homophonous words like *lie* ('speak falsely') and *lie* ('recline, rest') involve distinct morph forms [FORM $\langle lie_1 \rangle$] and [FORM $\langle lie_2 \rangle$]. Because lie_1 and lie_2 are different morphs, the grammar can determine how they inflect (*lie/lay/lain* vs. *lie/lied/lied*). This FORM feature will play a crucial role later on, in Backward Periphery Deletion.

---

[16]For instance, the phoneme /ʌ/ corresponding to the English indefinite article becomes /æn/ if it precedes a voiced segment. This is not a phonological rule of English because it applies only to the indefinite article (Pullum and Zwicky 1988). See Asudeh and Klein (2002) for a crosslinguistic overview of other morpheme-specific phonological processes in various other languages including Welsh, French, and Hausa.

(68)

$$
\begin{bmatrix}
\textit{word} \\[4pt]
\text{MP} \left\langle \begin{bmatrix} \omega \\ \text{PHON} \ /\text{sɪŋs}/ \\ \text{FORM} \ \langle sing \rangle \end{bmatrix} \right\rangle \\[12pt]
\text{SYN} \begin{bmatrix} \text{CAT} & \textit{verb} \\ \text{XARG} & X \\ \text{VAL} & \langle\ X{:}\text{NP}^{x}_{nom},\ \text{NP}^{y}_{acc}\ \rangle \\ \text{EXTRA} & \langle\,\rangle \end{bmatrix} \\[16pt]
\text{SEM} \begin{bmatrix} \text{INDEX}\ e \\ \text{RELS} & \{sing(e,x,y)\} \end{bmatrix}
\end{bmatrix}
$$

The syntactic feature VAL(ENCE) lists the valents that are subcategorized by the verb. The notation 'NP^x' is merely a shorthand for any nominal sign with an empty valence list [VAL $\langle\rangle$], and with an index x that is quantificationally bound. The least oblique valent is the nominative subject, which is singled out as an 'external argument' by the feature XARG. The two occurrences of the variable X basically state that the first member of VAL is also the value of XARG. The XARG feature allows a head to impose morphosyntactic and semantic constraints on the subject of a sister clause.[17] The feature EXTRA records any dependents that are extraposed rather than realized *in situ*. I follow van Noord and Bouma (1996) and Keller (1994) in assuming that the value of the feature EXTRA in a non-coordinate phrases is the concatenation of EXTRA values of the local daughters. The coordination case will be discussed in detail below.

Finally, the REL(ATION)S feature contains semantic relations described by the sign. Following Copestake et al. (2005) and Sag (2012), I take such semantic representations to be sets of scopally underspecified predications, very much like the underspecified Discourse Representation Structures proposed by Reyle (1993) and Frank and Reyle (1995).

Phrasal rules determine how (non-extraposed) valents are discharged from VAL. The phrase structure rule that allows a word of any given category X to combine with its subcategorized complements $X_1...X_n$ is shown (69), in a familiar phrase-structure grammar rule format, for perspicuity. The variables X and Y range over feature structure descriptions. In this work, I assume the linearization theory of Kathol (2000), although nothing truly hinges on this.

(69) HEAD-COMPLEMENT CONSTRUCTION

$$
\begin{bmatrix}
\textit{phrase} \\[4pt]
\text{SYN} \begin{bmatrix} \text{CAT} & X \\ \text{XARG} & Y \\ \text{VAL} & \langle Y \rangle \end{bmatrix}
\end{bmatrix}
\rightarrow
\begin{bmatrix}
\textit{word} \\[4pt]
\text{SYN} \begin{bmatrix} \text{CAT} & X \\ \text{XARG} & Y \\ \text{VAL} & \langle Y, X_1, \ldots, X_n \rangle \end{bmatrix}
\end{bmatrix}
\ X_1 \ldots X_n
$$

---

[17]For example, tag-questions (c.f. *Sarah$_x$ read the book$_y$, didn't she$_x$ / *it$_y$?* with *The book$_x$ was read by Sarah$_y$, wasn't it$_x$ / *she$_y$*) and dangling modifiers (cf. *Furious$_x$, Kim$_x$ threw the TV out the window* with **Furious$_x$, the TV was thrown out the window by Kim$_x$*). For more on XARG see Sag and Pollard (1991), Meurers (1999), Bender and Flickinger (1999), and Sag (2012).

In a nutshell, (69) states that a head-complement phrase is licensed if the complements $X_1, ..., X_n$ recorded in the valence of the lexical daughter are rightmost sisters. The category of the head daughter is required to be the same as the category of the head daughter via the constraint [CAT X]. Hence, a verb will project a phrase with the same part of speech. Analogously, (70) allows a predicate to combine with its subject, the sign that instantiates Y.

(70) HEAD-SUBJECT CONSTRUCTION

$$
\begin{bmatrix} phrase \\ \text{SYN} \begin{bmatrix} \text{CAT} & X \\ \text{XARG} & Y \\ \text{VAL} & \langle \rangle \end{bmatrix} \end{bmatrix} \rightarrow Y \quad \begin{bmatrix} \text{SYN} \begin{bmatrix} \text{CAT} & X \\ \text{XARG} & Y \\ \text{VAL} & \langle Y \rangle \end{bmatrix} \end{bmatrix}
$$

These two constructional rues license structures like the one in Figure (3). The top branching node is licensed by (70) and the lower branching node is licensed by (69). The symbol 'VP' is nothing but a shorthand for any verbal sign with a singleton VAL list, and 'S' is a shorthand for any verbal sign with an empty list value for VAL. For further discussion of how this grammar handles various other phenomena see Sag (2012).

$$
\text{S} \begin{bmatrix} \text{XARG} & \text{NP}^x_{nom} \\ \text{VAL} & \langle \rangle \\ \text{EXTRA} & \langle \rangle \end{bmatrix}
$$

$$
\text{NP}^x[\text{EXTRA } \langle \rangle]
$$
$$
\text{Tom}
$$

$$
\text{VP} \begin{bmatrix} \text{XARG} & \text{NP}^x_{nom} \\ \text{VAL} & \langle \text{NP}^x_{nom} \rangle \\ \text{EXTRA} & \langle \rangle \end{bmatrix}
$$

$$
\text{V} \begin{bmatrix} \text{XARG} & \text{NP}^x_{nom} \\ \text{VAL} & \langle \text{NP}^x_{nom}, \text{NP}^y_{acc} \rangle \\ \text{EXTRA} & \langle \rangle \end{bmatrix}
$$
$$
\text{sang}
$$

$$
\text{NP}^y[\text{EXTRA } \langle \rangle]
$$
$$
\text{songs}
$$
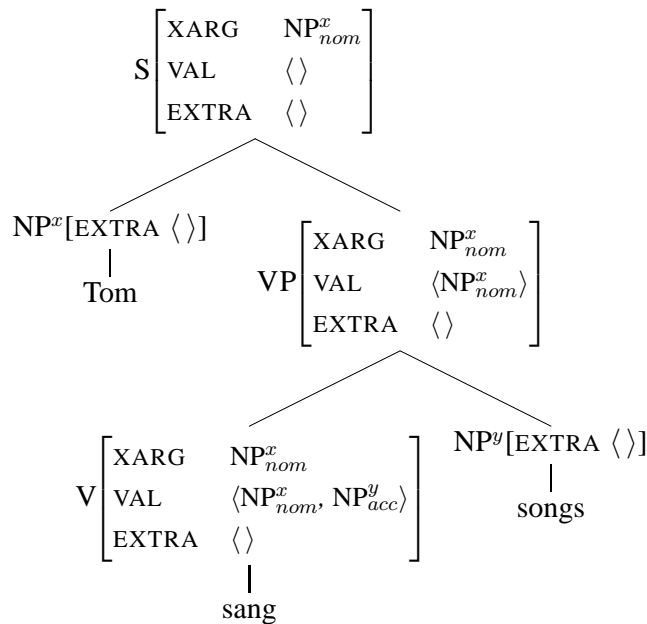
Figure 3: Derivation licensed by the Head-Complement and Head-Subject Constructions

Following Kim and Sag (2005), several rules handle different types of extraposition, each with syntactic and semantic idiosyncrasies. The extraposition of complements is modeled by the lexical rule in (71), which takes a complement from the valence list and places it in EXTRA instead. That valent will be realized to the right of its canonical location, not *in situ*.

(71) COMPLEMENT EXTRAPOSITION LEXICAL CONSTRUCTION

27

$$
\begin{bmatrix} word \\ \text{SYN} \begin{bmatrix} \text{XARG } Y \\ \text{VAL} \quad L_1 \circ L_2 \\ \text{EXTRA } L_3 \circ \langle X \rangle \end{bmatrix} \end{bmatrix} \rightarrow \begin{bmatrix} word \\ \text{SYN} \begin{bmatrix} \text{XARG } Y \\ \text{VAL} \quad L_1 \circ \langle X \rangle \circ L_2 \\ \text{EXTRA } L_3 \end{bmatrix} \end{bmatrix} \land X \neq Y
$$

The Complement Extraposition Lexical Construction takes as input a lexical sign like (68) and yields a variant of that lexical sign where one complement X is now in EXTRA instead of VAL. The symbol '$\circ$' corresponds to list concatenation. For example, if we apply (68) to this rule, then [VAL $L_1 \circ \langle X \rangle \circ L_2$] is unified with [VAL $\langle X{:}\text{NP}^x_{nom}, \text{NP}^y_{acc} \rangle$]. The unification resolves as $L_1 = \langle Y \rangle$ and $X = \text{NP}^y_{acc}$, and $L_2 = \langle \rangle$. If the verb had two complements instead, then there would be two possible resolutions, and so on. Figure (4) illustrates the effect of applying (68) to (71).

$$
\begin{bmatrix} word \\ \text{MP} \left\langle \begin{bmatrix} \omega \\ \text{PHON } /\text{sɪŋs}/ \\ \text{FORM } \langle sing \rangle \end{bmatrix} \right\rangle \\ \text{SYN} \begin{bmatrix} \text{CAT} \quad verb \\ \text{XARG} \quad \text{NP}^x_{nom} \\ \text{VAL} \quad \langle\, \text{NP}^x_{nom}\, \rangle \\ \text{EXTRA} \quad \langle\, \text{NP}^y_{acc}\, \rangle \end{bmatrix} \\ \text{SEM} \begin{bmatrix} \text{INDEX } e \\ \text{RELS } \{sing(e,x,y)\} \end{bmatrix} \end{bmatrix}
$$

$$
\begin{bmatrix} word \\ \text{MP} \left\langle \begin{bmatrix} \omega \\ \text{PHON } /\text{sɪŋs}/ \\ \text{FORM } \langle sing \rangle \end{bmatrix} \right\rangle \\ \text{SYN} \begin{bmatrix} \text{CAT} \quad verb \\ \text{XARG} \quad \text{NP}^x_{nom} \\ \text{VAL} \quad \langle\, \text{NP}^x_{nom}, \text{NP}^y_{acc}\, \rangle \\ \text{EXTRA} \quad \langle \rangle \end{bmatrix} \\ \text{SEM} \begin{bmatrix} \text{INDEX } e \\ \text{RELS } \{sing(e,x,y)\} \end{bmatrix} \end{bmatrix}
$$

Figure 4: Application of the Complement Extraposition Lexical Construction

A third phrasal construction discharges signs recorded in EXTRA. Whereas the Head-Complement Construction rule requires the head to be lexical, the rule in (72) requires the head daughter to be phrasal. Hence, any extraposed dependents X in EXTRA will necessarily occur to the right of their canonical location.

