



# Headed relative clauses in generative syntax – Part II

By Valentina Bianchi

### 3. The modification problem

In the first part of this State-of-the-Article I discussed the connectivity problem, namely, the syntactic relation between the relative “head” and the relativization site. The second general issue that I will be discussing here is the way in which the whole relative clause is syntactically related to the modified “head”.

As a preliminary, it is necessary to determine the syntactic category of the relative clause itself. Most generative approaches assume that relative clauses belong to the category *S*’/CP (see Bianchi, 1999; Hoekstra, 1992; Rizzi, 1997 and Zwart, 2000 for various analyses in terms of a split complementizer system). However, some alternative views have been proposed: according to Sag (1997), the relative clause is a projection of the verb (as a matter of fact, in various languages the highest verb of a relative clause bears a specific morphological mark); Áfarli (1994) argued that Norwegian relative clauses are TPs, and Doherty (1993) argued that English *that*-less relatives are IPs.

#### 3.1. A little history

The earliest generative approach to relative clauses is the **Determiner-S** analysis (Smith, 1964, 69): a determiner selects a restrictive relative marker and/or an appositive relative marker; the marker(s) is shifted to the right of the noun and adjoined to the NP node, and a relative clause is adjoined to its left, yielding the linear order: Det-N-relative clause. The restrictive relative marker allows for recursive adjunction, which yields stacked restrictive relatives; the appositive marker always occurs to the right of the restrictive one, thus accounting for the fact that an appositive relative follows any restrictive relative:

(29) The man that came to dinner, who was drunk, fainted.

Chomsky (1965) and Stockwell, Schachter and Partee (1973, 423–426) adopted a slightly different formulation, on which the relative clause is generated as a complement of the determiner and then undergoes obligatory extraposition to the right:

(30) a. [<sub>NP</sub> [<sub>artP</sub> the [<sub>S</sub>’ who came to dinner]] [<sub>N</sub>’ man]] ⇒

b. [<sub>NP</sub> [<sub>NP</sub> [<sub>artP</sub> the ] [<sub>N</sub>’ man]] [<sub>S</sub>’ who came to dinner]] (cf. Jackendoff, 1977, 170)

The proposed selectional relation between the determiner and the relative clause can straightforwardly account for the following co-occurrence constraints (Smith, 1964, 69):

- a) the zero determiner introducing (unmodified) proper names only allows for appositive relatives and not for restrictives;
- b) the definite and indefinite article allow for both appositives and restrictives;
- c) quantificational determiners only allow for restrictives, but not for appositives.

It also accounts for the behaviour of certain abstract common nouns, like *manner*, *way*, *time*, *place*, which can only occur when modified by a relative clause or by some kind of demonstrative determiner:

- (31) a. \*He did it the/a way.
- b. He did it that way.
- c. He did it the way that I prescribed.

Similarly, it accounts for the observation that a proper name can be preceded by the definite article when it is modified by a restrictive relative clause:

(32) the Paris \*(that I love)

The relative clause licenses a determiner that would be impossible otherwise. However, Vergnaud (1974) and Jackendoff (1977, 177–182) showed that the same pattern holds with other restrictive modifiers, like adjectives and prepositional phrases, and even with those that cannot be analysed as reduced relative

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clauses derived by “Rel-Be deletion”: cf. e.g. *the Paris of my youth, the old Paris, he did it in a pompous way*, etc. Therefore, the pattern cannot be reduced to the selection of a relative clause by the determiner. Another problem is that the obligatory extraposition rule required to get the right linear order seems completely *ad hoc*.

An alternative advocated by Ross (1967) was the NP-S analysis, whereby a restrictive relative is right-adjoined to the NP node. This hypothesis allowed one to state the identity requirement between the “head” and the internal relative NP as full identity/coreference (cf. §2.1), but as shown in (8)–(9) above, this yields the wrong result in the case of quantificational determiners. Another problem, pointed out by Stockwell, Schachter and Partee (1973, 427–435), is that gerundive nominalizations that arguably belong in the NP category disallow restrictive relativization, which is unexpected under the NP-S analysis.

