Agreement mismatch in partitive relatives¹

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1 The phenomenon

Relative clauses (RCs) at the right edge of partitive DPs tolerate a curious variability in agreement possibilities when the partitive is headed by "one." I refer to the apparently anomalous singular agreement as *Agreement Mismatch in Partitive Relatives* (AMPR).²

- (1) a. Paula is one of the few students who understands/understand *On Raising*.
 - b. John is one of the only linguists who is/are giving a talk.
 - c. Naomi is one of the many linguists who likes/like *Aspects*.

I adopt the view that partitive DPs have a silent head noun that is (optionally) elided under identity with the post-prepositional NP (see Jackendoff 1977; Cardinaletti and Giusti 1992; Zamparelli 1995; Sauerland 2004; a.o.). I will hereafter refer to the elided NP in (2) as the *partitive-head NP*, and the post-prepositional NP in (2) as the *domain NP*. In figures, I will indicate the partitive-head NP with superscript 'I' and the domain NP with superscript 'II'.

(2) [One book^I [of these books^{II}]]

Given (2), the chief interest of AMPR is that singular agreement in the RC is possible even when it modifies the plural domain NP. The structure I propose for AMPR is therefore as in (3). The essential challenge of AMPR is thus to understand why the RC-internal agreement can be singular when the overt head NP is plural, given that agreement mismatch of this sort isn't usually tolerated. The remainder of this section is devoted to defending (3).

(3) **Structure of AMPR**:

One [NPI of [the [NP.PL RC]]]]

 $(\checkmark plural agr; \checkmark singular agr)$

The main conceivable alternative to (3) has the agreement-mismatched RC modifying the partitive-head NP ([NP] book of these books] in (2)) rather than the domain NP, as in (4).

(4) One $[NP^{I}]$ of the NP^{II} RC

With this in mind, there are two arguments in favor of (3) and against (4). The first is that the denotation of the RC is included in the presupposition of a definite domain DP (see (6)). This is predicted if the RC attaches to the domain NP but not if it attaches to the head NP:

(5) a. Attachment to domain NP (cf. (3)): [One [NP^{II} [of [the [NP^{II} RC]]]]]

RC included in presupposition of *the*

b. Attachment to head NP (cf. (4)): [One [NPI [of [the NPII]]] RC]]

RC **not** included in presupposition of *the*

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²AMPR is robust and pervasive enough to be warned against in the New York Times style blog: ⟨LINK⟩

³The minimal variant where RC attaches to NP^I below PP, [[NP^I RC] [of the NP^{II}]] is indistinguishable from (4) for the purposes of the ensuing arguments.

- (6) a. Sally is one of the few mathematicians who respects set theory.
 - >> Few mathematicians respect set theory.
 - b. Bobby is one of the players who was fired last year.
 - ≫ A plurality of players were fired last year.

The second argument in favor of (3) and against (4) hinges on the fact that unmodified definite domain DPs are awkward in out-of-the-blue contexts (see (7a)). Adding a modifier to the domain NP, as in (7b), resolves the awkwardness, presumably by making the presupposition introduced by the definite article more specific and hence easier to accommodate. The argument is then that agreement-mismatched RCs have the same amelioration effect (see (7c)), suggesting that they too modify the domain NP.

- (7) a. #Sally is one of the few mathematicians.
 - b. Sally is one of the few (smart/tall/...) mathematicians (in the class)
 - c. Sally is one of the few mathematicians who respects set theory.

Crucially, attaching a modifier to the partitive-head NP does not resolve the awkwardness of an unrestricted definite domain DP (cf. (8a,b), where the modifier attaches to the partitive-head NP, and (8c), where the modifier attaches to the domain NP). The amelioration effect in (7c) therefore *must* involve modification of the domain NP. Because of the oddity of having two overt NPs in a partitive, I have elided the domain NP in (8).⁴ I conclude that AMPR involves the structure in (3). This squib presents and defends an analysis of this phenomenon.

- (8) a. #Mary is one student who was invited of the few students.
 - b. #Mary is one smart/tall/...student of the few students.
 - c. Mary is one student of [the few [students who were invited to the party]].