(72) HEAD-EXTRAPOSITION CONSTRUCTION

$$
\begin{bmatrix}
phrase \\
\text{SYN} \begin{bmatrix} \text{XARG} & Y \\ \text{VAL} & L_2 \\ \text{EXTRA} & L_1 \end{bmatrix}
\end{bmatrix}
\rightarrow
\begin{bmatrix}
phrase \\
\text{SYN} \begin{bmatrix} \text{XARG} & Y \\ \text{VAL} & L_2 \\ \text{EXTRA} & \langle X \rangle \circ L_1 \end{bmatrix}
\end{bmatrix}
\; X
$$

This grammar fragment licenses extraposition structures like the one in Figure (5). The sign recorded in the EXTRA feature of the first daughter is unified with the second daughter.
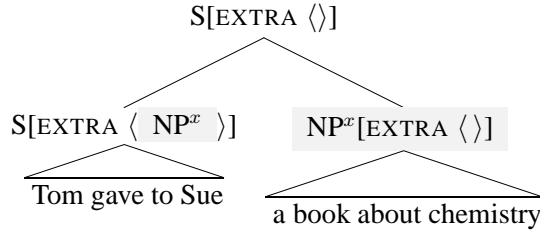
S[EXTRA $\langle\rangle$]

S[EXTRA $\langle$ NP^x $\rangle$]   NP^x[EXTRA $\langle\rangle$]

Tom gave to Sue   a book about chemistry

Figure 5: Application of the Head-Extraposition Construction

Let us now turn to coordination. Following Beavers and Sag (2004) and Copestake et al. (2005), the coordination construction is essentially a binary branching rule in which the rightmost conjunct is marked with the *and* coordinator marker. The latter is ensured by the feature [CRD *conj*]. I assume that the coordination construction has various subtypes, each with different syntactic, prosodic, semantic or pragmatic characteristics.[18] For our purposes we need only consider the construction that handles Non-Boolean Conjunction, shown in (73). The conjunction creates a plurality α with the conjuncts' indices (i and j), and conjoins the semantics of each conjunct (P and Q). This is crucial for the account of additive readings in general, since this rule combines the indices of any n ($n \geq 0$) dependents in an i-sum, for all SYN features Γ that record syntactic dependencies (EXTRA, VAL, SLASH and SEL).

(73) NON-BOOLEAN CONJUNCTION (and the Shared Dependent Condition)

$$
\begin{bmatrix}
phrase \\
\text{SYN} \left[\Gamma \; \langle \text{XP}_0^{z_0}, \dots, \text{XP}_n^{z_n} \rangle \right] \\
\text{SEM} \begin{bmatrix} \text{INDEX } k \\ \text{RELS } \{ k = i \oplus j, z_0 = x_0 \oplus y_0, \dots z_n = x_n \oplus y_n \} \cup P \cup Q \end{bmatrix}
\end{bmatrix}
\rightarrow
$$

$$
\begin{bmatrix}
\text{SYN} \left[\Gamma \; \langle \text{XP}_0^{x_0}, \dots, \text{XP}_n^{x_n} \rangle \right] \\
\text{SEM} \begin{bmatrix} \text{INDEX } i \\ \text{RELS } P \end{bmatrix} \\
\text{CRD } -
\end{bmatrix}
\begin{bmatrix}
\text{SYN} \left[\Gamma \; \langle \text{XP}_0^{y_0}, \dots, \text{XP}_n^{y_n} \rangle \right] \\
\text{SEM} \begin{bmatrix} \text{INDEX } j \\ \text{RELS } Q \end{bmatrix} \\
\text{CRD } conj
\end{bmatrix}
$$

[18]For example, packaging conjunction (e.g. *Eggs, cheese and bacon was all I needed*), numeral conjunction (e.g. *I counted five hundred and twenty-two cats*), arithmetical conjunction (e.g. *Two and two is four*), conditional conjunction (e.g. *Take one more step and I'll shoot you where you stand*), intensification conjunction (e.g. *The sound became louder and louder*), violated expectation conjunction (e.g. *I can drink two bottles of wine and not get drunk*), asymmetric scope conjunction (e.g. *You can't get a new car and Kim get just a postcard*), Boolean conjunction (e.g. *The owner and the editor is a member of the club*), Non-Boolean conjunction (e.g. *You can't simultaneously drive a car and talk on the phone*), 'good-and-bad' coordination (e.g. *There are teachers and there are teachers...*), 'regardless' coordination (e.g. *War or no war, we're going to Iraq*), and so forth.

The current grammar fragment allows sentences like in Figure (6), which can be interpreted additively (in which case the tune(s) that Fred hummed are different from the tune(s) that Mia sang), or non-additively (Fred and Mia hummed and sang the same tunes).
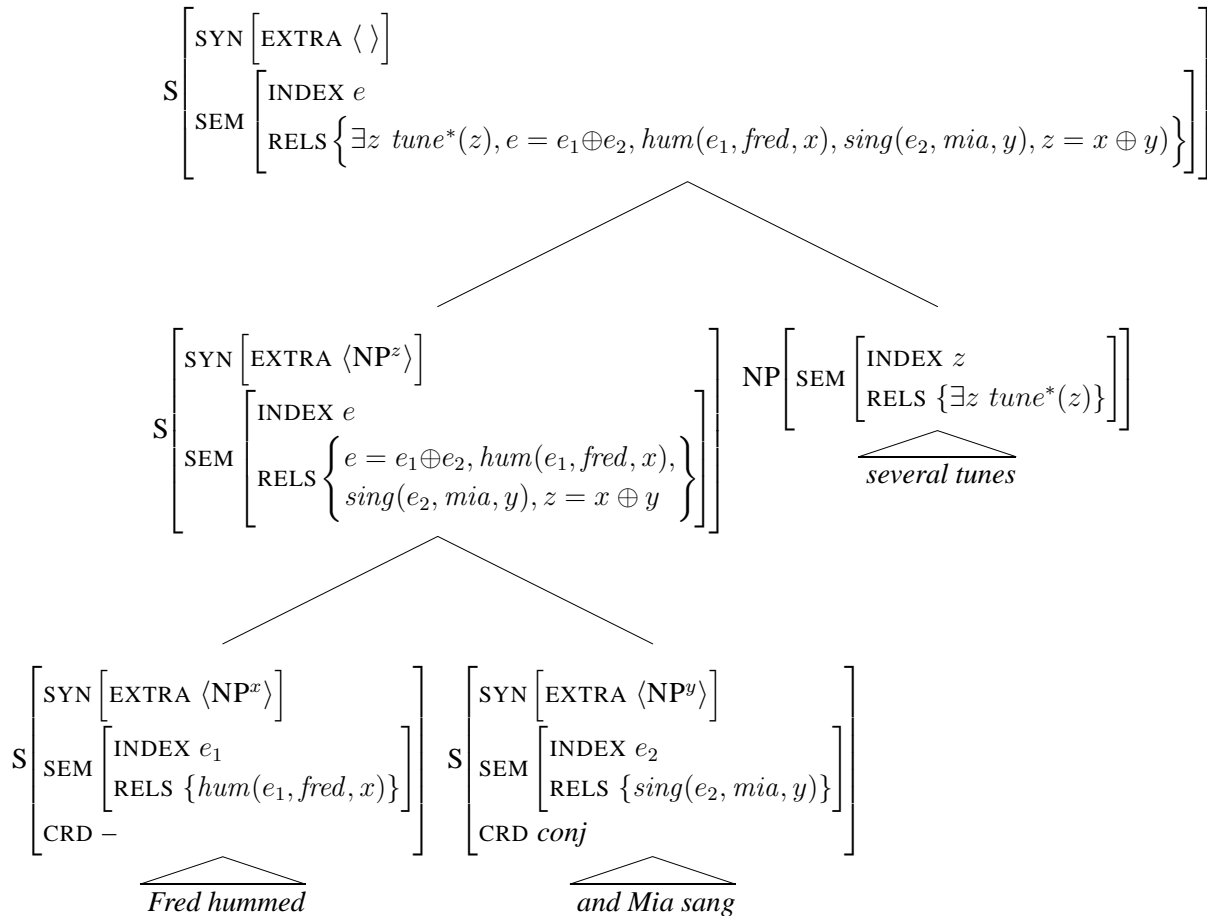
$$S \begin{bmatrix} \text{SYN} \begin{bmatrix} \text{EXTRA} \langle \ \rangle \end{bmatrix} \\ \text{SEM} \begin{bmatrix} \text{INDEX } e \\ \text{RELS} \left\{ \exists z \ tune^*(z), e = e_1 \oplus e_2, hum(e_1, fred, x), sing(e_2, mia, y), z = x \oplus y \right\} \end{bmatrix} \end{bmatrix}$$

$$S \begin{bmatrix} \text{SYN} \begin{bmatrix} \text{EXTRA} \langle \text{NP}^z \rangle \end{bmatrix} \\ \text{SEM} \begin{bmatrix} \text{INDEX } e \\ \text{RELS} \left\{ \begin{array}{l} e = e_1 \oplus e_2, hum(e_1, fred, x), \\ sing(e_2, mia, y), z = x \oplus y \end{array} \right\} \end{bmatrix} \end{bmatrix}$$

$$\text{NP} \begin{bmatrix} \text{SEM} \begin{bmatrix} \text{INDEX } z \\ \text{RELS} \{ \exists z \ tune^*(z) \} \end{bmatrix} \end{bmatrix}$$

several tunes

$$S \begin{bmatrix} \text{SYN} \begin{bmatrix} \text{EXTRA} \langle \text{NP}^x \rangle \end{bmatrix} \\ \text{SEM} \begin{bmatrix} \text{INDEX } e_1 \\ \text{RELS} \{ hum(e_1, fred, x) \} \end{bmatrix} \\ \text{CRD } - \end{bmatrix}$$

Fred hummed

$$S \begin{bmatrix} \text{SYN} \begin{bmatrix} \text{EXTRA} \langle \text{NP}^y \rangle \end{bmatrix} \\ \text{SEM} \begin{bmatrix} \text{INDEX } e_2 \\ \text{RELS} \{ sing(e_2, mia, y) \} \end{bmatrix} \\ \text{CRD } conj \end{bmatrix}$$

and Mia sang

Figure 6: ATB Extraposition

In this case the only dependents that are shared by the conjuncts are extraposed NPs in EXTRA, since there are no other dependents in other SYN features. Thus, the Γ in (73) is instantiated with EXTRA. Because the index z of the NP in EXTRA must be unified with the index of the overtly realized NP, this means that the ATB Extraposition of singular NPs like *each song* or *the song* are only felicitous if the index z in EXTRA corresponds to an atomic individual as well, via the $z = x = y$ resolution for the i-sum $z = x \oplus y$. For example, the ATB Extraposition parse of *John knows someone who speaks – and Bill knows someone who wants to learn* [*every Germanic language*] necessarily yields the $z = x = y$ resolution because the index of the ATB Extraposed NP is singular. This obtains the wide scope reading. The narrow scope and sloppy readings follow from Backward Periphery Deletion as in §3.3.