A further question is how to distinguish appositive from restrictive relatives. Ross (1967) proposed that appositive clauses are conjoined to the matrix clause in underlying Deep structure. This was intended to account for the fact that appositives share various properties of root clauses, e.g. the possibility of speaker-oriented modifiers like *frankly*, and the fact that they fall outside the scope of any operator contained in the matrix clause. The major problem for this hypothesis is the fact that an appositive relative should be allowed to be conjoined in the base also with non-declarative matrix sentences, like e.g. questions or imperatives (cf. Jackendoff, 1977, 197–199). The argument applies equally to the conjunction analysis of restrictives by Thompson (1971) (see Stockwell, Schachter and Partee, 1973, 440–441).

The impetus of Montague Grammar gave rise to a different way of conceiving of restrictive relatives. Partee (1975, 231) argued that in a definite description like *the man who dates Mary*,

a straightforward compositional semantics... requires that we first combine the relative clause property with the (lexical) common noun property to form a composite property, and then apply the semantic rule for the definite article to the result. If the syntactic and semantic rules are to correspond in compositional structure, which is a fundamental assumption in Montague’s approach, then relative clauses must also be syntactically combined with common noun phrases to form new common noun phrases, and the definite article attached to the result.

In the terms of early transformational grammar, this corresponded to the NOM-S analysis discussed by Stockwell, Schachter & Partee (1973, 435–440), in which the relative clause is attached to a NOM constituent that excludes the determiner/article:

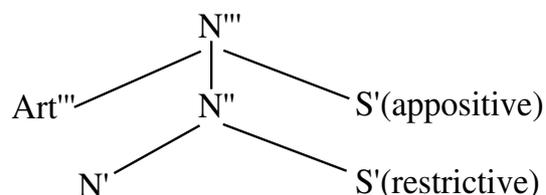
(33) [NP [Art the] [NOM [NOM [N man]] [S' who came to dinner]]]

This analysis has the immediate advantage that in a sentence like (8), repeated here as (34), the “shared” constituent is the NOM layer that excludes the quantificational determiner:

(34) [NP All the [NOM[NOM boys] [who left early]] missed the fun.

Partee’s compositionality argument was defied by Bach & Cooper (1978), who proposed an alternative compositional analysis consistent with the NP-S structure (such an analysis, they claim, is independently required in the analysis of Hittite correlative clauses; see §4). The correlation between syntactic attachment and semantic composition was systematized in Jackendoff’s (1977) thorough investigation of X-bar syntax. Jackendoff reduced the restrictive/appositive interpretation to different **levels of attachment** of the relative clause: a restrictive relative is a daughter to N'', a nominal layer that does not include the determiner, whereas an appositive relative is a daughter to N''' and a sister to the determiner:

(35)



The linear order exemplified in (29) is a consequence of the relative hierarchical position of restrictive and appositive relatives.

An entirely different approach to appositives was the **parenthetic clause** hypothesis, advocated by Emonds (1979), McCawley (1982) and Cinque (1982). These authors argued that the “head” and the appositive relative do not form a constituent in the base structure; in particular, the appositive is (or may be, on Cinque’s view) a parenthetical clause attached directly to the root node. The analyses differ as to how the surface pseudo-constituency of the “head” and the relative is brought about. Emonds proposed a basic conjoined structure like Ross’s; the second conjoined clause is turned into an appositive relative in two steps: a dedicated transformation shifts to the right of the second clause whatever constituent occurs between it and the “head”, and then another transformation attaches the second conjoined clause directly to the first one. According to McCawley, the appositive is a daughter to the root S node and is linearly reordered to a position adjacent to the “head” (see Bianchi, 1999, chapter 5 and de Vries, 2002, chapter 6 for detailed discussion of these approaches). The parenthetical status of appositive relatives is supported by the fact that they share the typical comma intonation of parenthetical elements.

This type of analysis straightforwardly captures the root clause properties of appositives mentioned above, and especially their islandhood for binding:

namely, the fact that neither the relative “head” nor any quantifier in the matrix clause can bind a variable contained in an appositive relative:

(36) \* Any man<sub>i</sub>, who drives a Cadillac, is insane.

(37) \* Everyone<sub>i</sub> bought a suit, which suited him<sub>i</sub>.

A related but conceptually distinct proposal was advanced by Safir (1986), who was specifically concerned with the observation that the relative pronoun of appositive relatives, contrary to that of restrictives, does not give rise to **Weak Crossover** effects:

(38) a. ?\* A man who his wife loves *t* arrived early.  
b. John, who his wife loves *t*, arrived early.

