Extraposition of NPIs from NP

Abstract: Analyses of Extraposition from NP can be divided into those that suppose the extraposed material is base-generated inside the host DP and those that suppose it is base-generated outside the host DP. This paper presents evidence from the licensing of negative polarity items by the quantifier *every* in relative clauses extraposed from direct objects to argue that extraposed material can be interpreted internal to the host DP. These results suggest the necessity of an analysis of Extraposition from NP that permits extraposed material to be base-generated inside the host.

Contents

1 Introduction

Extraposition from NP (EXNP) is a phenomenon whereby a PP or relative clause is interpreted as a modifier of a non-adjacent "host", such as *linguist* in (1).[1]

(1)   We met [$_{DP}$ a linguist]$_1$ yesterday [(who is) from East Africa]$_1$.

This paper is concerned with understanding the derivational history of EXNP configurations. At stake in particular is where the extraposed material is base-generated. Some analyses of EXNP suggest that the extraposed material is base-generated in the usual position inside the host and some additional mechanism, either in the syntax or at PF, results in the discontinuous constituency (e.g., Ross 1967, Chomsky & Lasnik 1977, Fox & Nissenbaum 1999, de Vries 2002). Other analyses argue that the extraposed material is simply base-generated outside of the host in a position adjoined to the verbal spine (e.g. Rochemont & Culicover 1990, Koster 2000, Webelhuth et al. 2013).

With a focus on the extraposition of relative clauses from direct objects, we will find that the extraposed material can be interpreted as if it were inside its host. The argument is based around the finding that a negative polarity item (NPI) licensed in the restrictor argument of a host headed by *every* remains licensed in an extraposed position (2).

(2)   a.   We took [$_{DP}$ every guest [$_{CP}$ who ate *any* of the potato salad]] to the hospital.
      b.   We took [$_{DP}$ every guest]$_1$ to the hospital [$_{DP}$ who ate *any* of the potato salad]$_1$.

Given NPIs are otherwise not licensed in the nuclear scope of *every*, a tight relationship between the extraposed material and the host is implicated in the licensing of the NPI in (2b). I will argue below that this finding is most naturally accounted for in theories of EXNP that generate the extraposed material in the restrictor argument of the host.

The remainder of the paper is organized as follows. Section 2 first briefly outlines the major representatives of the two competing classes of models for EXNP mentioned above as well as the predictions they make with respect to the ability to interpret the extraposed material inside the

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[1] Unless otherwise indicated, I will use the subscript notation [$_{DP}$ ...]$_1$ ... [$_{CP}$ ...]$_1$ as a theory-neutral indication of an EXNP configuration.

host. Section 3 establishes the licensing pattern for various NPIs in the restrictor argument of the quantifier *every* and introduces the phenomenon as a connectivity diagnostic for a displaced relative clause. Of particular consequence will be the observation that *every* is incapable of licensing an NPI in material that is simply adjoined to the verbal spine regardless of the configuration.

Section 4 presents an acceptability judgment study that tested the predictions and intuitions reported in this paper. This study reveals that participants reliably detect the contrast between NPIs in extraposed material that are licensed or unlicensed by the head of the host. Based on these results, I argue that extraposed material can be interpreted as if it were in the restrictor arguments of its host. Section 5 evaluates the available Host-Internal analyses of EXNP in light of this and additional data. I ultimately suggest that the QR-Theory of Fox & Nissenbaum (1999) most adequately accounts for the range of facts examined in this paper. Finally, section 6 summarizes and concludes.

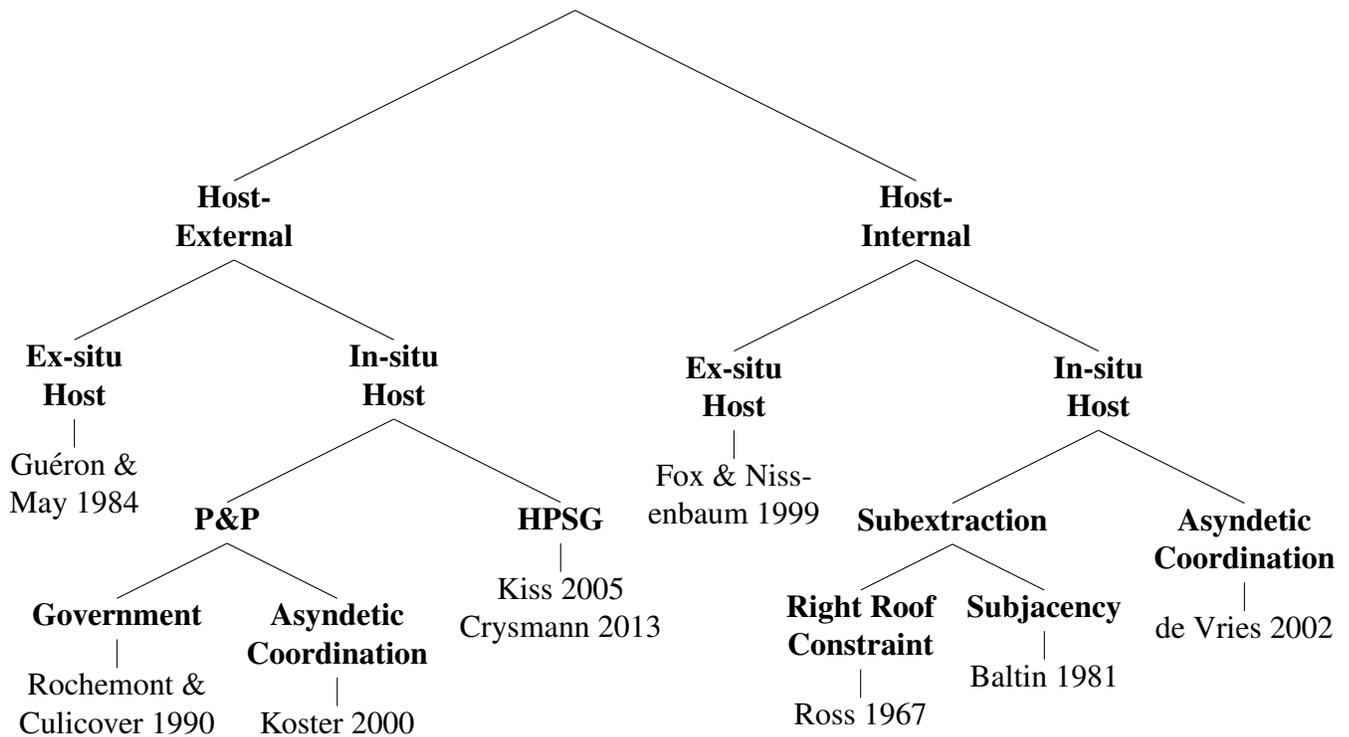## 2   Two Competing Models of Extraposition from NP

At a very high level, it is possible to distinguish analyses of EXNP with regard to the proposed relationship between the extraposed material and the host.[2] As illustrated by the diagram in (3), accounts may also differ with respect to whether the host is interpreted in-situ or ex-situ or perhaps with respect to where the extraposed material is spoken.[3] However, these are issues that can be treated as orthogonal to the question at hand. In what follows, we will initially be concerned with the distinction between what I refer to as *Host-External* and *Host-Internal* analyses of EXNP.