ON SYMMETRIC PREDICATES. There are several possible accounts of the internal readings of *different* and *same* (e.g. Barker (2007) and references therein). In what follows I sketch a rather straightforward model-theoretic analysis that will suffice for the purposes of this paper. As is well-known, one of the possible readings for a sentence like *Robin and Sam read several books* is the

cumulative reading, in the sense of Scha (1981:497), Kroch (1974), Krifka (1986), Schein (1993), Schwarzschild (1996), and Sternefeld (1998). In such a reading, the set of books read by Robin may or may not intersect with the set of books read by Sam. This includes the case in which the relation between books and readers is 'a special cumulative reading where, in addition, the relation is a bijective function' (Link, 1991). In the present account, the purpose of the expression *different* is precisely to force such a bijective interpretation. See Chaves (2012) for an analysis of *respectively* that involves essentially the same kind of intuition, and can model 'respectively' readings that do not involve pluralities, such as (74).

(74) For every document, she had to translate it to russian or bielo-russian respectively.

I tentatively assume that the adjective *different* has the truth satisfaction conditions in (75). The $\theta_k(i, R)$ function is true *iff* there is some tuple $t = \langle ..., i_k, ... \rangle$ in the denotation of a relation R, in which the individual i is the k-th member of t. Basically, (75) requires that every value of x and and every value of some y participate in some relation R only once, and the n-th and m-th arguments, respectively.

(75) $[\![different(x)]\!] = 1$ *iff* there is a bijective function f such that $f = \{(a, b) : a \sqsubseteq I(x) \wedge b \sqsubseteq I(y) \wedge \exists_{n \neq m} \exists R(\theta_n(a, R) \wedge \theta_m(b, R))\}$

The account is illustrated in ((76)), in which I revert to standard FOL notation for exposition purposes. For example, if $I(read) = \{\langle e_1, robin', b_1 \rangle, \langle e_2, sam', b_2 \rangle\}$, then (75) yields $f = \{(r, b_1), (s, b_2)\}$, which is a bijection.

(76) Robin and Sam read different books.
$\exists y\ book^*(y) \wedge different(y) \wedge x = robin \oplus sam \wedge read(e, x, y)$

In sentences like *Every student read a different book*, the b entities correspond to the individuals in the denotation of *every student*. A narrow scope reading of the complement *a different book* will allow the a entities to correspond to each of the different books. In this kind of example, there is no need for a cumulative reading in the sense of Scha (1981:497).

Finally, examples like (77) follow from the grammar of coordination and extraposition. As seen in Figure (6), the i-sum that (73) introduces combines the indices of the NPs that each of the conjuncts contains in EXTRA. As a consequence, each verb can predicate a different member of the set of opponents. This allows the conditions in (75) to be satisfied since there are two different R relations: *defeat* and *lose to* respectively. Again, we arrive at the bijection $f = \{(robin', o_1), (sam', o_2)\}$.

(77) Robin defeated and Sam lost to different opponents.

$\exists z\ opponent^*(z) \wedge different(z) \wedge$
$e = e_1 \oplus e_2 \wedge z = x \oplus y \wedge defeat(e_1, robin, x) \wedge\ lose\text{-}to(e_2, sam, y)$

A very similar analysis is adopted for *the same*, as seen in (78). The main difference is that a constant function is imposed rather than a bijective function. Hence, all the a entities must be paired with exactly the same b. A sentence like *Robin and Sam read the same books* means there is a set of books such that Robin and Sam read it, and a sentence like *Each student liked the same movie* means that there is one movie such that every student liked it, and so on.

(78) $[\![same(x)]\!] = 1$ *iff* there is a constant function f' such that $f' = \{(a,b) : a \sqsubseteq I(x) \wedge b \sqsubseteq I(y) \wedge \exists_{n \neq m} \exists R(\theta_n(a, R) \wedge \theta_m(b, R))\}$

ON THE LIMITS OF EXTRAPOSITION. Extraposition is standardly assumed to be a bounded syntactic dependency, unable to cross clausal nodes (Ross, 1967, Akmajian, 1975, Baltin, 1978, Stowell, 1981, Baltin, 1982) as seen in (79). This is usually given as an argument against ATB Extraposition accounts of RNR given that RNR is immune to island effects (see §2.1).

(79) a.*[I [met a man [who knows _] yesterday] [all of your songs]].

b.*[[[That a review _ came out yesterday] is catastrophic] [of this article]]

c.*[[That someone _ exists] [is a foregone conclusion] [who can beat you up]].

d.*[[[That it is impossible _] is clear] [for pigs to fly]].

However, the acceptability of the extrapositions in (80) suggests that the role of purely configurational factors has been overstated. According to my informants, the adverbial interveners in (80) do not require parenthetical prosody. Conversely, even strong parenthetical prosody on the adverbs in (79) fails to improve those data.

(80) a. I've been requesting [that you pay back _] ever since May [the money I lent to you a year ago].
(Kayne, 2000:251)

b. I've been wanting to meet someone who KNOWS _ ever since I was little [exactly what happened to Amelia Earhart].

c. I've been wondering [if it is possible _] for many years now [for anyone to memorize the Bible word for word].

Crucially, note that the durative semantics of *I've been wanting/requesting/wondering* in (80) raises an expectation about the realization of a durative adverbial expression like *ever since* or *for many years* that provides information about the durative semantics of the main predicate. Hence, the adverb is cued by the main predication, and coheres much better with the high attachment than with the lower attachment.

In (81) we see extrapositions from embedded clauses, which should be flat out impossible if extraposition is not an unbounded phenomenon. To be sure, my informants report that the adverbial interveners in (81) do not require any special prosody, which means that these data cannot be easily discarded as parenthetical insertions.

(81) a. I have [wanted [to know _] for many years] [exactly what happened to Rosa Luxemburg].
(attributed to Witten (1972) in Postal (1974:92n))

b. I have [wanted [to meet _] for many years] [the man who spent so much money planning the assassination of Kennedy].
(attributed to Janet Fodor in Gazdar (1981:177))

c. Sue [kept [regretting _] for years] [that she had not turned him down].
(Van Eynde, 1996)

d. She has been [requesting that he [return _] [ever since last Tuesday]] [the book that John borrowed from her last year].
(Kayne, 2000:251)

e. Mary [wanted [to go _] until yesterday] [to the public lecture].
(Howard Lasnik 2007 course handout[19])

It is well-known that extraposition causes some processing difficulty. For example, there is a general and measurable tendency for the language processor to prefer attaching new material to the more recent constituents (Frazier and Jr., 1996, Gibson et al., 1996, Traxler et al., 1998, Fodor, 2002a, Fernández, 2003). In particular, eye-tracking studies like Staub et al. (2006) indicate that the parser is reluctant to adopt extraposition parses. This explains why extraposition in written texts is less common in proportion to length of the intervening material (Uszkoreit et al., 1998): the longer the structure, the bigger the processing burden. Crucially, however, the preference for the closest attachment can be weakened by many factors (Fernández, 2003, Desmet et al., 2006, De Vicenzi and Job, 1993, Carreiras, 1992). In a recent study about the online processing of English relative clause extraposition, Levy et al. (2012) show that extraposition creates significant processing difficulty when compared with non-extraposed counterparts of the same sentences, but that a preceding context that sets up a strong expectation for a relative clause modifying a given noun can actually *facilitate* comprehension of an extraposed relative clause modifying that noun. In other words, in spite of a larger processing burden, some extrapositions can be made easier to process by parsing expectations. This finding is consistent with the relative acceptability of (80), and consistent with the immunity of RNR to islands, since RNR sentences typically cue the presence of incomplete structures via prosody. Interestingly, Stucky (1987:401-402) had already expressed this intuition by noting that extraposed relatives tend to be linked to the closest preceding head as long as they can combine with it in a semantically coherent way. Stucky (1987) also noted that when an attachment fails due to grammatical violations, it can be very difficult for the parser to recover and attempt to attach the extraposed phrase to a more distant element. This is illustrated in (82), in which the degree of oddness caused by linking the relative to the closest NP interferes with the ability to link it to the correct NP, the subject.

(82) a. ??A friend of mine wanted to talk to the administrators who feels wronged.

b. ?A friend of mine wanted to leave town who feels wronged.

Non-grammatical factors of this kind have been argued by Hawkins (2004) to be responsible for major typological trends in the languages of the world. I suspect that they play an important role in explaining extraposition islands as well, and that Grosu (1973), Gazdar (1981) and Stucky (1987). are right in claiming that extraposition is not as syntactically restricted as usually held, but rather, constrained by performance factors such as syntactic and semantic parsing expectations and memory resource limitations. There are various sources of empirical and experimental evidence in support of this view. Recent corpora and experimental findings by Strunk and Snider (2008 2013) show that extraposition does not always obey subjacency, contra Baltin (2006), Sabbagh (2007) and many others. The counterexamples in (83)a–c are adapted from Strunk and Snider (2008) and Strunk and Snider (2013), and (83)d–f are inspired by the latter.

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[19][http://ling.umd.edu/ lasnik/LING819%202007/Multiple%20Sluicing%20819%20.pdf]; Retrieved 2009.

(83) a. [In [what noble capacity _]] can I serve him [that would glorify him and magnify his name]?

b. We drafted [a list of basic demands _] last night [that have to be unconditionally met or we will go on strike].

c. For example, we understand that Ariva buses have won [a number of contracts for routes in London _] recently, [which will not be run by low floor accessible buses].

d. Robin bought [a copy of a book _] yesterday [about ancient Egyptian culture].

e. I'm reading [a book written by a famous physicist _] right now, [who was involved in the Manhattan Project].

f. I saw [your ad in a magazine _] yesterday [on the table at the dentist office].

In (84) I provide further evidence that extraposition is not as severely restricted by syntax as usually held. In these examples two extrapositions are entangled. First, *it* extraposition displaces a CP to object position and then a PP complement of the matrix verb is extraposed into the extraposed CP. Thus, one extraposed phrase moves into another's clausal domain.

(84) a. I've been asked $\_x$ if it is possible $\_y$ [[by every reporter in the state]$_x$ [for Morrison to return to the lineup by the end of the season]$_y$].

b. I said $\_x$ that [[it was in our interest] $\_y$ [to everyone in that room]$_x$ [to see Mr. Gorbachev succeed]$_y$].

c. I'm going to inquire $\_x$ if [[it's likely] $\_y$ [to each of the programmers]$_x$ [for a project to be completed in eight months]$_y$].

These data contrast with the oddness of (85), suggesting that the phenomena are due to the complex interaction of various factors rather than a general configurational condition.

(85) *It was believed $\_x$ that [there walked into the room] $\_y$ [by everyone]$_x$ [a man with long blond hair]$_y$.
(Rochemont, 1992)

It is also traditionally assumed that prepositions cannot be stranded in English extraposition, which contrasts with the well-known fact that RNR does allow preposition stranding. However, Wasow (2002) found attested preposition stranding extrapositions such as the one in (86)a. I supplement this with the constructed example in (86)b. Crucially, the material intervening between the preposition and its object does not require parenthetical prosody.

(86) a. I'll go over in my mind all the things I did wrong.
(Wasow, 2002:128,129)

b. I ran into just yesterday one of my FAVORITE writers of all time.

There is no shortage of other counterexamples to extraposition islands. For example, Baltin (1982) attributes the oddness of cases like (87)a to (generalized) subjacency. This view is refuted by Culicover and Rochemont (1990:28,ft.11), who note the data improve if the relative clause is focused. Stucky (1987:398) also points out counterexamples like (87)b, and argues that the oddness of (87)a results from the extraposed relative being uninformative, which makes it pragmatically odd. The speakers that I have consulted find my example in (87)c fully acceptable, even without focus.

(87) a. *John said he would meet a man at the party who was from Philadelphia, and meet a man at the party he did who was from Philadelphia.

   b. John said that he would call up his friends and call up his friends he did, for all of whom that must have been a great surprise.

   c. Simon said he wanted to meet someone today who can actually sing, and meet someone today he did who sung his socks off.