Safir argued that the appositive relative gets attached to the “head” at a post-LF level of representation, dubbed LF', at which the principle responsible for crossover effects is no longer operative; at the level of LF, the relative pronoun is not yet coindexed with the “head”, and thus it bears an index distinct from that of the crossed-over pronoun. The hypothesis of post-LF attachment also accounts for the binding islandhood of appositives exemplified in (36)–(37). (On the contrast in (38) see also Lasnik & Stowell, 1991; Safir, 1996). Yet another variant of the discontinuous constituency approach was proposed by Demirdache (1991, 103–162): the appositive relative is initially attached to the “head”, but it moves at LF and adjoins to the root (IP or CP) node. Thus, in the resulting LF representation the relative clause is not included in the *c*-command domain of the determiner of the “head”, but it is a daughter of the root node. —Finally, Fabb (1990) proposed the **radical orphanage** hypothesis, whereby the appositive relative never forms a constituent with the “head” at any level of representation.

The rise of the **DP hypothesis** (Abney, 1987) opened a new perspective on the modification problem. On this hypothesis, the determiner heads its own functional projection and takes the lexical NP projection as its complement. This allowed for a restatement of Jackendoff's hierarchical distinction within two-level X-bar theory (cf. Browning, 1987, 127–131). According to Demirdache (1991, 111) a restrictive relative is right-adjoined to the NP-projection, and hence it is *c*-commanded by the D° head, whereas an appositive relative is adjoined to the whole DP, so that it is higher than D°. This hierarchical distinction neatly correlates with different interpretive rules: intersective modification between the restrictive relative and the NP “head” vs. coreference between the relative pronoun and the DP “head” in appositives.

(39) a. [<sub>DP</sub> D° [<sub>NP</sub> [NP] [CP]]] (restrictive)  
b. [<sub>DP</sub> [<sub>DP</sub> D° NP] [CP]] (appositive)

The fact that coreference is involved in appositives explains why the “head” of an appositive relative is not necessarily a nominal category, but it can be any constituent that acts as an antecedent for a coreferential pronoun:

(40) a. [John arrived late], which was unfortunate.  
b. Mary is [courageous], which I will never be.

The adjunction analysis remained essentially unchallenged throughout the GB phase, up to Kayne's (1994) **antisymmetry hypothesis**. This hypothesis establishes a very rigid mapping between hierarchical relations of asymmetric *c*-command between any two nonterminal nodes in a tree and a linear ordering of the terminal symbols that these nonterminals dominate. This entails several *a priori* constraints on the general X-bar schema, in particular, the impossibility of right-hand adjunction and strict binary branching. Therefore, the antisymmetry hypothesis called for a reanalysis of right-hand modifiers, including post-nominal headed relative clauses.

The problem was taken up in Kayne (1994, Chapter 8), where a new version of the Determiner-S analysis was proposed, based on the DP hypothesis. Abney (1987) had already argued that the D° head can select for non-nominal maximal projections (for instance, in his analysis of the English *Poss-ing* structure). Kayne argued that the D° head selects the relative CP as its unique complement; the lexical NP of the “head” is generated in the relativization site (41a), and then raises to SpecCP, as shown in (41b) (recall the discussion around (17) in Part I):

(41) a. [<sub>DP</sub> the [<sub>CP</sub> [that [<sub>IP</sub> Bill bought [book]]]]] ⇒  
b. [<sub>DP</sub> the [<sub>CP</sub> [book] [that [<sub>IP</sub> Bill bought *t*]]]]

In support of the selection hypothesis, Kayne re-proposed the evidence illustrated in (31)–(32) above. In order to overcome the Vergnaud/Jackendoff objection, he argued that PP and AP restrictive modifiers can be analysed as **reduced relative clauses** with an underlying raising structure like (41); in the place of “Rel-Be deletion”, however, he proposed that adjectival and PP modifiers are endowed with abstract inflectional (I°) and complementizer (C°) heads (42a). Prenominal adjectives are derived by raising to SpecCP the adjectival phrase rather than the nominal “head” (42b):