2 Proposal

In this Section, I propose that AMPR involves a matching RC where the RC-internal head noun takes the (silent) head NP of the partitive as its antecedent, rather than the plural external head. The optionality of agreement then reflects the choice between the structures in (9b,c).

(9) a. One of the books that was on the table ... b. [One [book^I [of [the [books^{II} [RC [Op books] [t were ...]]]]]]]

Expected Agreement Ellipsis

c. [One [\underline{book}^{I} [of [the [books^{II} [$_{RC}$ [Op \underline{book}] [t was ...]]]]]]] AMPR

- (i) a. One of my few close friends is a lawyer.
 - \gg I have few close friends.
 - b. One of my few close friends who lives in Boston is a lawyer.
 - ≫ I have few close friends who live in Boston (≫ I have few close friends)

⁴Even in AMPR contexts where the domain DP's presupposition is easily accommodated without the RC, it is still interpreted as modifying the domain NP (Roger Schwarzschild, p.c.).

2.1 Background on RC and DP structure

Before presenting my proposal in detail, I spell out some prerequisite assumptions about RC and DP structure. Concerning RC structure, I assume, following Bhatt (2002), Hulsey and Sauerland (2006), that RCs are ambiguous between a matching structure, where a RC-internal DP headed by a null operator is moved to Spec(CP) and the associated NP is elided under identity to an external NP, and a raising structure, where the head NP is pied-piped to the clause edge, then extracted to an RC-external position and composed with a determiner.

(10) a.
$$[DP]$$
 the $[book [CP]$ [which/Op $book]_1$ [I read t_1]]]] (Matching structure) b. $[DP]$ the $[DP$

Concerning DP structure, I assume "DP" can be broken down into at least a DP and a NumP projection, with the latter being the locus of syntactic and semantic number features and the basic merge sight of cardinal numerals (see Ritter 1991; Zamparelli 1995; Nelson and Toivonen 2000; Longobardi 2001; Matushansky 2006; Watanabe 2006; Danon 2011).

(11)
$$[DP D [NumP Num [...NP...]]]$$

This structure has direct consequences on the types of ellipsis that must be involved in partitives and matching RCs. Granting that ellipsis requires semantic identity between the antecedent and elided constituent (Sag 1976; Williams 1977; Fox 2002; a.o.), the ellipsis involved in deleting the partitive-head NP (as in (2)) must target a node below NumP, as the head NP and the domain NP can show a number mismatch. This is confirmed by the fact that cardinal determiners survive the relevant deletion and can appear with a silent complement (see (2), again). The explicit structure of partitive DPs that I will adopt is therefore as below.⁵

(12)
$$[DP [NumP one.SG \underline{NP^{I}}] [of [DP the [NumP Num.PL \underline{NP^{II}}]]]]$$
Ellipsis

By similar logic, the ellipsis in matching RCs must extend to at least the NumP projection, given the requirement that the number features on the RC-internal head match those of the external head (AMPR aside). This means that RCs must attach at or above NumP: the RC itself cannot be contained in the antecedent for the ellipsis that deletes content within the RC. The structure of a matching RC can then be summarized as below.

(13)
$$[DP \ \underline{[Num NP]} \ [RC \ [Op \underline{[Num NP]}] \ [...t ...]]]]$$
Ellipsis

2.2 Proposal

Given the structures in (12) and (13), I propose that AMPR involves a matching RC in which the RC-internal head-NumP is elided under identity with the singular partitive-head NumP, rather than the plural external-head NumP (which is the domain NumP of the partitive). I will hereafter refer to the RC-internal head-NP as NP^{III}. The overall structure therefore has two instances of ellipsis: NP^{II} serves as the antecedent for NP ellipsis of NP^I, while the NumP^I containing NP^I serves as the antecedent for ellipsis of the NumP^{III} containing NP^{III} (see (14)). It follows that if NumP^I is singular, NumP^{III} must also be, even if NumP^{II} is plural. This allows for a number mismatch between the RC-external and RC-internal NumPs.

⁵I assume the partitive PP attaches to NumP or a higher projection. This is semantically innocuous under those analyses of partitive that are compatible with an elided head noun, e.g. Barker 1998.