Subject phrases are not absolute extraposition islands either, as in my (88), which are significantly more acceptable than *[*Pictures* _] *frighten people* [*of John*] (Drummond, 2009). One may argue that the acceptability of (88) is due to the subjects being passivized or unaccusative, but this is unlikely given the oddness of examples involving similarly derived subjects like *[A photograph of a book* _] *was published last year* [*about French cooking*] (Akmajian, 1975).[20]

(88) a. [The circulation of a rumor _] has started [that Obama will not seek re-election].

   b. [A copy of a new book _] arrived yesterday [about ancient Egyptian culture].

   c. [Concerns about the deaths _] were raised [of two diplomatic envoys recently abducted in Somalia].

Finally, Hofmeister et al. (2013) offer experimental evidence suggesting that freezing effects in extraposition can be seen as the result of processing complexity. In sum, there are good reasons to believe that extraposition is not as severely restricted by syntax as usually assumed. Rather, the evidence suggests that Grosu (1973), Gazdar (1981) and Stucky (1987) are correct in claiming that extraposition limitations are due to pragmatic and performance factors, like those experimentally manipulated by Levy et al. (2012), Strunk and Snider (2013), and Hofmeister et al. (2013).

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[20]There is mounting evidence that subjects of transitive verbs do not always block extraction, as in the following data from Chaves (2013). Brackets indicate the required prosodic phrasing:

   i. [Which president would the impeachment of _] [cause outrage]?

   ii. [Which doctors have patients of _] [filed malpractice suits in the last year]?

   iii. [Which school has the principal of _] [recently resigned]?

   iv. [I have a question] [that the probability of you knowing the *answer to* _] [is zero].

See also Chaves and Dery (2013) for further discussion. Conversely, there is also mounting evidence that passivized or unaccusative subjects do not guarantee that extraction is permitted, as in *What was the owner of arrested?* (Haegeman et al., 2013), for example.

3.3 Backward periphery deletion

I now turn to RNR cases that cannot be seen as predictions of ellipsis or of extraposition. These are what I consider to be RNR proper. Unlike ellipsis and extraposition, true RNR can (i) target any peripheral string of words that can form an independent prosodic unit, and (ii) imposes morph form identity. Let us start by considering cases where the RNRaised element is not an extractable or elidable unit. In (89) we see a nominal head being RNRaised, stranding an NP-internal modifier. For example, (89)a cannot be attributed to extraposition (*Elvis wrote a truly brilliant last year thesis) or to N'-Ellipsis (*Elvis wrote a truly brilliant).

(89) a. John wrote a MILDLY INTERESTING but Elvis wrote a TRULY BRILLIANT [thesis on nightingales].
    (Swingle, 1995)

  b. The first experiment involved a POSITIVELY while the second involved a NEGATIVELY [charged particle].
    (adapted from Wilder (1997))

  c. I thought it was going to be a GOOD but it ended up being a VERY BAD [reception].

  d. Is deforestation a MAJOR or is it the ONLY [factor for primate extinction]?

  e. Not only is deforestation a MAJOR – it is also probably the MAIN [factor for primate extinction].

  f. A CONSPICUOUS and it is hoped NOT UNPLEASANT [feature of the book] is its abundant illustrative quotations from eminent poets (...)[21]

Finite VPs can also be RNRaised as shown in (90). For instance, in (90)a both conjuncts share the same VP, and the subject *the captain* is left stranded inside the first conjunct, and the conjunct-final constituent. Such VPs cannot be omitted via VP-Ellipsis as shown by the oddness of *he suspects that the captain* nor leftward extracted as in *detests goat cheese, he suspects that the captain*.

(90) a. He SUSPECTS THAT THE CAPTAIN but KNOWS THAT THE MAJOR [detests goat cheese].
    (McCawley, 1998)

  b. The waiter forced THE CUSTOMERS and the manager persuaded THE STAFF [to leave quietly].
    (Beavers and Sag, 2004)

  c. One witness said that A GHOST and another claimed that AN ANGEL [had been sighted in the bell tower].

  d. Tonight A GROUP OF MEN, tomorrow night HE HIMSELF, [would go out there somewhere and wait].   [BRN]

  e. As far as I was concerned, she had ALREADY and had DANDILY [shown what she could do].   [BRN]

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[21]Bierce, Ambrose. 1911. *The Devil's Dictionary*. [http://www.gutenberg.org/ebooks/972]

f. (...) Democrats PRIVATELY and Republicans PUBLICLY [say that this is one subject on which Clinton does not have the moral high ground].
(http://cooktemp.dreamhosters.com/column/1999/061299.php)

Other cases of non-extractable and non-elidable RNR strings in English are TPs like (91) and comparative phrases as in (92). The simplest interpretation of these facts is that RNR does not involve any form of syntactic displacement.

(91) a. I've BEEN WONDERING whether but wouldn't want to positively STATE that [your theory is correct].
(Bresnan, 1974)

b. *[Your theory is correct], I've been wondering whether.

c. *I wondered whether yesterday [your theory is correct].

(92) a. An argument with Orville Torrence Killpath was AS FRUSTRATING and AS FUTILE [as a cap pistol on a firing range]. [BRN]

b. *As a cap pistol on a firing range, an argument with Orville Torrence Killpath was as frustrating/futile.

c. They were also AS liberal or MORE liberal [than any other age group in the 1986 through 1989 surveys]. [WSJ]

d. *Than any other age group in the 1986 through 1989 surveys, they were also AS liberal.

Neijt (1979) and Hartmann (2000:66,ft.5) note that [*and* XP] conjuncts can undergo RNR in Dutch. This is an important observation because conjunct phrases are not extractable.[22] I am inclined to accept this view – contra McCawley (1982:101,ft.11), Postal (1998:121) and others – given passable examples like (93). There is a strong tendency to parse *ordered ham* as a complete VP, but with strong continuation prosody at *ham* it is possible to parse this sentence as *I ordered ham and eggs but got bacon and eggs instead*.

(93) (?)I ordered HAM – but got BACON – [and eggs].

There are more extreme cases of RNR, discussed in §2.1, which cast further doubts on syntactic accounts of RNR, however defined. The first comes from idioms like (9), repeated here as (94). The prepositional phrase *with a full deck* has no syntactic mobility, and yet can be RNRaised. This is exactly as expected in a non-syntactic deletion account.

(94) Robin does NOT PLAY – or PRETENDS not to play – [with a full deck].
(*It is with a full deck that Robin does not play _)

---

[22]The phenomenon of *Stripping* (Ross, 1967, Hankamer and Sag, 1976, Chao, 1988) can give the appearance that a conjunct phrase can be moved, as illustrated by *John bought a book yesterday, and a newspaper*. The oddness of *John bought both a book yesterday, and a newspaper* indicates that this is an instance of elliptical clausal coordination, rather than an instance of NP coordination followed by conjunct movement.

Second, examples like (95)a,b would require a word part *dontist* that is clearly not a well-formed syntactic unit to behave as if it were a full-fledged unit. In fact, Sabbagh (2007:390,ft.33) assumes just this, by claiming that word-part RNR cases involve movement of stems into syntax, in violation of Lexical Integrity (Chomsky, 1970, Selkirk, 1982, Toman, 1985, Booij, 1985, Toman, 1985, Lapointe, 1997). But there is no evidence that a word part is a syntactic unit, or that stems can move from morphology to syntax.[23]

(95) a. Do you want to become an ORTHO- or a PERIO[dontist]?

b. Do you primarily work with ORTHO- or with PERIO[dontists]?

c.*Dontists, I don't think I could work with ortho-.

d.*Did you work with ortho- yesterday dontists?

Grosu (1976), Abbott (1976) and others noted that data like (96), argued that RNRaised elements need not be constituents. However, it is possible that these cases are obtained by extraposing sequences of constituents, or by assuming some form of non-standard constituency (Steedman, 1996, Sabbagh, 2007).

(96) a. Mary BAKED and George FROSTED [20 cakes] [in less than an hour].
(Grosu, 1976)

b. Bob OFFERED and Stacey actually GAVE [a gold Cadillac] [to the Schwartz family].

c. I BORROWED and my colleagues STOLE [large sums of money] [from the Chase Manhattan Bank].
(Abbott, 1976:639).

d. John TRIED TO PERSUADE but FAILED TO CONVINCE [his skeptical examiners] [that he knew the right answer].
(Neijt, 1979:41)

e. Robin plans to MAIL and DHL had better be ready to CARRY [a package of books] [this coming Thursday] [to the King of Norway].
(Levine, 2001:164)

But there are cases of non-constituent RNR that require assumptions about constituency that have no independent motivation. The first case is illustrated in (97).[24]

(97) a. It is possible that someone with a GOOD – and assumed that someone with an EXCELLENT [set of golf irons] [would make this hole in one].

b. I think that someone with FOUR – and firmly believe that someone with FIVE [kids in diapers] [*must* be insane].

---

[23]These data are problematic for any syntactic account, including multidominance, since there is no *independent* evidence that syntax can access word-parts as required by (95) as well as by (98) below. For further discussion about problems arising in movement accounts see Sabbagh (2007:382,391) and Yatabe (2007).

[24]These data are inspired by German data from Wesche (1995:55) and Wilder (1999).

Two constituents are RNRaised in (97): [*set of golf irons*]_{N'} and [*would make this hole in one*]_{VP}. The RNRaised N' belongs to an embedded PP in the rightmost NP on each conjunct (i.e. [*someone* [*with* [*a good/excellent* _]]]) whereas the RNRaised VP takes the entire NP headed by *someone* as subject. I know of no independent syntactic, semantic or prosodic reason for viewing such a N' VP sequence as a unit, even in theories where traditional constituency is rejected, like Steedman (1985 1996), Larson (1990:626-627), and Sabbagh (2007:395-397). And if there is no independent reason to assume such units form constituents, then this stipulation should be avoided.

A second challenge to the notion that only constituents can be RNRaised comes from data like (13), repeated below in (98). There is no independent justification for viewing as the strings '*war Germany*', '*star hotels*', or '*synaptic neuron*' as constituents. In all of these cases the first unit in the RNRaised string is a stem, not a syntactic entity, and there is no evidence that it can combine with the phrase that follows it.

 (98) a. These events took place in PRE- or in POST-[war Germany]?

      b. Explain how signals move from a PRE- to a POST-[synaptic neuron].

      c. I'm more interested in FOUR- than in FIVE-[star hotels].

The cases in (99) are particularly revealing because the RNRaised element is supposed to be a bound morpheme in one conjunct but supposed to be a syntactic phrase in the other. The idea that a syntactic element can move into morphology and vice versa has no independent motivation. See Booij (1985:147) for similar phenomena in Dutch.

 (99) a. Please list all publications of which you were the SOLE or CO-[author].
         (Huddleston et al., 2002:1325, ft. 44).

      b. It is neither UN- nor OVERLY [patriotic] to tread that path.

      c. The EX- or CURRENT [smokers] had a higher blood pressure.
         (Chaves, 2008)

      d. The NEURO- and COGNITIVE [sciences] are presently in a state of rapid development (...)
         [opinionator.blogs.nytimes.com/2011/12/25/the-future-of-moral-machines/?hp]

      e. Are you talking about A NEW or about AN EX-[boyfriend]?

Booij (1985) and Nespor (1985) note some direct evidence for the deletion analysis. In the Dutch data in (100), when *wesp* ('wasp') combines with *steek* ('sting') an additional schwa appears in between: *wespesteek*. This linking morpheme survives the deletion in German and Dutch, a fact that is hard to explain in a syntactic analysis.