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[2]A recent overview and critique of EXNP analyses can be found in Webelhuth et al. (2013).

[3] A set of analyses, which I will not directly address here but to which I return briefly in section 5, are the non-syntactic analyses of EXNP. These analyses suggest that the extraposed word order is the result of a post-syntactic reordering process (e.g., Chomsky & Lasnik 1977, Rochemont 1978, Göbbel 2013, Hunter & Frank to appear). In addition to the arguments presented in section 5, I would point to a number of syntactic and semantic effects that have been identified with the EXNP operation (e.g., Williams 1974, Guéron 1980, Taraldsen 1981, Guéron & May 1984, Rochemont & Culicover 1990, Fox & Nissenbaum 1999, Fox 2002, Bhatt & Pancheva 2004) to suggest that at least some instances of EXNP, including those considered in this paper, are syntactic.

(3)   *A Taxonmy for Syntactic Analyses of EXNP*

Host-External
- Ex-situ Host
  - Guéron & May 1984
- In-situ Host
  - P&P
    - Government
      - Rochemont & Culicover 1990
    - Asyndetic Coordination
      - Koster 2000
  - HPSG
    - Kiss 2005
    - Crysmann 2013

Host-Internal
- Ex-situ Host
  - Fox & Nissenbaum 1999
- In-situ Host
  - Subextraction
    - Right Roof Constraint
      - Ross 1967
    - Subjacency
      - Baltin 1981
  - Asyndetic Coordination
    - de Vries 2002

The unifying property of the Host-External class of analyses for EXNP is the assertion that the extraposed material is base-generated *external* to its host in a position adjoined directly to the verbal spine. The Host-Internal class asserts the obverse: the extraposed material is base-generated *internal* to its host.[4] After reviewing representative members of each class, I will spell-out, and attempt in subsequent sections to capitalize on, the specific a priori predictions that each class makes with respect to where extraposed material can and cannot be interpreted.

2.1   *Host-Internal Approaches to EXNP*

The initial formulation of the EXNP operation by Ross (1967) is among the Host-Internal class of approaches to EXNP. Under this analysis EXNP is an operation that extracts the extraposed material out of its host DP and right adjoins it to the first cyclic node (4).

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[4]A major Host-Internal analysis of EXNP that I will not directly address in this paper is the stranding approach that was pursued initially by Kayne (1994). Variations on this type of account can be found in Rochemont & Culicover 1997. I refer the reader to research by Wilder (1995), Büring & Hartmann (1997), Rochemont & Culicover (1997), Koster (2000), de Vries (2002), Vicente (2003), Sheehan (2010), and Webelhuth et al. (2013) for arguments addressing the untenability of such accounts of EXNP.

(4) We invited [$_{DP}$ a linguist e_1] yesterday [$_{CP}$ who is from East Africa]$_1$.

For Ross, the only cyclic node was CP. However, Baltin (1978, 1981) and Guéron (1980) and later Rochemont & Culicover (1990) observed that the extraposed material does not always behave as if it were adjoined to CP. The contrasting grammaticality patterns in examples (5) and (6), which have been adapted from Baltin (1981:269), suggest that the height of the extraposed material correlates with the height of the host. The contrast in (5) can be taken to show that a relative clause extraposed from a DP in direct object position cannot be stranded by a VP-fronting operation and so must be part of the VP constituent. The contrast in (6), on the other hand, suggests that the opposite is true of a relative clause extraposed from a DP in subject position. The extraposed relative clause cannot be treated as part of the VP constituent with respect to a VP-fronting operation.

(5) a. [$_{VP}$ Invite [$_{DP}$ someone]$_1$ tomorrow [$_{CP}$ who is from East Africa]$_1$]$_2$

                  though we may e_2, . . .

  b. * [$_{VP}$ Invite [$_{DP}$ someone]$_1$]$_2$ though we may e_2 [$_{CP}$ who is from East Africa]$_1$, . . .

(6) a. * [$_{VP}$ Invited [$_{CP}$ who is from East Africa]$_1$]$_2$

             though [$_{DP}$ someone]$_1$ may have been e_2, . . .

  b. [$_{VP}$ Invited]$_2$

    though [$_{DP}$ someone]$_1$ may have been e_2 [$_{CP}$ who is from East Africa]$_1$, . . .

From these facts Baltin (1981) suggests that a phrase extraposed from a direct object cannot target a position above VP while a phrase extraposed from the subject must target a position above VP and, for Baltin, even above the subject's surface position.[5]

Fox & Nissenbaum (1999) and later Fox (2002) argue for a Host-Internal analysis of EXNP that capitalizes on the Copy-Theory of movement (Chomsky 1993, 1995) and a single-output model of grammar (Bobaljik 1995, Brody 1995, Groat & O'Neil 1996). For them, the host DP first undergoes an application of Quantifier Raising (QR) to the edge of VP as shown in (7a) below. The extraposed material is subsequently late-merged into the higher copy of the host (as in Lebeaux 1988), which will be the copy of movement that is deleted at PF (7b).

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[5] See Culicover & Rochemont (1990:30–35) for a discussion of some complicating factors for this picture and relevant references.

(7)   a.   [$_{VP}$ [$_{VP}$ we met [$_{DP}$ a linguist] last week] [$_{DP}$ a linguist]]

       b.   [$_{VP}$ [$_{VP}$ we met [$_{DP}$ a linguist] last week] [$_{DP}$ ~~a linguist~~

[$_{CP}$ who is from East Africa]]]

A non-movement approach to EXNP of the Host-Internal variety is offered by de Vries (2002:ch.7). Following Koster's (2000) theory of *Parallel Construal*, which we will see in the following section, the extraposed material is part of a phrase projected from a null Boolean operator which is then conjoined with the matrix clause (i.e., asyndetic coordination). For de Vries (2002), the second conjunct of the asyndetic coordination phrase (&:P) contains not only the extraposed material but also a second occurrence of the matrix clause coordinate (8).

(8)   I [$_{\&:P}$ [$_{VP}$ met a linguist this morning] [$_{\&:P}$ &:

[$_{VP}$ ~~met~~ [$_{DP}$ ~~a linguist~~ [$_{CP}$ who is from East Africa]] ~~this morning~~]]]

As illustrated with strikethrough text, the EXNP word order is the result of targeting everything in the second conjunct with ellipsis except for the extraposed material.