(42) a. [<sub>DP</sub> the [<sub>CP</sub> [book]<sub>i</sub> [<sub>C°</sub> [<sub>IP</sub> *t*<sub>i</sub> [I° [on the shelf]]]]]]]  
b. [<sub>DP</sub> the [<sub>CP</sub> [yellow]<sub>i</sub> [<sub>C°</sub> [<sub>IP</sub> [book] [I° *t*<sub>i</sub>]]]]]]

One problem with this view is the fact that the proposed reduced relatives never show a relative determiner introducing the “head” (see again the discussion around (17)). As for the C° head, Kayne argued that in certain structures it is spelled out as the preposition *di/de/of*. Note also that in these structures the only possible relativization site is the external argument of the predicative PP/AP; this recalls the most restrictive relativization strategies investigated by Keenan and Comrie (1977), which only allow for relativization of the highest subject.

An important problem for the revised raising analysis is the unorthodox selectional relation between the external D° and the relative CP. As stressed in particular by Borsley (1997), determiners selecting finite clauses are attested cross-linguistically,

but their function is to nominalize an argument clause, and they usually show default agreement features (see Borsley & Kornfilt, 2001):

- (43) To, kogo Maria widziala  
 that-NOM who-ACC Maria saw  
 jest tajemnica.  
 is secret (Polish)  
 "Who Maria saw is a secret."

In the raising relative structure, instead, the determiner selects the CP but it agrees in gender and number with the raised "head", and from a semantic viewpoint, it binds into the "head" rather than nominalizing the whole clause. Bianchi (2000, 127) proposed that (43) involves a clausal determiner without agreement features and bearing a categorial C-feature to be checked, whereas (41) involves a well-behaved nominal determiner with an N-categorial feature and with agreement features to be checked by the raised "head". Even under this view, the selectional relation between  $D^\circ$  and the relative CP in (41) remains quite stipulative.

Kayne also extended the raising analysis to **appositive relatives**, and proposed that the non-restrictive interpretation results from the LF movement of the IP subconstituent of the relative clause to a position not c-commanded by the  $D^\circ$ ; this position he identified with Spec,DP:

- (44) a. [ $_{DP}$  The [ $_{CP}$  [ $_{DP}$  boy [who  $t_i$ ] [ $_{C^\circ}$  [ $_{IP}$   $t_i$  was very tired]]]]]  $\Rightarrow$   
 b. LF: [ $_{DP}$  [ $_{IP}$   $t_i$  was very tired] [the [ $_{CP}$  [ $_{DP}$  boy [who  $t_i$ ] [ $_{C^\circ}$   $t_{IP}$ ]]]]]

This hypothesis holds that the overt syntax of restrictive and appositive relatives is identical. As for the intonational break typical of appositives, Kayne observed that it is not a universal phenomenon; in his view, it is a phonological manifestation of the syntactic feature that triggers LF movement (in languages with postnominal relatives). This however would predict that the intonational break occurs after the relative pronoun, rather than between the "head" and the relative pronoun. Another problem, raised by Borsley (1997), is constituted by appositive relatives with non-nominal "heads" like (40) above: these cannot be reduced to the raising structure in (44). Bianchi (2000) suggested that these are not real appositive relatives, but parenthetical clauses in which the apparent relative pronoun performs cross-sentential anaphora (the so-called *relatif de liaison*). Various consequences and problematic aspects of Kayne's proposal were discussed by Bianchi (1999, 2000), Alexiadou, Law, Meinunger & Wilder (2000), and de Vries (2002), among others; see especially Borsley (1997, 2001) for a thorough criticism.

Even among people who adhered to the antisymmetry hypothesis, Kayne's analysis was subject to criticism. Platzack (2000) proposed an alternative antisymmetric structure in which a restrictive relative CP is a **complement to the  $N^\circ$  "head"** (without

raising); an appositive relative instead involves an empty  $N^\circ$  which takes the DP "head" as its specifier and the relative CP as its complement, as depicted in (45) and (46) respectively:

- (45) [ $_{DP}$   $D^\circ$  [ $_{NP}$   $N^\circ$  [ $_{CP}$  Op ... $t_i$ ]]] (restrictive)  
 (46) [ $_{DP}$   $D^\circ$  [ $_{NP}$  DP [ $_{N^\circ}$  [ $_{CP}$  Op ... $t_i$ ]]]] (appositive)

See also Kalluli (2000) and Schmitt (2000) for other versions of the complement analysis of restrictives.