(14) **Proposal**: AMPR involves the structure below:

$$[D \ \overline{[Num.SG \ \underline{NP^I}]} of [D \ [[Num.PL \ \underline{NP^{II}}] \ [_{RC} \ [Op \ \overline{[Num.SG \ NP^{III}]}] \ [...t_1 \ ...]]]]]]] \\ NP-ellipsis (\textit{partitive})$$

(15) a. One of the books that was on the table...

b.
$$\overline{[SG \ \underline{book^I}]} [of [the [[PL \underline{books^{II}}] \ [_{RC} \ [Op \ \overline{[SG \ book^{III}]}] [1 \ [t_1 \ was \dots]]]]]]]$$

Before moving on, I briefly show that the structure in (14) is interpretable and gives rise to the intuitively correct meaning. I focus here on the RC component, but see, e.g., Barker 1998, for a semantics of the partitive compatible with my proposal. For concreteness, I assume that singular number is semantically vacuous, that plural is interpreted as closure under mereological sum formation ((16a); Link 1983), and that there is a distributive operator that can be freely inserted in the syntax ((16b); Sauerland 1998, a.o.). The relevant part of the AMPR example in (17a) thus has the LF in (17b). The RC is interpreted as in (17c), and the external head as in (17d). A distributive operator must then be inserted at the top of the singular RC to allow it to combine with the plural external-head. The entire structure thus denotes the set of plural individuals whose atoms are books that were on the table (see (17e)).

(16) a.
$$[\![pl]\!] = * = \lambda P_{et}.\lambda X. P(X) \lor \exists x, y. \ x \oplus y = X \land P(x) \land *P(y)$$

b. $[\![Dist]\!] = \lambda P. \lambda X. \forall x. x \sqsubseteq X \land ATOM(x) \to P(x)$

- (17) a. One of the books that was on the table.
 - b. [the [[PL books] [Dist [$_{RC}$ [[Op [SG book]] [1 [t_1 was on the table]]]]]]]
 - c. $[RC] = \lambda x$. $[book](x) \land [on-the-table](x)$
 - d. $[[PL book]] = \lambda X_e \cdot * [book](X)$
 - e. $[[PL book] [Dist RC]]] = \lambda X_e \cdot [book](X) \land \forall x.x \sqsubseteq X \land ATOM(x) \rightarrow P(x)$

3 Predictions

3.1 AMPR involves a singular RC-internal head

The proposed account of AMPR holds that the RC-internal NumP can be deleted under identity with a singular partitive-head NumP rather than the plural RC-external NumP. Given that ellipsis depends on semantic identity (Sag 1976; Williams 1977; Fox 2002; a.o.), this means that the RC-internal NumP is both syntactically and semantically singular. This gives rise to several syntactic and semantic predictions, which I now argue are borne out.

3.1.1 Syntactic Predictions

As is common, I assume the number feature on NumP is expressed on the containing DP, so that the RC-internal head-DP is syntactically singular in AMPR contexts. The first syntactic prediction is that this DP should trigger singular verb-agreement if it's a subject. This constitutes the core AMPR phenomenon discussed in Section 1, and is borne out (see (1)).

Moving on, because the proposed analysis treats the agreement mismatch as a side effect of

⁶The proposal is also compatible with more sophisticated semantics for number, as in, e.g., Sauerland 2003.

the singular nature of the RC-head, AMPR should be dissociable from subject-verb agreement. We can test this by examining the status of pronouns bound by the RC-head, under the assumption that a bound pronoun must agree syntactically in φ -features with its binder (Heim 2008). As a baseline, in AMPR contexts we predict that the ability for an underlying subject RC-head to bind a singular pronoun should be correlated with singular agreement on the verb (see (18a)). We also predict that RC-heads that are underlyingly non-subjects should be capable of binding singular pronouns (see (18b)), as should underlying subjects in tenses/aspects where subject-verb agreement is not overtly expressed (see (18c)). All three predictions are borne out, confirming that AMPR is dissociable from subject-verb agreement.