2.2 *Host-External Approaches to EXNP*

Host-External analyses can be traced back to a suggestion about PP-extraposition from NPs by Guéron (1980:642) that was subsequently applied to result-clause and comparative-clause extraposition by Guéron & May (1984:sec.2).[6] For Guéron & May, the extraposed material is base-generated as an adjunct on the verbal spine. The host subsequently undergoes covert movement to an adjoined position above the extraposed material where the two can be interpreted together.

Culicover & Rochemont 1990 and Rochemont & Culicover 1990 extend this idea to suggest that material extraposed from an NP is also base-generated in its extraposed position. Rochemont

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[6]Outside of Transformational analyses of EXNP, which I focus on in this paper, Kiss (2005) provides a base-generation analysis of EXNP within the theory of Head-Driven Phrase Structure Grammar (HPSG). See Webelhuth et al. (2013) for a discussion of this system and Crysmann (2013) in the same volume for an extension of it. Put very simply, there is an index on the host, represented as the feature ANCHOR, which can percolate up the tree. It is the local percolation of this feature that licenses the base-generation of a relative clause, which is actively looking for one of these ANCHOR features, in a position where it is adjoined to the verbal spine.

At present it is difficult to fairly evaluate this analysis on par with the others as analyses of NPI-licensing in HPSG have emerged only relatively recently (e.g., Tonhauser 2001, Richter & Soehn 2006, Sailer 2007). It is not entirely clear to me exactly what the predictions of any given analysis would be concerning the licensing of NPIs in a relative clause (in-situ or ex-situ). It is for this reasons that I must set such analyses aside for the time being.

& Culicover (1990:32–36) propose that there is an interpretive principle that allows an extraposed phrase to be interpreted as the complement of a noun that it governs. This interpretive principle is subject to specific locality conditions that Rochemont & Culicover (1990:35) formulate as the *Complement Principle*, which is provided in (9).

(9) *Complement Principle*
β is a potential complement of α (α, β = X^{max}) only if α and β are in a government relation.
(adapted from Rochemont & Culicover 1990:35)

The Complement Principle in conjunction with the definition of Government shown in (10) essentially forces material extraposed from an NP to adjoin to the first VP or IP that dominates the surface position of the host in accordance with the constituency facts seen in (5) and (6).[7]

(10) *Government*
α governs β iff α c-commands β and for every γ (γ = X^{max}) that dominates β and excludes α, either
(i) β = $γ°$, or
(ii) β = SPEC, γ, or
(iii) there exists a segment of γ that does not dominate β.
(adapted from Rochemont & Culicover 1990:35–36)

Another base-generation analysis for EXNP of the Host-External variety is couched within the theory of *Parallel Construal* proposed by Koster (2000). Koster (2000) proposes employing the type of asyndetic coordination adopted by de Vries (2002). However, what Koster (2000:22) calls a Colon Phrase (:P) conjoins only the extraposed material with some XP in the matrix clause that contains the acting host (11).

(11)   I [:P [XP met [DP a linguist] this morning] [:P : [CP who is from East Africa]]]

The method for interpreting such a structure that is suggested by Koster (2000:22–23, 25) is that the extraposed material can be semantically interpreted as giving "further specification" to the acting host DP via "set intersection".

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[7] To be precise, Rochemont & Culicover argue that EXNP from a direct object targets the edge of VP, EXNP from a subject targets the edge of IP or optionally VP, and EXNP from a fronted *wh*-element targets the edge of CP.

2.3   Interpretive Predictions

As we have seen from the discussion above, these two sets of analyses of EXNP differ on where
they assert the extraposed material is base-generated. Because of this, they also lead to different a
priori predictions about where it is possible to interpret the extraposed material.

The three Host-Internal analyses presented above predict that extraposed material should be-
have as if it were at some point in the restrictor argument of its host. A failure to observe any such
behavior should be interpreted as a short-coming for this class of analyses. On the other hand,
the Host-External analyses above lead us to expect the extraposed material to behave as if it were
always adjoined to the verbal spine and never in the restrictor arguments of its host. Observing that
the extraposed material *does* behave as if it were in the restrictor arguments of its host should be
seen as a short-coming for this class of analyses. The following section will introduce exactly the
type of phenomenon that could be used to test these predictions.[8]

3   A New Connectivity Diagnostic: NPIs Licensed in the Restrictor of *Every*

Among the class of NPIs originally discussed at length by Klima (1964) are elements like *any* and
ever. Since at least Ladusaw 1979 it has been known that such NPIs are licensed in the restrictor
argument of the universal quantifier *every* but not in its nuclear scope. This is illustrated in (12a)
wher the NPI *any* is licensed in a relative clause modifying *guest*, but goes unlicensed while in the

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[8]It is worth noting at this point, that other connectivity diagnostics have been explored in the literature as they
relate to EXNP. Taraldsen (1981), for example, observed that the disjoint reference effect between the indirect object
pronoun *her* and *Kim* in the relative clause in (ia) is ameliorated in the context of EXNP (ib). Rochemont & Culicover
(1990) go further to show that the disjoint reference effect persists when *her* appears in subject position (ii).

   (i)   a.   * I showed her$_2$ [$_{DP}$ a picture [$_{CP}$ that Kim$_2$ thought I lost]] this morning.

           b.   ? I showed her$_2$ [$_{DP}$ a picture]$_1$ this morning [$_{CP}$ that Kim$_2$ thought I lost]$_1$.

   (ii)   a.   * She$_2$ was shown [$_{DP}$ a picture [$_{CP}$ that Kim$_2$ thought I lost]] this morning.

           b.   * She was shown [$_{DP}$ a picture]$_1$ this morning [$_{CP}$ that Kim$_2$ thought I lost]$_1$.

These facts are interesting in that they can be interpreted as showing that material extraposed from a direct object is
generated above the indirect object but below the subject. However, this data isn't relevant to the question at hand.
While they potentially tell us something above the height of the the base-generated position of the extraposed material,
they do not help us decide whether this position is internal or external to the host.

148 matrix clause in (12b).[9]

149 (12) a. Every [NP guest who ate *any* of the potato salad] [VP became ill].
150 b. * Every [NP guest who became ill] [VP ate *any* of the potato salad].

151 The examples in (13)–(16) below are intended to help establish the generality of this pattern. In

152 addition to the NPIs *any* and *ever*, so-called "minimizers" like *the slightest bit* and *so much as (a*

153 *dime)* are also licensed in the restrictor argument of *every*. The contrasts in the (a) and (b) variants

154 are between sentences with *every* and sentences with *some*, which Ladusaw (1979) noted does not

155 license NPIs in its restrictor argument.