Rebuschi (2001) reviewed various antisymmetric approaches and argued that the  $D^\circ$  takes as a complement the **conjunction** of the NP "head" and the relative CP (both of type  $\langle e, t \rangle$ ). Koster (2000) argued that the relative clause is connected to the "head" by a **Boolean operator** of asyndetic specification performing set intersection (in the restrictive interpretation) or set union (in the appositive interpretation):

- (47) [ $_{NP}$  [ $_{NP}$  a woman] [ : [ $_{CP}$  who<sub>k</sub> knows everything]]]

As for appositives, de Vries (2002, ch. 6) developed a related analysis in which the appositive relative is a false free relative introduced by an empty external pronominal head ( $DP_2$  in (48)), and is connected to the relative "head" ( $DP_1$ ) by specifying coordination (see also Bianchi, 1999, chapter 5, Koster, 2000 and Rebuschi, 2001 for related ideas). Semantically, specifying coordination is interpreted as the subset relation between the referent of  $DP_2$  and the referent of  $DP_1$ :

- (48) [ $\&:P$  [ $_{DP1}$  Annie]<sub>i</sub> [ $\&:$  [ $_{DP2}$   $\emptyset_k$  [ $_{CP}$  who<sub>k</sub> is our manager]]<sub>j</sub> ]]

This proposal accounts for the backgrounded status of the specifying appositive, for the referential independence of the "head"  $DP_1$ , and for the lack of reconstruction effects. It also accounts for the fact that the appositive relative follows a restrictive relative, which is necessarily contained in  $DP_1$ . Finally, islandhood for binding is shared by other specifying appositives, though it is not accounted for in structural terms. These conjunction analyses are compatible with current restrictive versions of X-bar theory; the cost is the postulation of a phonetically empty Boolean head.

I believe that the various approaches to the modification problem were crucially conditioned by *a priori* adopted constraints on phrase structures and by specific views of syntax-semantics compositionality. Focussing on the second, there are in my opinion two crucial choices. The first one is whether the restrictive term of a determiner is taken to correspond to its c-command domain. The second one is whether the independent clause/islandhood properties of appositives are explicitly encoded in the syntactic derivation (e.g. by postulating an underlying clausal conjunction structure, or an invisible LF movement), or they are attributed to the semantic interpretation. As is often the case, the underlying question is the proper balance between the syntactic and the semantic component.

### 3.2 Some issues related to the modification problem

The attachment of the relative clause to its “head” has figured prominently in recent minimalist arguments concerning the derivational nature of the computational component of human language and the question of single vs. multiple access to the latter by the two interpretive components. These arguments are often highly theory-internal, but they provide a useful illustration of some general trends of the field.

The starting point is Lebeaux’s (1988, 1990) discussion of an **argument/adjunct asymmetry** originally pointed out by Freidin (1986). This is illustrated in (49a–b): in (49a), a complement clause contained in a fronted *wh*-phrase shows a Principle C effect under reconstruction; no comparable effect is found with the relative clause in (49b):

- (49) a. \* [Which claim [that John<sub>i</sub> was asleep]] was he<sub>i</sub> willing to discuss *t*?  
 b. [Which claim [that John<sub>i</sub> made *t*]] was he<sub>i</sub> willing to discuss *t*?

The only relevant difference is the status of the clause embedded in the *wh*-phrase: a selected complement in (49a), a modifying adjunct in (49b). Lebeaux argued that in (49a) the Projection Principle forces the insertion of the complement clause in the base position of the *wh*-phrase at D-structure; however, no general principle forces the insertion of the non-selected relative clause in (49b). The lack of a reconstruction effect can be accounted for by assuming a less constrained view of the syntactic derivation, whereby a **generalized transformation** attaches the relative clause to the *wh*-phrase after the latter has been fronted to SpecCP. (This late attachment of the relative clause recalls Safir’s 1986 proposal for appositive relatives.)

The empirical evidence is somewhat controversial (see e.g. Watanabe, 1995; Bianchi, 1999, 127–129, and especially Safir, 1999); however, this proposal had important consequences for the development of the theoretical framework, and it became a strong argument in support of the strongly derivational view of syntax proposed by Chomsky (1993), which completely eliminated intermediate levels of representation and generally allowed for countercyclic insertion of adjuncts.