- (18) a. Sally is one of the only linguists who₁ is/*are submitting her₁ paper.
 - \Rightarrow Sally $\in \{x : x \text{ is submitting } x \text{'s paper}\}$ (\checkmark binding)
 - b. Bill is one of the only linguists who 1 Sue convinced to submit his 1 paper.
 - \Rightarrow Bill $\in \{x : \text{Sue convinced } x \text{ to submit } x \text{'s general's paper}\}$ (\checkmark binding)
 - c. Sue is one of the few students who₁ finished her₁ generals papers on time.
 - \Rightarrow Sue $\in \{x : x \text{ finished } x \text{'s generals paper on time}\}$ (\checkmark binding)

A final prediction concerns the behavior of AMPR RCs in languages that mark overt number on the relative pronoun.⁸ We expect that in such languages, the relative pronoun should surface with singular inflection in AMPR contexts, reflecting the syntactically singular status of the RC-internal DP.⁹ This is borne out. In Greek, for example, AMPR is available, and singular agreement in the RC is correlated with a singular relative pronoun.¹⁰

(19) I Maria ine mia apo tis liges filenades mou [i opia trechi kathe the Maria is one from the few girlfriends my the who.F.SG.NOM runs.SG every proi dyo milia] morning two miles 'Maria is one of my few female friends who runs two miles every morning' (Sabine Iatridou, p.c.)

3.1.2 Semantic predictions

The analysis also entails that the RC-internal head DP is *semantically* singular, generating additional predictions. First, AMPR should be incompatible with collective predicates (see (21)), which require semantically plural subjects. Note collective predicates permit *syntactically* singular subjects (*team* in (20)), so this prediction is independent of syntactic number.

(i) *These are the professors who₁ still like his₁ dissertation.

(X binding)

(i) Janez in Bill sta bila dva od edinih študentov ki Janez.NOM.SG and Bill.NOM.SG AUX.3.DU been.M.DU two.M.NOM of only.M.PL.GEN student.M.PL.GEN COMP sta bila povabljena na zabavo.

AUX.3DU been-M.DU invited.M.DU on party.ACC

'John is one of the only students who was.DU invited to the party.'

⁷In ordinary RCs, a plural head noun cannot bind a singular pronoun.

⁸AMPR is also possible in at least Greek, French, Hebrew, Slovenian, where it's also possible in the dual:

⁹I assume the features on the relative pronoun match the features on the DP it projects, just as, e.g., determiners that inflect for number must match the number of their containing DP: [DP these/*this books].

 $^{^{10}}$ All the arguments from the introduction that AMPR RCs modify the partitive NP carry over to Greek.

- (20) They are/the team is/*Sue is gathering on the field.
- (21) a. The police will arrest one of the two men who *is/are meeting in that café.
 - b. Sue is one of the many people who *is/are gathering at Boston Common today.

Second, we predict that the AMPR RC-head should be unable to serve as the antecedent to a reciprocal pronoun (see (23)), which requires a semantically plural antecedent. Syntactically singular nouns can, in some cases, serve as the antecedent to a reciprocal (see (22); e.g., Landau 2001: 49ff.), so this prediction is once again independent of syntactic number.

- (22) The couple greeted ?each other/*themselves and sat down.
- (23) a. Sally is one of the only linguists who *gets/get along with each other.
 - b. Smiths is one of the five grocery stores that *sells/sell each other's products.

Third, we predict that AMPR subjects should be compatible with non-collective singular predicate nominals (see (25)), which require a semantically singular subject (see (24); Dotlačil 2011). As above, this requirement is independent of syntactic number (see (24b)).

- (24) a. *These women are a doctor.
 - b. These scissors are a great tool.
- (25) a. John is one of the few linguists who is/*are also a doctor.
 - b. Sue is one of the only senators who is/*are also a professor.

3.2 AMPR is limited to matching RC

The proposed analysis of AMPR crucially depends on the matching RC-structure, which furnishes a distinct RC-internal NumP that can then be elided under identity with the partitive-head NumP. This leads to the prediction that AMPR should be impossible for raising RCs. I now provide three arguments that this is borne out. First, following Bhatt (2002), if the head noun of an RC contains a comparative modifier or *only*, the modifier can take scope in the base position only under the raising parse. Contexts that force matching therefore block the low reading (see, e.g., Bhatt 2002: 82). I illustrate the low vs. high contrast in (26).