(100) wespe- en   bije[steken]
        wasp-   and bee stings'
        (Booij, 1985)

Further difficulties for movement-based accounts come from *discontinuous* RNR, first noted by Wilder (1999) with data like (101). The first verb is not compatible with with *to Mary*, but the second verb is. Schematically, we have a sequence of elements '*A & B C D*' which is interpreted as '[*A C*] *&* [*B C D*]', not as '[*A C D*] *&* [*B C D*]'. In such cases, the RNRaised NP is not in a higher structural position than the conjuncts.

(101) John should FETCH and GIVE [the book] to Mary.
               $\underbrace{}_{A}$ $\underbrace{}_{B}$ $\underbrace{}_{C}$ $\underbrace{}_{D}$

The same point is further illustrated by the attested data in (102), from Whitman (2009:238–240). Each verb shares the same rightmost complement NP, but that complement immediately precedes another phrase (underlined) which belongs to the last (underlined) conjunct.

(102) a. A Monroe County man, convicted yesterday of RAPING, BEATING, and <u>STUFFING</u> [a 7-year-old girl] <u>into an abandoned well</u>, could be executed by lethal injection.

    b. The blast UPENDED and <u>NEARLY SLICED</u> [an armored Chevrolet Suburban] <u>in half</u>.

    c. During the War of 1982, American troops OCCUPIED and <u>BURNED</u> [the town] <u>to the ground</u>.

    d. Members of the platoon testified that they PUNCHED, KICKED, and <u>STRUCK</u> [the detainee] <u>with their rifles</u>.

There are even more complex cases of discontinuous RNR. As Whitman (2009) notes, sometimes the D part is neither a complement of B nor a modifier of it. For example, in (103) the string *to perform the necessary actions without injury* is a constituent, in contrast with the data above. Whitman (2009) admits being unable to model such cases.

(103) a. Please move from the exit rows if you are UNWILLING or <u>UNABLE</u> [to perform the necessary actions] <u>without injury</u>.

    b. In the player's box was Tony Nadal, the UNCLE and <u>COACH</u> [of Rafael Nadal] <u>since he started playing as a youngster</u>.

Bachrach and Katzir (2008) argue that discontinuous RNR involving clausal coordination is not possible. In their account, each conjunct is a clause and therefore undergoes Spell-Out before the conjunction takes place. The multidominated material is not spelled-out because it is not completely dominated within each conjunct. It is completely dominated once conjunction occurs, but since Spell-Out has already taken place, linearization cannot be interfered with. However, discontinuous clausal RNR does exist, as illustrated by (104). Bachrach and Katzir (2008) incorrectly predict that such cases are impossible.

(104) a. The first platoon OCCUPIED and the second BURNED [the town] <u>to the ground</u>.

    b. Tom SPENT and Mary DONATED [over one hundred dollars] <u>to charity</u>.

Discontinuous RNR is best seen as deletion because of examples like (105). The former involves sub-lexical units, and the latter involves a non-coordination structure. Both of these cases are expected in the present approach if they are deletion-based RNR.

(105) a. Are you talking about A NEW or that <u>EX</u>-[BOYfriend] <u>you used to date</u>?
      (cf. with ?*Are you talking about a new?)

    b. The troops that OCCUPIED ended up <u>BURNING</u> [the town] <u>to the ground</u>.

The evidence suggests that true RNR is not a syntactic operation: it can apply to virtually any strings, including non-constituent units that cannot be displaced in any way, or discontinuous strings located within a non-initial conjunct. We also have cases where two strings with different sub-lexical and phrasal status can trigger RNR, and cases where a stem is apparently moved to the syntactic domain, as if it were a phrase, and cases where a syntactic phrase is apparently moved into morphology, as if it were a stem. There is no independent evidence to assume that these kinds of syntactic operations are possible. However, if these kinds of RNR are due to a Backward Deletion operation that only targets linearized strings, not syntax, then such phenomena are expected.

IDENTITY CONDITIONS. Following Booij (1985), Beavers and Sag (2004), and Chaves (2008), I assume that Backward Periphery Deletion imposes morph form identity conditions. There is much evidence in favor of this view. First, note that phonological identity is not sufficient, as shown in (106). In (106)a,b the RNRaised units are morphemes that belong to different parts of speech, and in (106)c-f the two RNRaised nominals are required to have two different senses at the same time. For example, *lamb* must describe both an animal and its meat, *bat* must describe both an animal and a sports instrument, and *armed* must describe a body and a weapon. Oddness arises because in general the same phrase cannot simultaneously have two meanings, except in puns (Zaenen and Karttunen, 1984:316).

(106) a. *Randy SAW and Rene has BEEN [flying planes].

    b. *Jo WILL and Sandy BUILT THE [drive].
      (Milward, 1994)

    c. *Mary FED and Tom ENJOYED [the lamb].
      (adapted from Buitelaar (1998:64))

    d. *Robin SWUNG and Leslie TAMED [an unusual bat].
      (Levine and Hukari, 2006:156)

    e. *I AM and I SPEAK [Japanese].

    f. *There stood a ONE- and WELL-[armed man].

Similarly, the cases in (107) are odd because there is no morpheme to delete: *blackboard*, *butterfly*, and so on are grammaticized monomorphic words, not productive compounds. Blackboards need not be black or made of board, and butter flies are not flies, nor buttery. And as Müller (1990) and Smith (2000) point out, for a morpheme to be deleted it must not be grammaticized.

(107) a. *I am interested in DIALECT- and EPISTEM[ology].

    b. *We caught BUTTER- and FIRE[flies].
      (Chaves, 2008)

    c. *We need new BLACK- and FLOOR[boards].
      (Artstein, 2005)

The oddness of (107) contrast with the acceptability of the data in (108).

(108) a. We saw a landscape dotted with WIND- and WATER-[mills].
      (Artstein, 2005)

b. We caught HOUSE and HORSE [flies].
   (Stanley Dubinsky, p.c.)

There are also reasons to believe that semantic identity is not required, given the that examples like (109) allow sloppy readings, as noted by Höhle (1991).

(109) a. Chris LIKES and Bill LOVES [his bike].

b. Tom LOVES and Jeff ADORES [every girl from his school].

c. Fred SENT Mary and Tim HANDED Sue [a love poem].

Moreover, RNR differs from *bona fide* extraction in that only the former allows semantic duplication of a quantifier. For example, in (110)a the phrase *very few accounts of the local situation* can be construed distributively (Pat wrote few accounts and Birch emailed few accounts), as predicted by a Backward Periphery Deletion, whereas in (110)b a single quantifier must bind into both conjuncts, resulting in a complex conjunctive restriction on the quantifier (the accounts that were both written by Pat and emailed by Birch), as predicted by ATB Extraposition. The interrogative *wh*-expression in (110)c similarly lacks a distributed interpretation (the question is only asking for one number; not two).

(110) a. (During the long campaign,) Pat wrote his mother and Birch emailed her father, [very few accounts of the local situation].

b. (During the long campaign,) there were [very few accounts of the local situation] that Pat wrote to his mother and Birch emailed to her father.

c. [How many accounts of the local situation] did Pat write to his mother and Birch email to her father?

Notably, RNR does not seem to impose strict constraints on grammatical properties. For example, in (111) the RNRaised NP *Frauen* is required to be accusative by the verb *findet* and dative by the verb *hilft*. The same pattern arises in the word-part RNR in (112). Crucially, such sentences are only possible because the accusative and dative plural realizations of *Frau* involve the same morphological form. This pattern is to be expected if the identity conditions imposed by Backward Periphery Deletion pertain to morph stems, as assumed above.

(111) Er findet ~~Frauen~~   und hilft [Frauen]
     he finds women.ACC and helps women.DAT
     (Ingria, 1990)

(112) Weil   Leituns(wasser) von Mineral[wasser]   unterscheiden ist
     Because flat-water.NOM from mineral-water.DAT differentiated is
     (Wiese, 1992)

The same phenomenon can be seen in languages like Finnish, as (113) shows. This sentence is only possible because the possessive suffix added to the noun obliterates case distinctions. If the different case markings were overt, RNR would be impossible. Similar data have been noted in a variety of other languages (Bayer, 1996).

(113) He   lukivat hänen uusimman (kirjansa)   ja   me hänen parhaat [kirjansa].
       they read   his   newest   book.SG-GEN and we his   best   books.PL-NOM
       (Zaenen and Karttunen, 1984)

English RNR exhibits the same disregard for grammatical features. In (114)a *will* requires a non-finite VP while *have* requires a finite VP. In (114)c the NP *a movie star* is required to be predicative by the first conjunct but non-predicative by the second.

(114) a. I certainly WILL and you already HAVE [set$_{nfin/fin}$ the record straight].

    b. Either THEY or YOU [are$_{2sg/3pl}$ going to have to do it].
      (Pullum and Zwicky, 1986)

    c. Would you like TO MEET or TO BE [a movie star$_{pred+/-}$]?
      (Whitman, 2005)

Further evidence that morph stem form identity is a key constraint imposed by Backward Periphery Deletion comes from the contrast in (41) – repeated below in (115). Whereas VP Ellipsis allows gender mismatches, true RNR does not. Example (41)c also shows that (41)a cannot be reversed, which supports the claim that (41)a is not due to VP Ellipsis.

(115) a. Chris$_x$ LIKES ~~his$_x$ bike~~ and Bill$_y$ LOVES [his$_y$ bike].

    b. #Chris$_x$ LIKES ~~his$_x$ bike~~ and Sue$_y$ LOVES [her$_y$ bike].

    c. *Chris LIKES his bike and Bill LOVES ~~his bike~~.

There are other data suggesting that RNR imposes some form of morphophonological identity, as originally discussed in Pullum and Zwicky (1986). Consider the evidence in (116), which shows that tense differences block RNR.

(116) a.*Tom let MIA ~~play outside~~ and Mary allowed BILL [to play outside].

    b.*Kim SUCCEEDED IN ~~helping us~~ and Sam TRIED TO [help us].

    c.*I LIKE ~~playing guitar~~ and I WILL [play guitar].

But when it comes to number inflection it seems that RNR is somewhat more flexible, as shown in (117)a,b. It is possible that number inflection is less relevant for RNR because it makes a weaker semantic contribution than tense inflection. Whereas tense is referential (since it indicates an associated time interval via inter-sentential or extrasentential dependencies) whereas agreement is a local phenomenon between elements in the sentence, meaningless outside the grammatical system.[25]

(117) a. Tom thinks that THE SHOES but Mary thinks that THE COAT [is too expensive].

    b. ??Tom thinks that THE COAT but Mary thinks that THE SHOES [are too expensive].

---

[25]Alternatively, the acceptability of (117)a may be due to a performance error. See Solomon and Pearlmutter (2004), Eberhard et al. (2005), Bock et al. (2006), and Bock and Middleton (2011) for recent discussion of the psycholinguistic evidence for so-called agreement attraction errors.

    c.*Tom thinks that THE COAT but Mary thinks that THE SHOES [is too expensive].

    d.*Tom thinks that THE SHOES but Mary thinks that THE COAT [are too expensive].

Matters are further complicated by the fact that the pattern in (117)d is sometimes passable for some speakers, in restricted contexts. This 'summative agreement' RNR has been noticed before, by Postal (1998:173) and Yatabe (2002). I illustrate this point with the paradigm in (118). Judgements appear to be somewhat idiosyncratic, but the acceptability of summative agreement improves if *John* and *Mary* are not contrasted.