156 (13) a. We met [DP every biker [CP who has *ever* ridden on these trails]].
157 b. * We met [DP some bikers [CP who have *ever* ridden on these trails]].
158 (14) a. The company considered [DP every applicant
159 [CP who was from *any* of the local temp agencies]].[10]
160 b. * The company considered [DP some applicants
161 [CP who were from *any* of the local temp agencies]].
162 (15) a. The bank contacted [DP every customer [CP who was in *the slightest bit* of debt]].
163 b. * The bank contacted [DP some customers
164 [CP who were in *the slightest bit* of debt]].
165 (16) a. Sam stole [DP every bag [CP that had *so much as a dime* inside]].
166 b. * Sam stole [DP some bags [CP that had *so much as a dime* inside]].

167 The contrasts in the examples above suggest that there is in fact something about *every* that is

168 responsible for licensing an NPI.[11] The examples below in (17)–(20) go further to show that it is

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[9] NPIs are also licensed in the restrictor of the universal *all (of)*, but not *each* or *both*, and they are licensed in the restrictor argument of proportional *most (of)* and *few (of)*. In this paper, I will focus on the use of *every*. See Heim (1984) for a discussion of some interesting felicity conditions for the licensing of NPIs in the restrictor of *every* and Hoeksema (2012) for a discussion of the types of NPIs that do and do not appear in the restrictor of universals.

[10] It is worth addressing at this point the fact that I regularly use *any* in a partitive construction in an extra effort to block the free-choice reading of *any*, which is also licensed in the restrictor argument of *every* (e.g., Hoeksema 2012), but which would only introduce an additional complicating factor to the investigation in this paper. According to Dayal (2009), *any* in a partitive construction tends to resist a free-choice interpretation unless it appears in the semantic scope of a possibility modal.

[11]For the purposes of this paper I will set aside the issue of how to properly model the licensing conditions on NPIs in the restrictor of *every*. However, I would direct the reader to Giannakidou (1998) and Hoeksema (2012) for challenges faced by both the standard monotonicity analysis of weak NPIs (Ladusaw 1979, von Fintel 1999) and the Anti-Additivity analysis of strong NPIs (Zwarts 1998) with respect to licensing NPIs in the restrictor argument of *every*. It will be enough for the argument being made in this paper to work purely with the empirical facts observed in this section. It is, after all, these facts that the precise formulation of the semantic licensing conditions on NPIs must be made to capture anyway.

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crucial for the NPI to be in the restrictor argument of the universal quantifier. The licensing pattern observed in these examples suggests that NPIs that are in a phrase that is simply adjoined to the matrix clause cannot be licensed by *every*.[12]

(17) a.   We met every biker [CP while riding on these trails].

       b.   * We met every biker [CP while *ever* riding on these trails].

(18) a.   The company considered every applicant

                          [CP because they were from one of the local temp agencies].

       b.   * The company considered every applicant

                          [CP because they were from *any* of the local temp agencies].

(19) a.   The bank contacted every customer [CP after they were in some amount of debt].

       b.   * The bank contacted every customer [CP after they were in *the slightest bit* of debt].

(20) a.   Sam stole every bag [CP because they had some money inside].

       b.   * Sam stole every bag [CP because they had *so much as a dime* inside].

Moreover, as we have already seen from the contrast in (13), it is not enough even for the NPI to appear in the syntactic/semantic scope of the phrase headed by *every*. That is, *every* still fails to license an NPI in its nuclear scope even when a configuration is forced in which that NPI is in the syntactic and semantic scope of the phrase headed by *every*. The pair in (21) illustrates further. The DP headed by *every* binds a variable in the phrase containing the NPI and, therefore, presumably occupies a position in which the NPI is in its syntactic and semantic scope. Even under these conditions, the NPI fails to be licensed.

(21) a.   [DP Every girl]$_1$ leaves early after she$_1$ gets bored.

       b.   * [DP Every girl]$_1$ leaves early after she$_1$ *ever* gets bored.

Based on these observations, the correct generalization of the data seems to be as follows:

(22) An NPI is licensed by *every* iff that NPI is generated in the restrictor argument of *every*.

This generalization provides us with a fairly straightforward way to evaluate the two sets of analyses from the previous section. Finding that an NPI remains licensed following the extraposition operation would suggest that the extraposed material is base-generated in the restrictor argument

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[12] Note that it is a property of certain elements including *if*, *without*, *instead of*, and *before* that they independently license NPIs in their complements.

of the host. This is naturally captured by the Host-Internal analyses. If we find that an NPI is no longer licensed following the extraposition operation, we would have no evidence for claiming that the extraposed material is base-generated in the restrictor argument of the host. The Host-External theories would more naturally account for this state of affairs.

The example in (23) represents one of the relevant data points to be evaluated. A relative clause containing the NPI *any* is intended to be interpreted as a modifier for a non-adjacent host, *guest* in this case. The contrast in acceptability that arises from the presence of either *every* or *some* suggests that *every* is capable of licensing the NPI in the extraposed material.

(23) a.   They took [$_{DP}$ every guest]$_1$ to the hospital [$_{CP}$ who ate *any* of the potato salad]$_1$.
      b.   * They took [$_{DP}$ some guests]$_1$ to the hospital [$_{CP}$ who ate *any* of the potato salad]$_1$.

The additional examples in (24)–(27) are variations of the examples above and are intended to help establish the robustness of this pattern. The (a) variants present the NPI *ever* and the minimizers in relative clauses that have been extraposed from a host headed by *every*. The (b) variants provide the relevant contrast with the quantifier *some*.

(24) a.   We met [$_{DP}$ every biker]$_1$ yesterday [$_{CP}$ who had *ever* ridden these trails]$_1$.
      b.   * We met [$_{DP}$ some bikers]$_1$ yesterday [$_{CP}$ who had *ever* ridden these trails]$_1$.
(25) a.   The company considered [$_{DP}$ every applicant]$_1$ last month
                                    [$_{CP}$ who was from *any* of the local temp agencies]$_1$.
      b.   * The company considered [$_{DP}$ some applicants]$_1$ last month
                                    [$_{CP}$ who were from *any* of the local temp agencies]$_1$.
(26) a.   The bank contacted [$_{DP}$ every customer]$_1$ today
                                    [$_{CP}$ who is in *the slightest bit* of debt]$_1$.
      b.   * The bank contacted [$_{DP}$ some customers]$_1$ today
                                    [$_{CP}$ who are in *the slightest bit* of debt]$_1$.
(27) a.   Sam stole [$_{DP}$ every bag]$_1$ last night [$_{PP}$ that had *so much as a dime* inside]$_1$.
      b.   * Sam stole [$_{DP}$ some bags]$_1$ last night [$_{PP}$ that had *so much as a dime* inside]$_1$.