(26) 2001 is the first movie that Mary claimed that Kubrik directed.

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\approx Mary's claim: 2001 is the first movie K. directed (\checkmark claim *) first \approx Mary's first claim was that K. directed 2001 (\checkmark first *) claim
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AMPR blocks the otherwise possible low reading, confirming that it involves a matching RC.

(27) a. Marx is one of the first two people John claimed were inspired by Engels.

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(\checkmark claim » first; \checkmark first » claim)
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b. Marx is one of the first two people John claimed was inspired by Engels.

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(X claim » first; √ first » claim)
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(28) a. Roundabout is one of the five longest songs that Sally believes **were** written in 1971.

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(✓ believe » longest; ✓ longest » believe)
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b. Roundabout is one of the five longest songs that Sally believes was written in 1971.

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(X believe » longest; √ longest » believe)
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Second, relative clauses formed around the existential-*there* construction, sometimes called *amount relatives* (Carlson 1977), must be raising RCs (Cinque 2015; Sportiche 2017). AMPR is impossible in such cases (see (30)), further confirming the present prediction.

- (29)The very few books that there were on his shelves were all mysteries.
 - Many of the articles that there are in this journal are quite bad. b.
- (30)Sally wouldn't read even one of the many books that there are/*is in this library. a.
 - John couldn't find even one of the many pictures that there are/*is of Bill online.

Third Sichel (to appear) argues that raising but not matching RCs permit extraction out of them. The argument is based primarily on data from Hebrew, where the contrasts are reportedly sharp. In English, the baseline matching/raising distinction is subtle: the key contrast is between (31a) and (31b), where the matching structure is forced by the R-expression in the head-NP that would cause a Principle C violation in the gap site (Sauerland & Hulsey 2006).

- (31)a. ??Which spy did the police arrest a relative of his who John asked to contact?
 - b. ?*Which spy₃ did the police arrest a relative of John₁ who₂ he₁ asked to contact?

Turning to AMPR, agreement mismatch does appear to make extraction worse, as expected if it forces a matching structure. The judgement is subtle, but of the same character as (31).

- a. ??Which topic is Mary one of the two people who are most qualified to talk about? (32)
 - b. ?*Which topic is Mary one of the two people who is most qualified to talk about?

I conclude that AMPR requires a matching RC.¹¹ Taken in conjunction with the data in Section 3.1, this confirms the core predictions of the account.

Relative deletion

The proposed analysis of AMPR departs slightly from the prevalent view of the ellipsis involved in matching RCs, which is usually thought to be subject to the two constraints in (33). Constraint (33a) captures the fact that the RC-internal NumP is never pronounced, and (33b) the fact that non-local ellipsis antecedents are not usually tolerated, so that, e.g., (34) doesn't have the otherwise plausible reading in which the subject NP is represented as the internal head of the RC that modifies the object. The AMPR proposal apparently violates (33b).

- (33)**Relative Deletion** (e.g., Sauerland 2000): In matching RCs:
 - The internal head-NumP must be elided.
 - The external head-NumP must be the antecedent for the ellipsis.
- (34)A boy knows the students who are/*is coming to the talk.
 - b. *A boy knows the [[PL student] [[Op [SG boy] who is coming to the talk]]]

- $\begin{array}{l} [One~[\underline{NP_{IDM}}~[of~[the~[NP_{IDM}~RC]]]]]\\ [One~[\underline{picture}~of~himself~[of~[the~[[pictures~of~himself]~RC]]]]] \end{array}$
 - One of the cats that got out of the bag surprised me. c.
 - One of the beans that they spilled upset Sue.
 - *I read one of the books about himself₁ that John₁ liked.
 - *I saw one of the shadows under itself₁ that the Eiffel Tower₁ cast. (cf. Sportiche 2017: 18)

(*X* idiomatic force)

(X Condition A)

(X idiomatic force)

(*X* idiomatic force)

(X Condition A)

(X Condition A)

¹¹The familiar matching/raising diagnostics from relativized idiom chunks and reconstruction for variable binding (Sauerland 2000) can't be readily applied here, as the baseline examples are degraded. In partitive contexts, a variable or idiom chunk contained within the head-noun of the RC is also be represented in the elided partitive-head NP (see (ia,b)). This extra copy of the idiom/variable is never in the scope of the RC, ruling out idiomatic force/variable binding independent of the RC-structure.