A further development is Fox & Nissenbaum’s (1999) analysis of **adjunct extraposition** from NP, exemplified in (50b).

- (50) a. Yesterday I met [a man who I knew in high school].  
 b. I met [a man] yesterday [who I knew in high school].

The phenomenon of extraposition has always been problematic since Ross’s (1967) seminal work (see Baltin, forthcoming for an overview). On the one hand, it is fairly natural to relate (50b) to (50a) by means of a movement transformation. On the other hand, this purported movement has completely opposite properties w.r.t. standard movement: (a) it

is *rightward* movement; (b) it is optional; (c) it is bounded to the first clausal node and cannot proceed in a successive cyclic fashion (Right Roof Constraint); (d) it extracts an adjunct from an NP, which is impossible under *wh*-movement:

- (51) a. We saw [a painting] yesterday [from the museum].  
 b. \*?? [From where] did you see [a painting *t*]?

There was a long debate between movement vs. base-generation analyses of (relative clause) extraposition (see especially Beerman *et al.* 1997; Rochemont & Culicover, 1990, and references therein), which also revolved around the question of the landing site. As shown in (52), extraposition requires nesting paths: a relative clause extraposed from a subject must appear to the right of a relative clause extraposed from an object. This seems to indicate that the former is right-adjoined to IP and the latter to VP:

- (52) [A man]<sub>i</sub> entered [the room]<sub>k</sub> last night [that I had just finished painting]<sub>k</sub> [who had blond hair]<sub>i</sub>.

Fox & Nissenbaum (1999) propose a minimalist solution to the problem of adjunct extraposition which requires an even more radically derivational approach than the one envisaged by Lebeaux (1990) and Chomsky (1993). On their analysis, the “source NP” undergoes phonologically covert Quantifier Raising that right-adjoins it to an intermediate projection (53a); after QR has taken place, the relative clause is counter-cyclically merged to the copy of the source NP in the Quantifier-raised position ((53b); overstriking indicates phonological deletion):

- (53) a. [We<sub>i</sub> [ [VP *t*<sub>i</sub> [[saw a painting] yesterday] [~~a painting~~]]] (QR)  
 b. [We<sub>i</sub> [ [VP *t*<sub>i</sub> [[saw a painting] yesterday] [~~a painting~~ from the museum]]] (adjunct merger)

The evidence for this analysis is twofold. First, the scope of the source NP is at least as high as the attachment site of the extraposed adjunct, which follows from the hypothesis that it has undergone covert Quantifier Raising. In (54), the source NP is a polarity item but it cannot be licensed in the scope of the modal verb *look for*, since covert QR has raised it out of VP:

- (54) \* I looked for [anything] very intensely [~~anything~~ that will/would help me with my thesis].

Furthermore, the adjunct cannot be reconstructed into the VP, because it has been counter-cyclically merged in the VP-external position; this accounts for the lack of a Condition C violation in (55) (parallel to (49b) – but see (57) below):

- (55) I gave him<sub>i</sub> [an argument] yesterday [that supports John<sub>i</sub>’s theory].

The second type of evidence shows that adjunct extraposition does not obey standard constraints on movement; on the contrary, extraposition of a

complement involves movement and obeys these constraints. An example is the Definiteness Constraint, which blocks complement extraposition (and standard *wh*-movement), but not adjunct extraposition:

- (56) a. ?? I saw [the best picture] yesterday [of the museum]. (complement extraposition)  
 b. I saw [the best picture] yesterday [from the museum]. (adjunct extraposition)

On the theoretical side, this analysis of adjunct extraposition is incompatible with the distinction between a phonologically overt and a phonologically covert (LF) cycle, which the minimalist model had inherited from the GB “Y-model”; it requires instead a uniform derivation in which overt and covert operations are freely interspersed. These theoretical implications are worked out in Nissenbaum (2000, ch. 5), who argues that the operation of Spellout applies repeatedly throughout the derivation but only targets the internal domain of each cycle (cf. also the “derivation by phase” model by Chomsky, 2001a, 2001b). Importantly, countercyclic merge into a syntactic object is only possible at the **linear edge**: this constraint accounts for the rightmost position of extraposed adjuncts (cf. Borsley, 1997; Büring & Hartmann, 1997), and for the fact that each cycle can contain at most one extraposed element.