Intuitively, the EXNP structures here follow the same licensing pattern observed with the in-situ structures in the previous section. The acceptability of an NPI in the extraposed relative clauses seems to be dependent on the presence of *every* as opposed to *some*. This contrast suggests that *every* is capable of licensing an NPI even when the NPI appears in an extraposed relative clause.

At this point we might be tempted to conclude that the predictions of the Host-Internal analyses are borne out. However, the crucial comparison to be made is between sets of sentences like in (2), which has been repeated below. Recall that it is whether or not the NPI remains licensed in the extraposed position that provides a window into the derivation of EXNP structures.

(2) a. We took [$_{DP}$ every guest [$_{CP}$ who ate *any* of the potato salad]] to the hospital.
     b. We took [$_{DP}$ every guest]$_1$ to the hospital [$_{DP}$ who ate *any* of the potato salad]$_1$.

Evaluating such pairs using our native-speaker intuitions, though, is not as straightforward as it was made to seem in the introduction. Independent of the licensing of the NPI, there are additional influencing factors to be considered. These might include, for example, the effect of EXNP on acceptability and possibly the increased difficulty in licensing an NPI that this additional complexity might introduce. The following section reports on an experiment designed test the intuitions reported here and the predictions in section 2 while taking these additional factors into account.

4 Experimental Evidence

A judgement study was conducted to evaluate the acceptability of NPIs in both in-situ and extraposed relative clauses. Based on the claims in the previous sections, we should expect to find that sentences with an NPI in a relative clause that modifies the restrictor argument of *every* are perceived as more acceptable or more natural than when the same relative clause modifies the restrictor argument of *some*. Finding that this contrast disappears when there is no NPI in the relative clause would be a confirmation of Ladusaw's (1979) claim that *every*, but not *some*, licenses NPIs in its restrictor argument.

Moreover, this experiment was designed so as to identify any difference in the ability of *every* to license an NPI in an in-situ or extraposed relative clause. If it is the case that an NPI is licensed in both in-situ and extraposed relative clauses, then we should expect to see the asymmetry between *every* and *some* that arises in the presence of an NPI regardless of the position of the relative clause. Conversely, if it is the case that an NPI fails to be licensed in extraposed material, we expect to observe the above quantifier asymmetry with an in-situ relative clauses but the asymmetry should

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²⁵² effectively be neutralized with an extraposed relative clause.

4.1 Participants

Sixty-four native speakers of English were recruited for the study using Amazon's Mechanical Turk, a web-based service for crowd-sourcing tasks.[13] Only participants with a minimum 95% success-rate on task completion (minimum of 100 tasks) were accepted for participation. To prevent evaluating data from non-native speakers, participation was restricted to IP addresses in the United States and participants were asked to report their language abilities. Only a single participant reported a first language other than English. This participant's data was removed and another participant was recruited to replace the lost data. Participants ranged in age from 18 to 73 with an average age of 36.33 years and a median age of 33 years. Of the 64 participants, 53% were female and 47% were male.

4.2 Materials

The materials consisted of 16 items distributed across 8 lists in a fully crossed $2{\times}2{\times}2$ design that included the factors *Extraposition*, *Host*, and *Polarity*. A full example item is provided in (28). Extraposition refers to whether the item had a relative clause that is extraposed (28a) or in-situ (28e). Items differing on the nature of the Host, had either the NPI-licensing *every* (28a) or the non-NPI-licensing *some* (28b). The final dimension, Polarity, had items vary between having an NPI in the relative clause (28a) or some other non-polarity-sensitive element (28c).

(28) a. *Ex-situ, Every, NPI*
Park rangers removed every camper yesterday
who was at any of the sites with significant flooding.
b. *Ex-situ, Some, NPI*
Park rangers removed some campers yesterday
who were at any of the sites with significant flooding.
c. *Ex-situ, Every, Other*
Park rangers removed every camper yesterday
who was at one of the sites with significant flooding.

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[13] https://www.mturk.com

d.	*Ex-situ, Some, Other*
Park rangers removed some campers yesterday
who were at one of the sites with significant flooding.
e.	*In-situ, Every, NPI*
Yesterday park rangers removed every camper
who was at any of the sites with significant flooding.
f.	*In-situ, Some, NPI*
Yesterday park rangers removed some campers
who were at any of the sites with significant flooding.
g.	*In-situ, Every, Other*
Yesterday park rangers removed every camper
who was at one of the sites with significant flooding.
h.	*In-situ, Some, Other*
Yesterday park rangers removed some campers
who were at one of the sites with significant flooding.

In all cases the NPI in the extraposed relative clause was *any*. In the same way as noted in fn.9, the NPI sometimes appeared in a partitive construction in an attempt to discourage a possible free-choice reading. The non-NPI counterparts did not always contain a partitive construction as they do in (28). For the purpose of grammaticality or coherence, a simple indefinite or other non-polarity-sensitive element was used instead.[14] A full list of the experimental items can be found in Appendix A.

4.3 Procedure

Once agreeing to participate, participants clicked a link that took them to the on-line experiment presentation tool Ibex Farm where the experimental items were presented.[15] Participants were told that they would be reading sentences and evaluating their naturalness as sentences of English. After providing informed consent they then received a short guided practice for using a 7-point Likert-scale where 1 corresponded to "Completely Unnatural" and 7 corresponded to "Completely Natural".

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[14] One might note that these issues could be avoided entirely by using an NPI like *ever* or a minimizer instead of *any*. Minimizers were avoided because the experimental design did not make it possible to be sure that participants were not interpreting the minimizer under a literal interpretation. The reason *any* was preferred to *ever* is that this experiment is part of a larger study that is also investigating the extraposition of PPs from NP and *ever* is not possible in PPs.

[15] Ibex Farm was developed by Alex Drummond and can be accessed at: http://spellout.net/ibexfarm/.

307 The items were presented in a Latin-square design and were presented randomly among 38

308 filler items. The filler items had a large number of non-canonical word orders including passive and

309 cleft constructions. A total of 4 items were designed to be ungrammatical by including an island

310 violation, a case assignment problem, or a violation of a selectional restriction. The Likert-scale

311 with the corresponding scale values were presented along with each item. The experiment took an

312 average of approximately 15 minutes to complete and participants received $0.50 in compensation

313 upon completing the task.

314 *4.4 Results*

315 The mean naturalness rating for each condition is presented numerically in Table 1 and graphically

in Figure 1.