While (33) captures the facts (excepting AMPR), it's an ad-hoc operation that doesn't follow from any known independent principles nor apply in any generality. NP-ellipsis is otherwise subject to no such constraints (see (35)). As is widely recognized in the literature (e.g., Sauerland 2000: 3.1; Sportiche 2017: Sec. 2), this is conceptually undesirable, so that (33) is best viewed as an encapsulation of the open questions on matching RCs.

(35) Mary gave three books to her mother. John only gave two (books) to his (mother).

In this context, the fact that some RC structures deviate from the prescribed standard offers a chance to better understand, or at least better delineate, the principles responsible for (33). To this end, I propose a minimal revision to (35) that affords it the flexibility to handle AMPR.

In particular, I propose that the locality constraint in (33b) be recast as a representational constraint on matching RCs, as in (36b), rather than as a constraint on ellipsis, *per se*.

(36) **Rule R**: In matching RCs:

- a. The internal head must be elided.
- b. The external and internal head-NPs must be semantically identical. 12

While the constraint in (36b) crucially does not require external head-NumP to be the antecedent for deletion of the internal head-NumP, it achieves essentially the same results in the majority of cases. Notably, the standard option of taking the external head-NumP as the antecedent for ellipsis of the internal head-NumP is always possible under (36): ellipsis requires identity, so (36) is satisfied in such cases. Similarly, a NumP with different semantic content from the external head-NumP will always be barred from serving as the antecedent for ellipsis of the internal head-NumP: ellipsis requires parallelism, so if the antecedent for deletion of the internal head-NumP does not match the external head-NumP, neither will the internal head itself, violating (36a). This correctly rules out examples like (34).

The predictions diverge when there is an accessible antecedent for ellipsis that is identical to the external head at the NP level but not the NumP level. While (33b) blocks such an antecedent, (36b) allows it. This is the exact degree of flexibility needed for AMPR derivations. Consider an abstract AMPR configuration, as in (37). Here, NP^{II} is deleted under identity with NP^{II} , so $NP^{II} = NP^{III}$. Likewise, $NumP^{III}$ is deleted under identity with $NumP^{I}$, so $NP^{I} = NP^{III}$. By transitivity, $NP^{II} = NP^{III}$, so (36b) is met.

(37) a.
$$[NumP_{I} NP^{I}] [of [D [Num_{II} NP^{II}]] [RC[Op Num_{III} NP^{III}]] [1 [...t_{1} ...]]]]]]$$
b.
$$NP^{I} = NP^{II} Partitive ellipsis$$
c.
$$NP^{I} = NP^{III} (RC ellipsis)$$
d.
$$NP^{II} = NP^{III} (\sqrt{\textbf{(36b)}}; Transitivity))$$

Before concluding, I briefly address the concern that (36) appears to over-generate, so that, e.g., (38) is acceptable under (36), counter to fact. These examples are only a problem if we assume that (36) is the *only* constraint that governs the choice of ellipsis antecedent in matching RCs. It is well known, though, that there are a variety of discourse factors that govern when a given XP is an accessible antecedent for ellipsis resolution (see, e.g., Hardt and Romero 2004). It is fully compatible with the account developed here that these factors intervene to block structures that technically satisfy the constraints on matching RCs.

¹²Technically NP could be replaced here with any XP \sqsubset NumP.

(38) a. *One student met the students who was invited.

b.
$$*[[\overline{[SG \ \underline{student^I}]} met \ [the \ [[\underline{PIstudents^{II}}] \ [[Op \ \overline{[SG \ \underline{student^{III}}]}]...t \ ...]]]]]]]$$

In short, as long as we are willing to acknowledge the action of additional discourse-related principles that govern the choice of acceptable antecedents for NP/NumP ellipsis, (33) is an acceptable constraint on matching RCs. I will leave to further work a full accounting of these pragmatic principles and their operation.

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