One aspect of this analysis remains unclear (at least to me): namely, why extraposition is only to the right. This should follow from Nissenbaum’s (2000) linear edge condition, but as far as I can see, at the cycle where late merger applies, say VP, both the left and right linear edges are in principle available: it is only at the next cycle that further material is added to the left linear edge of VP. Moreover, nothing in principle prevents covert QR of a source NP to a root IP/CP, which would allow for counter-cyclic merge both at the left and at the right linear edge of IP/CP. (Note that the linear edge condition could successfully derive the nested multiple extraposition of (52) if it could ensure that extraposition from the subject NP too targets the right linear edge). Chomsky (2001b, 19–20) raises some further theoretical problems.

Extraposition was also debated in the context of the antisymmetry hypothesis, which excludes right adjunction both as a base-generated structure and as the result of movement (see the papers in Beerman *et al.* 1997). Kayne (1994, ch. 9) and Haider (1993) independently argued that extraposed clauses are very low in the clausal structure, on the basis of binding facts like (57):

- (57) I would not tell everyone<sub>i</sub> all the details at once [that he<sub>i</sub> might be interested in]. (Haider, 1993)

Kayne proposed a **stranding** analysis, whereby the relative clause is contained in a DP with an empty external D° in the base position, and it is stranded by leftward movement of the relative “head” from SpecCP to a matrix clause position (see (41) above). This proposal was independently criticized by Bors-

ley (1997), Büring & Hartmann (1997) and Koster (2000).

An alternative solution to the extraposition problem has been proposed by Koster (2000). Recall that on his view, a relative clause is connected to the antecedent “head” by a Boolean operator of asyndetic specification (cf. (47) above). Extraposition results from the option of taking as the first conjunct of the Boolean head a phrase properly containing the NP “head”, rather than the “head” itself:

- (58) Ik heb [[<sub>AGR</sub>OP [<sub>NP</sub> een vrouw] gezien]  
 I have a woman seen  
 [ : [<sub>CP</sub> die alles wist]]  
 who everything knows  
 ‘I saw a woman who knows everything’ (Dutch; Koster, 2000, 23)

The possibility for an NP to “pied-pipe” a larger phrase in a conjunction structure is independently attested in an example like (59), another case of **parallel construal**:

- (59) Ik heb [[<sub>AGR</sub>OP Jan gezien] [ en [<sub>NP</sub> Marie]]].  
 I have Jan seen and Marie  
 ‘I saw Jan and Marie.’

In a structure like (58), the largest phrase that can contain the NP “head” is the minimal CP dominating it: this accounts for the Right Roof Constraint. The lack of reconstruction of the extraposed clause in the visible position of the antecedent “head” (55) also follows straightforwardly. The right-hand position of extraposed clauses follows the general pattern of asyndetic specification, in which the specificational element follows the specified antecedent.

Chomsky (2001b, 19–20) proposes a somewhat similar alternative to the Fox-Nissenbaum late merge: extraposition results from an **afterthought** structure in which the “head” of the relative clause undergoes ellipsis.

- (60) We saw [<sub>NP</sub> a painting] yesterday, (that is,  
 a ~~painting~~ [<sub>ADJ</sub> from the museum].

Chomsky also extends this proposal to the phenomenon of **Antecedent-Contained Deletion**: a relative clause is contained in the matrix VP and has a deleted VP, whose antecedent is the matrix VP itself (61a). The standard solution was to extract the QP containing the relative clause out of the matrix VP by Quantifier Raising (61b) and then copy the resulting matrix VP in the deletion site (May, 1985). Fox (2002) proposes an analysis based on extraposition (cf. Baltin, 1987): the relative clause is countercyclically attached to the QP after Quantifier Raising has extracted the QP from the matrix VP (61c). Chomsky (2001b) criticizes Fox’s solution and extends to this case his afterthought analysis, as shown in (61d):

- (61) a. John [<sub>VP</sub> likes [<sub>QP</sub> every boy [<sub>CP</sub> that Mary does [<sub>VP</sub> e]]]]  
 b. [<sub>QP</sub> every boy [<sub>CP</sub> that Mary does [<sub>VP</sub> e]]]<sub>i</sub> John [<sub>VP</sub> likes t<sub>i</sub>]

- c. [[<sub>VP</sub> John likes every boy] ~~every boy~~ that Mary does <likes boy>] (Fox, 2002, 76)  
 d. John likes every boy, (that is, more accurately,) ~~every boy~~ Mary does ~~like~~.