	Ex-Situ		In-situ	
	Every	Some	Every	Some
NPI	4.60 (0.13)	3.87 (0.14)	4.96 (0.13)	3.98 (0.14)
Other	5.14 (0.11)	5.13 (0.12)	5.23 (0.13)	5.44 (0.12)

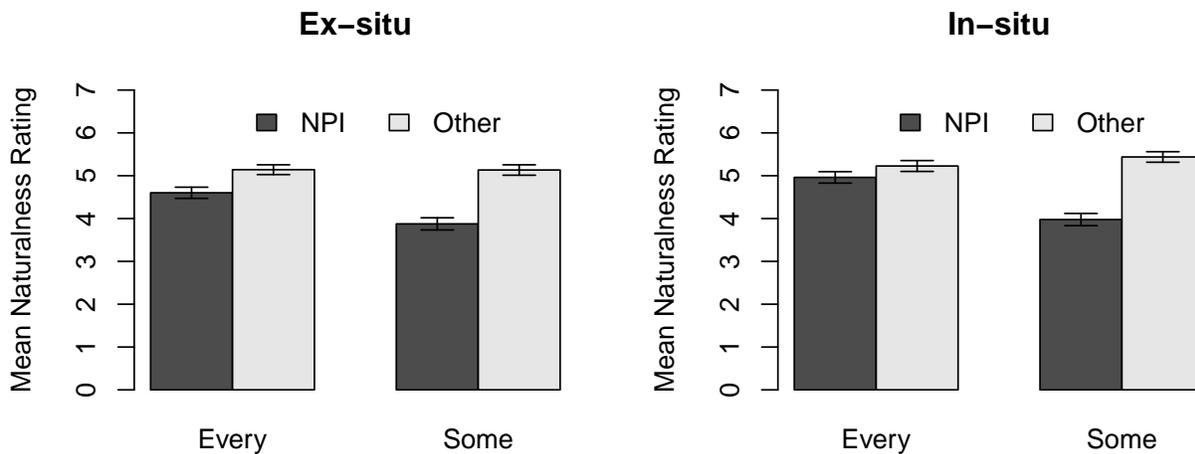Table 1: Mean naturalness ratings by condition with standard errors in parentheses.

Figure 1: Mean naturalness ratings by condition with standard errors bars.

316

317 The data were analyzed using a linear mixed-effects (LME) regression model (Baayen et al.

318 2008) with the `lme4` package (Bates et al. 2014) in the statistical computing environment R, version

319 3.1.1 (R Core Team 2014).[16] The fixed effects of Extraposition, Host, and Polarity, as well as their

320 interactions, were included as predictors and centered around 0 (Ex-situ,Every,NPI = 1). Both

321 subjects and items as well as the predictors and their interactions were assigned random slopes.

322 The model that was evaluated is provided in (29).

323 (29)   Rating $\sim$ Extraposition $\times$ Host $\times$ Polarity $+$

324   (Extraposition $\times$ Host $\times$ Polarity $+ 1|$subject$) +$

325   (Extraposition $\times$ Host $\times$ Polarity $+ 1|$item$)$

326 This model yielded the results summarized in Table 2. Significance at the conventional level

$\alpha = 0.05$ was determined by an absolute t-value greater than 2.00. A significant main effect was

	$\hat{\beta}$	Std. Error	t
(Intercept)	4.793234	0.128254	37.26
Extraposition	-0.104616	0.042642	**-2.45**
Host	0.189503	0.047551	**3.99**
Polarity	-0.437982	0.083674	**-5.23**
Extraposition$\times$Host	-0.005814	0.038525	-0.15
Extraposition$\times$Polarity	-0.010332	0.044934	-0.23
Host$\times$Polarity	0.237007	0.061509	**3.85**
Extraposition$\times$Host$\times$Polarity	-0.055153	0.047679	-1.16

Table 2: LME model results with estimate, standard error, and t-value.

327

328 revealed for each of the fixed effects Extraposition, Host, and Polarity. Additionally, a significant

329 interaction was observed for the type of Host and the Polarity sensitivity of the extraposed mate-

330 rial, reflecting a significantly larger effect of Polarity for conditions with the host *some* than for the

331 conditions for the host *every*. In particular, collapsing over the factor Extraposition, we find that

332 there was overall a significantly greater penalty in naturalness for replacing a non-NPI with an NPI

333 in the relative clause when the host was *some* ($\Delta_{\hat{\mu}} = 1.36$) than there was when the host was *every*

334 ($\Delta_{\hat{\mu}} = 0.40$).

335   The LME model did not detect a significant effect of the three-way interaction term. Looking

336 closely at Table 1 and Figure 1, though, it does seem that numerically there was some additional

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[16] http://www.r-project.org/

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penalty in naturalness observed for having an NPI in an extraposed relative clause compared to having an NPI in an in-situ relative clause. For this reason, a set of post-hoc analyses were designed to further investigate the effect.

First, examining only those conditions with an NPI in the relative clause, a comparison of the confidence intervals for the difference between the two Host conditions in an Ex-situ construction (28a)/(28b) 95% CI [0.29,1.17] and the difference between the same two conditions In-situ (28e)/(28f) 95% CI [0.56,1.40] failed to indicate a significant effect of Extraposition on naturalness ratings. A pair of by-participants (F_1) and by-items (F_2) repeated-measures ANOVAs were also performed on the NPI conditions. These analyses, like the LME model, showed a significant effect of both Extraposition ($F_1(1,63) = 6.09, p < 0.05; F_2(1,15) = 4.91, p < 0.05$) and the type of Host ($F_1(1,63) = 48.8, p < 0.01; F_2(1,15) = 31.7, p < 0.01$). However, this analysis, too, failed to observe a significant interaction between Extraposition and Host.

The same analyses were also performed over the conditions with *every* as the host. Comparing the confidence intervals for the difference between the two Polarity conditions ex-situ (28a)/(28c) 95%CI [-0.93,-0.15] and the same conditions in-situ (28e)/(28g) 95% CI [-0.66,0.12] again did not indicate a significant effect of Extraposition on naturalness ratings. In the repeated-measures ANOVAs, Polarity was significant by-participants and by-items ($F_1(1,63) = 14.2, p < 0.01; F_2(1,15) = 5.64, p < 0.05$) while Extraposition was significant by-participants and marginally significant by-items ($F_1(1,63) = 4.55, p < 0.05; F_2(1,15) = 3.43, p < 0.10$). The interaction of Extraposition and Polarity failed to reach significance.

4.5 Discussion

Beginning with the main effect of Extraposition found in the LME model, this is not a surprising finding. We can understand the lower acceptability ratings for Ex-situ structures to be a reflection of the fact that EXNP is a marked structure in out-of-the-blue contexts. The main effect observed for each of Host and Polarity in the LME model do not follow directly from any a priori predictions made here. However, we might imagine that the main effect of the presence or absence of an NPI

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in the relative clause reflects the additional cost in processing related to licensing an NPI. The main effect of the type of Host, and perhaps even some of the main effect of Polarity, seems to be carried by the significant interaction between these two factors. From the direction of this interaction, which is apparent in the graph in Figure 1, we see that NPI conditions with the host *every* consistently received higher ratings than the NPI conditions with the host *some*. This is a clear reflection of the intuition that NPIs are licensed by *every* but are not licensed by *some*.