(118) a. Tom said that John – and Mia said that Mary – [were wonderful students].

      b.*Tom said that JOHN – and Mia said that MARY – [were wonderful students].

      c. Tom said that JOHN – and Mia said that MARY – [was a wonderful student].

Summative agreement also seems to arise in RNR of matrix VPs:

(119) a. Today A MAN – and tomorrow A WOMAN – [is coming for an interview].

      b. Today a man – and tomorrow a woman – [are coming for an interview].

The above patterns are contrary to Grosz (2012), where summative agreement is assumed to be the only option for these types of RNR, and to arise due to configurational conditions.

    I propose that summative agreement arises when the speaker has a privileged perspective on the situation under discussion and opts to summarize it in his/her own words, by repackaging the sentence on-the-fly. For example, suppose that Fred (the speaker) knows that (i) Mia thinks Mary is a wonderful student and that (ii) Tom thinks John is a wonderful student. Then, Fred might opt to say that Mia and Tom think that Mary and John are wonderful students, respectively. This can be paraphrased in various ways, including (118)a. But when it is less likely for the speaker to have a privileged perspective, the two propositions should be kept separate. The latter case is illustrated in (120). Without a proper contextualization, it is harder to construe a situation where the speaker of (120)a,b is privy to Sue's and Kim's thoughts or to Bob's guesses. The access to this kind of information is less immediate than in (118)a, where the speaker is simply reporting what Tom and Mia have said.

(120) a. Sue thought that Bill – and Kim thought that Tom – [was / ?*were lost].

      b. ?*Bob guessed that John – and Mia warned that Mary – [were bad students].

Beavers and Sag (2004) note that summative agreement is at least in part a semantic process, since it does not occur in disjunction. I illustrate this point with (121). This shows that summative agreement is is contingent on the semantics of the coordinator.

(121) a. Did you say that JOHN or did you say that MARY [was a wonderful student]?

      b.*Did you say that JOHN or did you say that MARY [were wonderful students]?

Symmetric predicates can occur in summative agreement RNR as well, as illustrated in (122), in spite of claims of the contrary by Grosz (2012).

(122) a. We used to think that Tom's problems and Bill's problems were different, but after discussing them with you, we've come to the realization they're not so different: I think that Tom – and you think that Bill – [have very similar problems].
(= 'there is a set of problems that I think Tom has and you think Bill has')

b. I suspect that there's no winner in this case, it's pretty much a tie. To put it in perspective: I think that Robert – and you think that Bill – [are equally annoying].
('there is an equal degree of annoyance that Robert and Bill cause')

I propose that summative agreement arises when the speaker repackages two independent propositions into a third proposition by adding additional contextual information. The idea that such sentences involve an extra 'repackaging' step that combines with independent propositions is consistent with the speaker variation that Yatabe (2002) observes. In my view, such RNRaisings do not truly have a semantic effect. They simply mirror the fact that the speaker has additional information that can be integrated into the utterance during the deletion. In other words, deletion offers the speaker the chance to fuse the two statements into a richer one. Evidence that this process does not have a semantic effect comes from the fact that true plural predication is not allowed, as noted by Moltmann (1992) with (123).

(123) a.*I said that Bill – and Mary said that Bob – [have finally met].

b.*Tom is happy that Bill – and Fred is glad that Mary – [love each other].

c.*Today A MAN and tomorrow A WOMAN [are talking about each other].

The oddness of such cases contrasts with the acceptability of (124), discussed by Ross and Perlmutter (1970), Hintikka (1974) and McCawley (1982 1998). In my account, (124) is obtained via ATB Extraposition as in Chaves (2009).

(124) A man ENTERED and a woman LEFT [who had met in Vienna].

A FORMALIZATION OF BACKWARD PERIPHERY DELETION. Backward Periphery Deletion allows peripheral and prosodically independent units to be deleted under morph form identity. Recall that the feature M(ORPHO)P(HONOLOGY) contains both phonological and morph form information, as illustrated in (125). The phrase 'these big books' consists of a phonological phrase (ϕ) with three prosodic words (ω). In what follows I assume that the elements in FORM are restricted to morphs with semantic contribution: stems, derivational affixes, and tense affixes. For ease of exposition, morphophonological representations like (125)a are abbreviated as shown in (125)b.

(125) a.
$$\begin{bmatrix} phrase \\ \\ \text{MP} \left\langle \begin{bmatrix} \phi \\ \\ \begin{bmatrix} \omega \\ \text{PHON} / \eth iz/ \\ \text{FORM} \langle this \rangle \end{bmatrix}, \begin{bmatrix} \omega \\ \text{PHON} / b\text{ɪ}g/ \\ \text{FORM} \langle big \rangle \end{bmatrix}, \begin{bmatrix} \omega \\ \text{PHON} / b\text{ʊ}ks/ \\ \text{FORM} \langle book \rangle \end{bmatrix} \end{bmatrix} \right\rangle \end{bmatrix}$$

b.
$$\begin{bmatrix} \phi \ / \eth iz \ b\text{ɪ}g \ b\text{ʊ}ks/ \\ this \ big \ book \end{bmatrix}$$

Following Inkelas and Zec (1990), Kratzer and Selkirk (2007) and many others, I assume that prosodic structure is built locally and incrementally. The morphophonology of a phrase is computed as the linear combination of the phonologies of the daughters, which allows the grammar to straightforwardly access properties that have been argued to be important for prosodic phrasing (syntactic boundaries, category membership, headship, (directionality of) branching, and grammatical relations), and it also allows deletion to apply locally, as sketched in (126). Here, α_n is a morphophonologic constituent, $^+$ is a Kleene plus, and * is a Kleene star.

(126) BACKWARD PERIPHERY DELETION CONSTRUCTION (informal version)

Given a sequence of morphophonologic constituents $\alpha_1^+ \ \alpha_2^+ \ \alpha_3^+ \ \alpha_4^+ \ \alpha_5^\star$, then output $\alpha_1^+ \ \alpha_3^+ \ \alpha_4^+ \ \alpha_5^\star$ *iff* α_2^+ and α_4^+ are identical up to morph forms.

The account is informally illustrated below. Square brackets correspond to intonational phrases and parenthesis to smaller prosodic units of different strengths, such as prosodic words or phonological phrases. The latter roughly correspond to a maximal syntactic projection of a lexical category or a syntactic branching phrase. Although there is experimental evidence showing that a finer-grained hierarchy of intonational boundaries is probably needed, the precise nature of this hierarchy remains to be established. In (127)a-d the contrastive stress creates prosodic boundaries that would otherwise not exist, thus allowing (126) to apply. The deletion pattern in (127)a is obtained if α_1^+ = [(*Alice LOVES*)], α_2^+ = [(*bagels*)], α_3^+ = [(*and Tim HATES*)], α_4^+ = [(*bagels*)], and $\alpha_5^\star$ is the empty string. If $\alpha_3^\star$ is non-empty, then discontinuous RNR occurs, as in (127)b. The latter corresponds to α_1^+ = [(*John should FETCH*)], α_2^+ = [(*the book*)], α_3^+ = [(*and GIVE*)], α_4^+ = [(*the book*)], and $\alpha_5^\star$ = (*to Mary*). In the NP in (127)e no contrast is needed since there is a natural prosodic boundary between the prosodic words.

(127) a. [(*Alice LOVES*)] [~~(*bagels*)~~] [(*and Tim HATES*)] [(*bagels*)]

   b. [(*John should FETCH*)] [~~(*the book*)~~] [(*and GIVE*)] [(*the book*)] [(*to Mary*)]

   c. (*in PRE*) (~~*war Germany*~~) (*or in POST*) (*war Germany*)

   d. (*distinguish NEURO*) (~~*linguistics*~~) (*from PSYCHO*) (*linguistics*)

   e. (Thai) (~~food~~) (and Burmese) (food)

Given that (126) can only apply to well-formed prosodic phrasings that are licensed by the independent prosodic rules of English typically means that deletion targets units that are peripheral in the first daughter and non-initial in the second. And since deletion applies to only certain parts of a phrase, comprehenders can more easily determine that the sentence is incomplete and that the missing material will be realized downstream. This functional explanation for the directionality of RNR is consistent with the fact that prosodic cues are known to help the production and comprehension of a variety of different constructions (Fodor, 2002a b, Kitagawa and Fodor, 2006) and consistent with the functional explanation offered in §2.2 for the fact that the prosodic contrast observed in RNR is correlated with the distance between the RNRaising site and the overt RNRaised unit.

In order to formalize (126), I draw from Yatabe (2002), Beavers and Sag (2004), and Chaves (2008), and propose the rule in (128). This construction splits the MP list of a phrase into five

sublists, using the list concatenation '∘' operation. The $F_{1...n}$ variables range over lists of morph stem forms, and $L_{1...4}$ range over lists of morphophonological units. With the exception of L_4, all lists are required to be non-empty (otherwise, the rule could apply with no effect). The elided material is the sublist containing morph forms $[\text{FORM } F_1], ..., [\text{FORM } F_n]$ that occur again later, in different morphophonological units. The notation $L : \langle [\text{FORM } F_1], ... , [\text{FORM } F_n] \rangle$ means that $L = \langle [\text{FORM } F_1], ..., [\text{FORM } F_n] \rangle$.

(128) BACKWARD PERIPHERY DELETION CONSTRUCTION (formal version)

$$\begin{bmatrix} phrase \\ \text{MP } L_1\text{:}\textit{ne-list} \circ L_2\text{:}\textit{ne-list} \circ L_3 \circ L_4 \end{bmatrix} \rightarrow$$

$$\begin{bmatrix} phrase \\ \text{MP } L_1 \circ \left\langle \begin{bmatrix} \text{FORM } F_1 \end{bmatrix}, ..., \begin{bmatrix} \text{FORM } F_n \end{bmatrix} \right\rangle \circ L_2 \circ L_3 : \left\langle \begin{bmatrix} \text{FORM } F_1 \end{bmatrix}, ..., \begin{bmatrix} \text{FORM } F_n \end{bmatrix} \right\rangle \circ L_4 \end{bmatrix}$$