Concerning the three-way interaction, we were looking for this effect as a sign that the sensitivity of an NPI in a relative clause to the type of host is affected by whether or not that relative clause has been extraposed. Finding that EXNP neutralizes the effect of the type of host would suggest that NPIs are not licensed in extraposed material. Interestingly, this three-way interaction between factors was not detected in the LME model. In the absence of this interaction there is no evidence that the magnitude of the additional decrease in perceived naturalness that results from having an NPI in a relative clause with a universal host is different based on whether or not the relative clause is in-situ or extraposed. This means that we are unable to reject the null-hypothesis that NPIs are equally licensed by the presence of *every* in-situ and ex-situ.

The post-hoc analyses also failed to reject this null-hypothesis. The lack of evidence that Extraposition interacts with the Host conditions given an NPI in the relative clauses means that we are unable to say that the observed licensing asymmetry between *every* and *some* differs given the position of the relative clause. The inability to identify an interaction between Extraposition and the Polarity conditions when the host was headed by *every* means we cannot conclude that the observed ability of *every* to license an NPI differed as a function of the position of the relative clause. Something extra must be said, then, concerning the additional penalty that seems to be present numerically when an NPI is in extraposed material. A potential explanation that one might pursue is that this effect is an off-line reflection of some additional increase in on-line processing effort that is associated with licensing an NPI either across a greater distance or in the face of greater structural complexity. The current study was not designed to speak to either of these possibilities, thus the issue must be left for future research.

17

To summarize briefly, in the absence of any evidence that EXNP affects the observed licensing patterns, in both the planned and post-hoc comparisons, I will continue to promote the intuitions that were reported above: NPIs are licensed in a relative clause extraposed from a direct object headed by *every*. Returning to the predictions made by the two sets of analyses for EXNP discussed in section 3, these results show the predictions of Host-Internal analyses borne out. Although a relative clause has been extraposed, with respect to NPI-licensing it behaves as if it were generated in the restrictor argument of the DP that hosts it.

5   Towards Modelling Extraposition from NP

Having found that a Host-Internal analysis of EXNP will be necessary, at least to account for the NPI-licensing data at hand, the question that naturally follows is which of the available analyses should be preferred. The data that we have concerned ourselves with so far do not provide a way to directly compare the three Host-Internal analyses discussed in section 2.1. Each of those analyses is consistent with the generalization from (5), which is repeated below and captures Ladusaw's 1979 original observation.

(22)   An NPI is licensed by *every* iff that NPI is generated in the restrictor argument of *every*.

In what follows, I will gradually introduce additional data that will allow us to evaluate the empirical benefits of each of the Host-Internal analyses from section 2.1.

To begin, there seems to be a general consensus in the literature, following Linebarger (1980), Uribe-Etxevarria (1994), and de Swart (1998), that NPIs are licensed by virtue of being interpreted in the scope of their licensor at LF. To illustrate, consider the example in (30), which has been adapted from Linebarger (1980:227). It is interesting to note of this example first that the NPI *any* inside the subject is licensed by the following instance of sentential negation. What is more interesting is the observation that this string is grammatical only on the reading in which the subject is interpreted under negation (30a). As (31) reveals, the scope of the subject is otherwise ambiguous with respect to negation in the absence of the NPI.

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(30) A doctor who knew *any*thing about acupuncture was not avaialble.

    a. $\neg > \exists$: It is not the case that there is a doctor x such that x knew about acupuncture and x was available.

    b. $*\exists > \neg$: There is a doctor x such that x knew about acupuncture and it is not the case that x was available

(31) A doctor was not avaialble.

    a. $\neg > \exists$: It is not the case that there is a doctor x such that x was available.

    b. $\exists > \neg$: There is a doctor x such that x was not available.

A way of understanding these facts is to assert that reconstruction of the subject in (30) to a position below negation must take place in order to license the NPI.

Assuming that this is correct, something similar will be required for the extraction analysis of EXNP from Ross (1967). The extraposed material must be interpreted in the restrictor of *every* in order to license the NPI.[17] If this were the case, then we should expect NPI-licensing in extraposed material to conflict with any requirement that the extraposed material be interpreted elsewhere. Such a requirement could come in the form of Antecedent-Contained Deletion (ACD), an example of which is provided in (32).

(32)   I [$_{VP}$ bought every book]$_1$ yesterday [$_{CP}$ that I was told to Δ_1].

Based on the observations in Sag (1976) and Williams (1977) and following May (1985), the relative clause containing the ellipsis site must evacuate the antecedent VP. It is in this way that the identity relationship that is required for deletion can be established between the ellipsis site and the antecedent VP without falling into the problem of infinite regress. Baltin (1987) proposes an EXNP-by-extraction analysis of ACD intended to do exactly this. For him, the relative clause in (32) is extracted from its host *every book* and adjoined to an extended projection of the VP. By allowing movement to only optionally leave a trace (e.g. Pesetsky 1982, Lasnik & Saito 1984), the ellipsis site can be resolved under identity with the antecedent VP.[18] Basically, then, it is because the extraposed material is interpreted in its extraposed position that ACD is licensed.

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[17]Independent of the discussion here, the need to reconstruct the extraposed material is arguably a weakness of this analysis. I would refer the reader to Williams (1974), Rochemont & Culicover (1990), Fox & Nissenbaum (1999), Fox (2002), and Bhatt & Pancheva (2004) for interpretive evidence that extraposed material must be interpreted in its extraposed position.

[18] See Larson & May (1990) and Fox (2002) for further discussion of other potential issues for this analysis.

441   This requirement for the extraposed material to be interpreted outside the antecedent VP in

442 order to license ACD would be expected to conflict with the requirement that the extraposed mate-

443 rial be interpreted inside the antecedent VP in the restrictor of the host in order to license an NPI.

444 These conflicting requirements on where to interpret the extraposed material should be expected

445 to result in ungrammaticality in a sentence with both an instance of ACD and an NPI licensed by

446 the head of its host. As the contrast in (33) demonstrates, this is contrary to fact.

447   (33)   a.   I [$_\text{VP}$ bought every book]$_1$ yesterday [$_\text{CP}$ that I had *ever* been told to Δ_1].

448   b.   * I [$_\text{VP}$ bought some books]$_1$ yesterday [$_\text{CP}$ that I had *ever* been told to Δ_1].

449 Given the particular beliefs about ACD that have been adopted here, I interpret the grammaticality

450 of (33a) as indicating that reconstruction is not necessary for the licensing of NPIs in extraposed

451 material. It can, therefore, be taken as evidence against extraction analyses of EXNP.

452   We can note, too, that (33a) also resists a non-syntactic analysis of the EXNP operation. As-

453 sume that NPI-licensing in an extraposed relative clause with a host headed by *every* is possible

454 because the EXNP operation involves constituent reordering at PF. Such an analysis falls into the

455 Host-Internal variety of analyses seeing as the extraposed material is generated in the restrictor

456 argument of its host. It would also straightforwardly account for the ability of the host to license

457 an NPI in extraposed material because the extraposed material in fact never leaves the host. How-

458 ever, the fact that the extraposed material never leaves this position means that the ellipsis site in

459 (33a) would still be antecedent-contained at LF. This in turn means that the ellipsis site could not

460 be properly interpreted and we would again incorrectly predict ungrammaticality.

461   This leaves us with two remaining Host-Internal analyses: the QR analysis in Fox & Nis-

462 senbaum 1999 then Fox 2002 and the asyndetic coordination analysis in de Vries 2002. Both of

463 these analyses can handle the facts in (33). For each analysis, the extraposed material is in the

464 restrictor argument of its host and the host is in a position external to the antecedent VP. This

465 is precisely the type of configuration required to simultaneously license an NPI with *every* and

466 properly resolve an ellipsis site in the extraposed material.

In choosing between these two remaining analyses, we can note that the asyndetic coordination analysis suffers from a general interpretive problem. Webelhuth et al. (2013:38) point out that, given a quantificational head, the phrases being coordinated could potentially have different truth conditions. The issue is more serious for the universally quantified structures that we have been considering in this paper. We in fact get the wrong truth conditions. For example, the postulated conjuncts for the structure in (34) would respectively mean *x took every guest to the hospital* and *x took every guest who ate any potato salad to the hospital*.

(34)   They [&:P [VP took every guest to the hospital] [&:P &:
             [VP ~~took~~ [DP ~~every guest~~ [CP who ate *any* of the potato salad]] ~~to the hospital~~]]]

Because the truth conditions of the first conjunct entail the truth conditions of the second, the conjunction of the two is expected to be equivalent to *x took every guest to the hospital*. However, this example, in which the extraposed relative clause is intended to serve as a restrictive modifier, has only the interpretation in which a subset of all the guests, namely those who ate any of the potato salad, were taken to the hospital.

This interpretive problem is not an issue for the QR analysis, which interprets the quantifier only once. Fox (2002) suggests that for extraposition structures to be interpretable, the lower copy of the host must be turned into the kind of object at LF that can be bound by the higher copy. Following Engdahl (1980) and Sauerland (1998), Fox (2002:67) formulates an operation called *Trace Conversion* which effectively turns the lower copy into a definite description with a variable. The variable that is introduced by this operation can then be bound by the binder index introduced as part of the movement of the host in the way suggested by Heim & Kratzer (1998). This is illustrated in (35), which is a rough partial representation of the LF for the example in (33a).

(35)   [VP [DP every book [CP λy that I had *ever* been told to [VP$_E$ buy [DP the book y]]]]
             λx [VP [VP I [VP$_A$ bought [DP the book x]]] yesterday]]

The direct object *every book* here has undergone an instance of QR to the edge of the matrix VP (for ease of exposition I have linearized the QR operation to the left in this case). The lower copy of the direct object in the matrix antecedent VP$_A$ has undergone Trace Conversion, which

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replaced the lower instance of *every* with a null variant of *the* and inserted the variable *x* to yield *the book x*. The relative clause containing both the NPI *ever* and the elided VP_E, which was merged counter-cyclically, is present only in the higher copy of QR'ed direct object. The NPI is licensed in this configuration by virtue of being interpreted in the restrictor argument of *every*. The identity relationship between VP_E and VP_A required for deletion of VP_E can also be satisfied in this configuration as VP_E is not contained in VP_A. Along with the additional assumption that relative clauses can involve a type of head-internal analysis,[19] the lower copy of the movement dependency in the relative clause will undergo Trace Conversion to yield *the book y*. Modulo the names of the variables, the LF representations of these VPs are identical and ellipsis is licensed.

Because this analysis is compatible with the licensing of NPIs while simultaneously accounting for the additional data presented here, I would suggest that it is this analysis that is best suited for modeling instances of EXNP that call for a Host-Internal approach.

6 Conclusion

We have seen in this paper that NPIs are licensed in relative clauses that have been extraposed from a direct object host that is headed by the quantifier *every*. I have argued that this observation is best modeled by a Host-Internal analysis of EXNP, which treats the extraposed material as being generated internal to the restrictor argument of its host. Host-External analyses claiming that the extraposed material is adjoined to the nuclear scope of the host do not predict a priori the possibility of NPI-licensing in such configurations. Based on additional evidence presented in section 5, I suggested further that the range of data observed here is best modeled by the QR analysis of EXNP in Fox & Nissenbaum 1999.

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[19]Fox (2002) cites Kayne (1976), Cinque (1981–82), Sauerland (1998), Cresti (2000) and Kennedy (2000).

Appendix A: Experimental Items

(1) (Yesterday) park rangers removed [every/some] camper(s) (yesterday)
who was/were at [any/one] of the sites with significant flooding.

(2) (Last night) the boys stole [every/some] bag(s) (last night)
that had [any/a few] credit cards inside.

(3) (Last night) we invited [every/some] neighbor(s) (last night)
who had [any/some] interest in building a park.

(4) (Yesterday) citizens ousted [every/some] politician(s) (yesterday)
who had [any/many] connection(s) to pirates.

(5) (Last month) the bank contacted [every/some] customer(s) (last month)
who had [any/some] outstanding credit card debt.

(6) (Last year) the company considered [every/some] job applicant(s) (last year)
who was/were from [any/one] of the local temp agencies.

(7) (Last week) the press criticized [every/some] representative(s) (last week)
who is/are from [any/one] of the Republican districts.

(8) (Last week) the police monitored [every/some] witness(es) (last week)
who was/were in [any/some] danger from the local mafia.

(9) (This afternoon) Greg removed [every/some] rosebush(es) (this afternoon)
that was/were in [any/some] of the temporary pots.

(10) (This month) Kara promoted [every/some] employee(s) (this month)
who was/were in [any/one] of the top accounting divisions.

(11) (This morning) the doctors examined [every/some] patient(s) (this morning)
who is/are on [any/some] of the new experimental pain medications.

(12) (Last week) the government quarantined [everyone/someone] (last week)
who was on [any/one] of the cruises in the Caribbean.

(13) (Last night) someone stole [every/some] bike(s) (last night)
that was/were on [any of/∅] the bike rack(s) behind the building.

(14) (Today) Sarah sold [every/some] book(s) (today)
that was/were in [any/one] of the national book review journals.

(15) (Next season) teams will recruit [every/some] athlete(s) (next season)
who is/are at [any of the/a] universities/university with a recent championship.

(16) (Last semester) Allen tutored [every/some] student(s) (last semester)
who was/were on [any/one] of the intramural basketball teams.

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