Crucially, only the second of the $[\text{FORM } F_1], ..., [\text{FORM } F_n]$ sequences appears in the mother. The effect of (128) is illustrated in Figure (7). The peripheral units are highlighted.
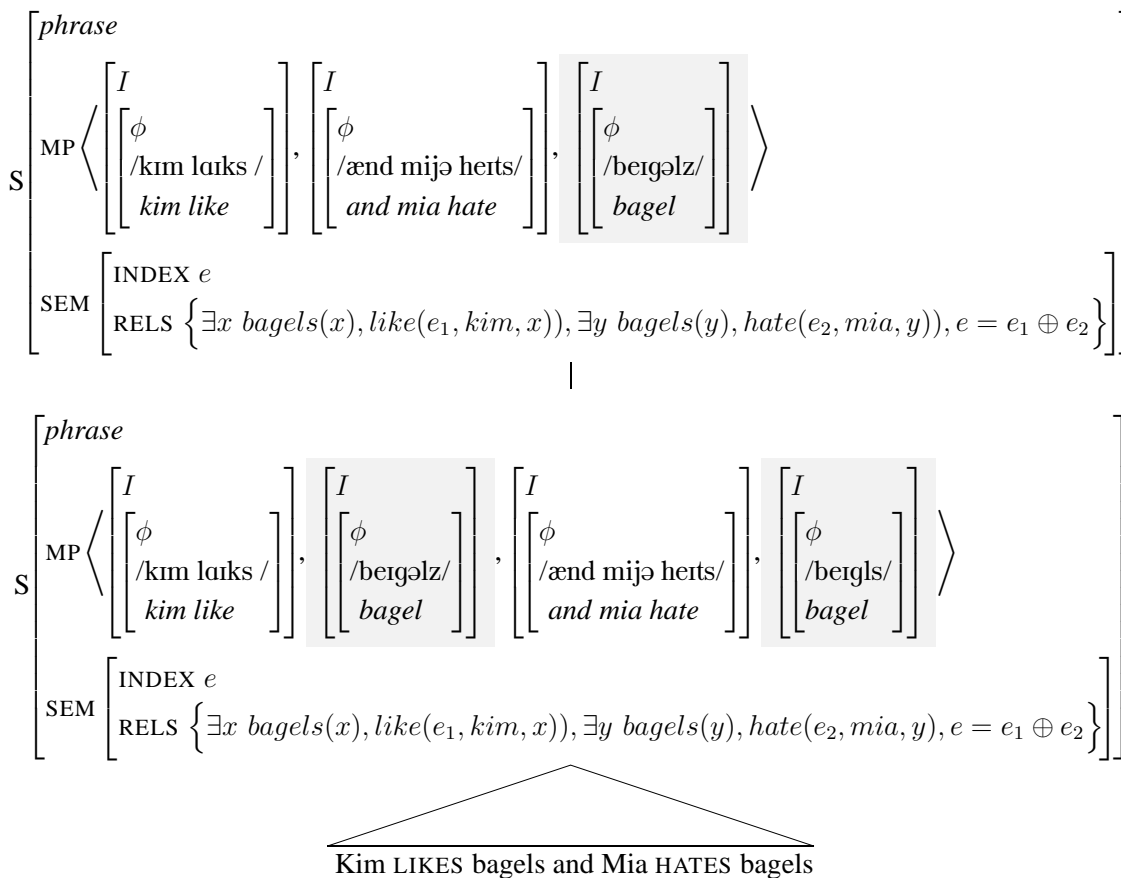

Figure 7: Backward periphery deletion of linearized morphophonological units

Here the L_1 variable corresponds to a singleton list containing the phonology [(*Kim LIKES*)], L_2 corresponds to a singleton list containing the phonology [(*and Mia HATES*)], and L_3 corresponds

to a singleton list with [(*bagels*)]. In this case, L_4 is the empty list, and therefore the RNR is not discontinuous. The nature of the prosodic constituents in MP is not specified by the rule in (128), this is left to independently motivated prosodic phrasing. Thus, if (128) applies to a clause then the prosodic constituents are intonational phrases (I), if the phrase is sub-clausal then the constituents are phonological phrase (ϕ), and so on.[26]

The deletion rule in (128) can omit any sequence of independent morphophonological units, in any phrasal node, coordinate or not, under morph form identity, as long as the syntax-phonology rules of the grammar are respected. Consequently, part of speech and syntactic constituency is irrelevant. Furthermore, the account correctly predicts that RNR is not possible in word-parts with similar phonology but which do not have a corresponding morpheme, due to grammaticization, as discussed in (106) above. For example, the compounding process that created the words *butterfly* and *firefly* is no longer productive. Hence, although these lexemes have two prosodic words each (/bətɪflaɪ/ and /fɑjɪflaɪ/), they consist of one morph root each, *butterfly* and *firefly*. Because the two words correspond to completely different morph forms, the identity requirement imposed by (128) cannot be satisfied, and the deletion in (129) is correctly blocked.

(129) Did you catch a BUTTER*(fly) or a FIREfly?

Backward Periphery Deletion targets independent prosodic units, and therefore makes various correct predictions, as discussed in §2.2. For example, Milward (1994) claims that (130) is odd because RNR requires each conjunct to have the same syntactic bracketing. But such a radical stipulation is unnecessary, as the oddness follows in the present account from the Sense Unit Condition (Selkirk, 1984:291). More specifically, the syntactic bracketing of the first conjunct [[*a friend of Terry*]*'s handbag*] cannot be realized with the required prosodic bracketing [*a friend of*] [*Terry's handbag*].

(130) *I saw a friend of – and the manufacturer of – Terry's handbag.

Note that the rule in (128) is simplified in that RNRaised unit should be allowed to be un-accented and to be grouped prosodically with the preceding prosodic constituent. I assume that independent morphophonological rules can apply to the output of the deletion in (128) and obtain this effect. This phenomenon is worth mentioning because it offers a simple explanation to a number of puzzling RNR phenomena. Consider (131), first noted by Kayne (1994). This example is challenging to most theories of RNR because the negative polarity item *any* must somehow still be in the scope of negation in order to be licensed.[27]

(131) John has READ but he hasn't UNDERSTOOD any of my books.

However, there is evidence that what is RNRaised here is *my books*, not *any of my books*. In other words, the complement of *read* is the plural NP *my books*, and *understood* takes as complement the singular partitive NP between square brackets. The example in (132) offers independent support for this view.

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[26]See Wagner (2010) for arguments that coordination can yield recursive prosodic structure.

[27]A reviewer suggests that this may be a case of null complement ellipsis. I think this is implausible because of the oddness of ?*John has read* in the relevant interpretation.

(132) John may very well have READ but he ended up MENTIONING none of my books.

The complement of *read* is *my books* rather than *none of my books*. Hence, in spite of the fact that the partitive NP forms an intonational unit, the RNRaised string is actually *my books*. The words *none/any of* belong to the second conjunct but end up being phonologically integrated in the same prosodic unit after the nominal phrase is RNRaised. Hence, (131) poses no challenge for NPI licensing since *any of* is not part of the RNRaised string: [(*John has* READ)][(~~*my books*~~)][(*but he hasn't* UNDERSTOOD)(*any of*)][(*my books*)]. The present analysis also predicts the contrast below. In (133)a the string *books* (NP) is deleted under morph identity with the string *books* (N') in the second conjunct. Conversely, in (133)b there is no suitable coordination that can feed Backward Periphery Deletion.

(133) a. Robin READ ~~books~~$_{NP}$ but Mary DIDN'T READ any books$_{N'}$.

     b.*Robin DIDN'T READ ~~(any) books~~ but Mary READ any books.

Cases like (134) are also correctly predicted to be odd. Since the only NP that both conjuncts can share is *any books*, the oddness stems from the fact that the first conjunct cannot license the presence of the NPI. If the string *any of my books* were truly being RNRaised in (131) then the oddness of (134) and the acceptability of (131) would be a mystery.

(134) *John has SEEN ~~(any) book~~ but he hasn't BOUGHT [any book].

The account predicts (135), in which the first daughter RNRaises an NP, but the second seems to RNRaise a different phrase. In my account, *with* and *than* are not part of the RNRaised NP in (135)a,b, and merely prosodify with it after deletion takes place.

(135) a. We either give THE MARINES or supply THE PARATROOPERS [with extra guns].

     b. They were also AS liberal or MORE liberal [than any other age group in the 1986 through 1989 surveys].   [WSJ]

Let us turn to summative agreement RNR, in (118)a and (122), repeated here as (136).

(136) a. I said that JOHN and you said that MARY [were wonderful students].

     b. I think that BOB and you think that BILL [have very similar problems].

In §3.3 I argued that these cases involve subtle judgments and require a particular type of context in which the speaker can employ a perspective shift. In this account, deletion offers the speaker an opportunity to integrate a limited amount of contextual information into the construction. The fact that this process involves access to the signs that correspond to the elided units makes it a reconstruction operation, which is consistent with the fact that speaker judgments are difficult, and sometimes unstable. This is depicted in Figure (8).

The speaker's knowledge that the x and y dependents are referentially different leads to a repackaging of the remainder of the sentence, via the coordination of the two VPs. Given that implicit coordination, the Shared Dependent Condition for Conjunction can apply and cumulate the shared dependents x and y. Finally, the morphophonology of the reconstructed coordinate

S

I think that ROBERT and you think that BILL [have similar problems]$_{x \oplus y}$

|

S

I think that ROBERT ~~has problems~~$_x$ and you think that BILL ~~has problems~~$_y$
(+ Context: speaker knows that Robert's problem and Bill's problem are similar)
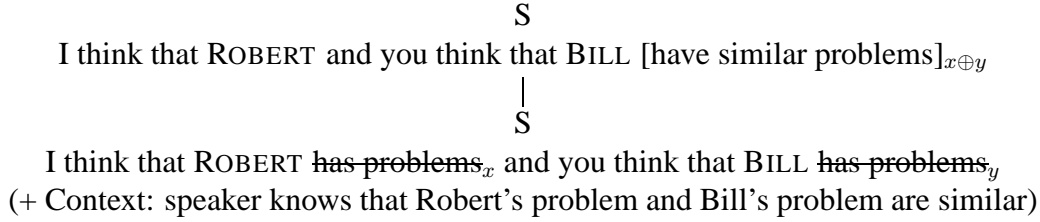
Figure 8: Shared Dependent Cumulation in Backward Periphery Deletion (informal)

VP is integrated in the mother node, rather than the morphophonology of the original VPs: *has problems*.

Figure (8) is somewhat misleading since RNR only enforces morph stem identity, but the point is that the phrase *have similar problems* reflects the speaker's knowledge about the values of x and y. In that sense, the additive reading has no semantic effect on the logical form of the sentence. A more formal version of this analysis is fleshed out in Figure (9).

$$
S\begin{bmatrix} phrase \\ \text{MP} \left\langle \begin{bmatrix} I \\ \begin{bmatrix} \phi \\ /\text{ʌɪ θɪŋk ðæt bɔb}/ \\ \textit{I think that Robert} \end{bmatrix} \end{bmatrix}, \begin{bmatrix} I \\ \begin{bmatrix} \phi \\ /\text{ænd ju θɪŋk ðæt bɪl}// \\ \textit{and you think that Bill} \end{bmatrix} \end{bmatrix}, \begin{bmatrix} I \\ \begin{bmatrix} \phi \\ /\text{hʌv similəɪ pɹɔblems}/ \\ \textit{have similar problem} \end{bmatrix} \end{bmatrix} \right\rangle \\ \text{SEM} \begin{bmatrix} \text{INDEX } e \\ \text{RELS} \begin{Bmatrix} \exists x\ problem^*(x), think(e_1, I, have(robert, x)), \\ \exists y\ problem^*(y), think(e_2, you, have(bill, y)), e = e_1 \oplus e_2, \end{Bmatrix} \end{bmatrix} \end{bmatrix}
$$

|

$$
S\begin{bmatrix} phrase \\ \text{MP} \left\langle \begin{bmatrix} I \\ \begin{bmatrix} \phi \\ /\text{ʌɪ θɪŋk ðæt bɔb}/ \\ \textit{I think that Robert} \end{bmatrix} \end{bmatrix}, \begin{bmatrix} I \\ \begin{bmatrix} \phi \\ /\text{hʌv pɹɔblems}/ \\ \textit{have problem} \end{bmatrix} \end{bmatrix}, \begin{bmatrix} I \\ \begin{bmatrix} \phi \\ /\text{ænd ju θɪŋk ðæt bɪl}// \\ \textit{and you think that Bill} \end{bmatrix} \end{bmatrix}, \begin{bmatrix} I \\ \begin{bmatrix} \phi \\ /\text{hʌv pɹɔblems}/ \\ \textit{have problem} \end{bmatrix} \end{bmatrix} \right\rangle \\ \text{SEM} \begin{bmatrix} \text{INDEX } e \\ \text{RELS} \begin{Bmatrix} \exists x\ problem^*(x), think(e_1, I, have(robert, x)), \\ \exists y\ problem^*(y), think(e_2, you, have(bill, y)), e = e_1 \oplus e_2, \end{Bmatrix} \end{bmatrix} \end{bmatrix}
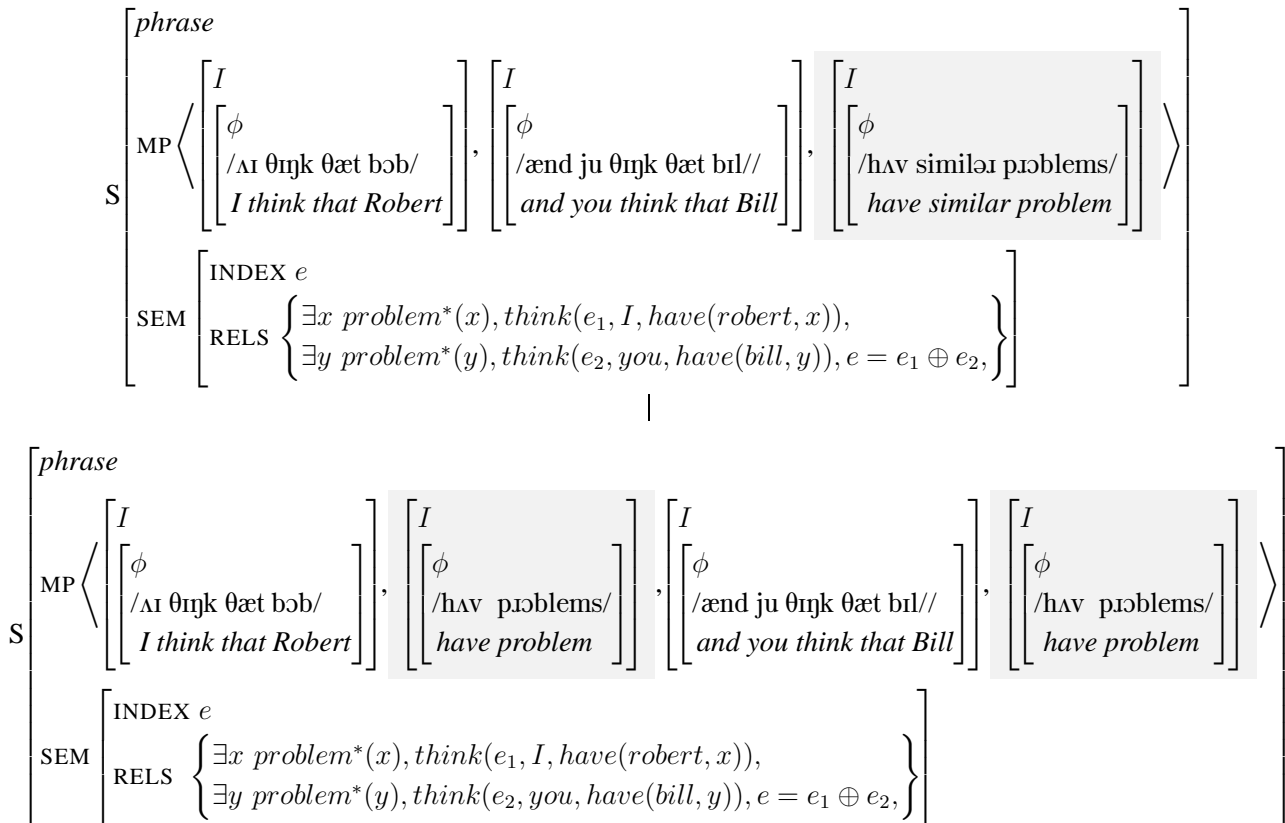$$

Figure 9: Shared Dependent Cumulation in Backward Periphery Deletion

This analysis can be obtained by revising (128) as shown in (137). The function $\Upsilon()$ takes as an argument the list of MP material that is shared in the daughters. In the simplest case, the speaker is faithful to the sentence and does not tamper with the morphophonology: $\Upsilon(L) = L$. In that case, everything works as in (128).

(137) BACKWARD PERIPHERY DELETION CONSTRUCTION (extended version)

$$\begin{bmatrix} phrase \\ \text{MP } L_1\text{:}ne\text{-}list \circ L_2\text{:}ne\text{-}list \circ \Upsilon(L_3) \circ L_4 \end{bmatrix} \rightarrow$$

$$\begin{bmatrix} phrase \\ \text{MP } L_1 \circ \left\langle \begin{bmatrix} \text{FORM } F_1 \end{bmatrix},...,\begin{bmatrix} \text{FORM } F_n \end{bmatrix} \right\rangle \circ L_2 \circ L_3 \text{:} \left\langle \begin{bmatrix} \text{FORM } F_1 \end{bmatrix},...,\begin{bmatrix} \text{FORM } F_n \end{bmatrix} \right\rangle \circ L_4 \end{bmatrix}$$

In the non-trivial case, $\Upsilon(L)$ allows the speaker's privileged contextual perspective to interfere with the realization of L during the processing of deletion. In that case, $\Upsilon(L)$ outputs L', the morphophonology of a phrase that corresponds to the conjunction of two eventuality-denoting signs X_1 and X_2 that have the same morphophonology L. The signs X_1 and X_2 can be found by inspecting the working memory workspace, as in (138).[28]

(138) SHARED DEPENDENT CUMULATION IN BACKWARD PERIPHERY DELETION

$\Upsilon(L) = L'$ *iff*

  i. There are two eventuality-denoting signs X_1 and X_2 with the same morphophonology. More formally:

$$\exists X_1 \exists X_2 \quad X_1\text{:}\begin{bmatrix} \text{MP} & L \\ \text{SEM} & \begin{bmatrix} \text{INDEX } e_1 \\ \text{RELS } \Gamma_1 \end{bmatrix} \end{bmatrix} \land X_2\text{:}\begin{bmatrix} \text{MP} & L \\ \text{SEM} & \begin{bmatrix} \text{INDEX } e_2 \\ \text{RELS } \Gamma_2 \end{bmatrix} \end{bmatrix}$$

  ii. L' is the morphophonology of the conjunction of X_1 and X_2:

$$\begin{bmatrix} \text{MP} & L' \\ \text{SEM} & \begin{bmatrix} \text{INDEX } e = e_1 \oplus e_2 \\ \text{RELS } \Gamma_3 \end{bmatrix} \end{bmatrix} \land \Gamma_3 \leftrightarrow (\Gamma_1 \land \Gamma_2 \land C)$$

Condition (i) requires that two signs X_1 and X_2 with the same morphophonology L be accessible in the working memory parsing workspace. Both signs describe eventualities (e_1 and e_2) and have as semantic representations Γ_1 and Γ_2, respectively. These signs are required to describe eventualities because perspectives are attitudinal stances that speakers entertain about eventualities. The output of $\Upsilon(L)$ is the morphophonology L' of a phrase that denotes the conjunction of Γ_1 and Γ_2, as per condition (ii). I assume that if X_1 and X_2 have shared dependents x and y then they are cumulated in the usual way, via the Shared Dependent Condition for Conjunction. The result is a phrase that is equivalent to $\Gamma_1 \land \Gamma_2 \land C$. The term C consists of contextual information, and as such it can contain information about the dependents x and y shared by the conjuncts X_1 and X_2. Thus, if C establishes that $x = y$ then L' can be something like *the same problem*, if C establishes that $x \neq y$ then L' can be *different problems*, if C establishes that $similar(x, y)$ then L' is *similar problems*, and so forth.

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[28]Alternatively, it might be possible to access X_1 and X_2 via the SAL(IENT)-UTT(ERANCE) discussed in §3.1. Lack of space prevents me from exploring this possibility in more detail.

Because the perspective combination process implemented by $\Upsilon()$ focuses on phrases that describe eventualities, we predict that unambiguous instances of Backward Periphery Deletion are unacceptable if the RNRaised unit is nominal, as seen in (139).[29]

(139) a.*This is the difference between an INTERESTING and a TEDIOUS [teachers].
    (cf. with 'this is the difference between an INTERESTING and a TEDIOUS [teacher]')

    b.*We relied on a NEURO- and on a PSYCHO[linguistic claims of equal value].
    (cf. with 'we relied on NEURO- and on PSYCHO[linguistic claims of great value]')

    c.*Do you usually collaborate with an ORTHO- and a PERIO[dontists]?
    (cf. with 'do you usually collaborate with an ORTHO- and a PERIO[dontist]?')

The same goes for discontinuous NP RNR in (140). Since this type of RNR can only be derived via Backward Periphery Deletion, we predict that (140) cannot have internal readings. Again, this follows because $\Upsilon()$ is restricted to combining eventuality-denoting expressions.

(140) a.*Between them, Tom SPENT and Mary DONATED [a total of \$3,000] to charity.

    b.*They helped to EVACUATE and BURN [a total of four villages] to the ground.

Finally, since (137) and (138) can target non-coordinate constructions, we correctly predict the acceptability of additive readings like the following.

(141) a. The people who initially OPPOSED ended up SUPPORTING the very same proposal.

    b. You're floundering, if you say you OPPOSE then later SUPPORT the same proposal.

4 Conclusion

This work argues that no previous account of RNR can explain the full range of empirical facts because no parsimonious unitary analysis of RNR can be formulated: different subsets of RNR data lead to conflicting analytical interpretations. This impasse can be resolved if what is usually called RNR is seen as the conflation of three (partially overlapping) independent phenomena: (cataphoric) VP/N'-Ellipsis, ATB Extraposition, and Backward Periphery Deletion. All three phenomena are superficially similar in that they delay the overt realization of a shared string. Any sufficiently robust account of Ellipsis and Extraposition can predict various instances of putative RNR phenomena. True RNR boils down to a deletion operation which targets linearized strings and deletes independent morphophonological units under morph form identity. The proposed analysis draws from previous work on deletion (Booij, 1985, Swingle, 1995, Yatabe, 2002, Beavers and

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[29]Additive readings like (i) and (ii) are unproblematic. The conjoined adnominal phrases *full-time and part-time* undergo deletion of a peripheral morphophonological unit (e.g. *full-~~time~~ and part-time*). As predicted, an additive reading is not allowed: **full- and part-times*. However, the conjoined adnominals *full-time and part-time* adjoin to the same same nominal head, and therefore it can be cumulated in exactly the same way as in (5) above.

    i. Both [[full- and part-time] employees] will get raises this year.

    ii. We don't see many [[three-, four-, and five-year-old] children] around here.

Sag, 2004, Chaves, 2008). Extraposition accounts of RNR are traditionally problematic because extraposition has been assumed to be severely restricted by syntax. However, Grosu (1973), Gazdar (1981) and Stucky (1987) and others have noted counterexamples which suggest that the role of syntax in extraposition islands has been overstated, and recent psycholinguistic research supports that conclusion (Staub et al., 2006, Strunk and Snider, 2013, Levy et al., 2012, Hofmeister et al., 2013). In this work I complement this evidence with new data that further indicate that extraposition is not a syntactically bound phenomenon.

This paper also argues that the typical prosodic correlates of RNR are not grammatical requirements of RNR, as they are not obligatory in various cases. On the contrary, the usual prosody is motivated by functional factors having to do with ambiguity-avoidance. This is supported by Kentner et al. (2008), which shows that the longer the remnants, the stronger the contrastive stress. Finally, I have argued that additive RNR is an instance of a much more general conjunction-based phenomenon that allows dependents shared by conjuncts to be semantically combined. This process occurs independently of symmetric predicates and in a wide range of other constructions, including leftward extraction and adjunction.

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