An ellipsis solution has been recently advanced by Suñer (2001) for another well known problem, namely relative clauses with multiple conjoined “heads” (which Link, 1984 dubbed *hydras*; see especially Vergnaud, 1974/85 for detailed discussion):

- (62) the man<sub>i</sub> and the woman<sub>k</sub> who<sub>i+k</sub> got married yesterday

Here the “head” of the relative clause is apparently the conjunction of two definite NPs, *the man* and *the woman*; this raises a problem for the NOM-S analysis and its various descendants. Note that the problem cannot be easily solved by postulating Right Node Raising of the relative clause from two conjoined NPs, because the relative clause contains a collective predicate that cannot apply to each NP conjunct separately. Perlmutter and Ross (1970) pointed out an even more complex example, in which the “head” of the extraposed relative is constituted by two non-conjoined NPs:

- (63) [A man]<sub>i</sub> came in and [a woman]<sub>k</sub> went out [who<sub>i+k</sub> resembled each other].

Link (1984) provided a semantic analysis of (62) in which the definite article combines with the conjoined “heads” only once, so as to denote a unique group of two individuals; but he did not spell out his assumptions on the syntactic side. Suñer (2001) proposes an ellipsis solution in which an identical relative clause modifies each conjoined noun phrase, but backward deletion eliminates it in the first conjunct. As for the problem of collective predication (and of plural agreement, in languages that can morphologically manifest it), she argues that it obtains by means of a collective event argument in the relative clause (based on Lasersohn, 1995).

In sum, the problems of extraposition and hydras have persisted throughout the history of the field up to the most recent minimalist framework, and they have been analysed in terms of a variety of special mechanisms (ellipsis, rightward movement, parallel construal, countercyclic merge...). The reason is that these phenomena seem to defy the standard view of constituency based on X-bar syntax, both at the empirical and at the theoretical level. Perhaps a satisfactory solution will require a less rigid view of the correspondence between semantic and syntactic constituency (cf. e.g. Culicover & Jackendoff, 1997).

#### 4. Two related structures?

Two “exotic” relativization strategies raise questions related to both of our main issues: correlative clauses like (64) and internally headed relatives like (65).

- (64) [[<sub>CP</sub> [jo larki]<sub>i</sub> khari hai] [vo<sub>i</sub> lambi hai]].  
 which girl standing is, she tall is  
 ‘The girl who is standing is tall.’  
 (Hindi; Srivastav, 1991)

- (65) [[Mari [owiza wa] kage] ki] he ophewathu.  
 Mari quilt a make the Dem I buy  
 ‘I bought the quilt that Mari made.’  
 (Lakhota; Williamson, 1987, 171)

Concerning the connectivity problem, note that in both of these structures the relative “head” surfaces as an internal constituent of the dependent (relative) clause. In the correlative structure, the “head” is introduced by a relative-like determiner (*jo* in (64)) and is usually fronted to an initial position of the dependent clause. In internally headed relatives, the “head” is usually in the argument position corresponding to the relativization site, although it can also be anteposed to some intermediate or initial position (see Basilico, 1996 for detailed discussion). Concerning the modification problem, both these structures are atypical (cf. Andrews, 1975): correlative clauses are left- or right-adjoined to the clause that contains a nominal correlate of the relative “head” (cf. Srivastav, 1991); internally headed relatives are nominalized clauses introduced by a determiner (*ki* in (65)) and can appear in an argument position of the matrix clause, or in a dislocated position (see Bonneau, 1992; Cole, 1987; Cole & Hermon, 1994; Culy, 1990; Basilico, 1996; Williamson, 1987). As mentioned in §3.1, Bach & Cooper (1978) discussed Hittite correlative clauses as evidence against Partee’s (1975) view of compositionality.

Grosu & Landman (1998) and Grosu (2002) propose that correlatives (and certain internally headed relatives) fall in the category of maximalizing relatives. From this perspective, it might be argued that these structures do not necessarily have the same constraints as restrictive relatives w.r.t. the syntax-semantics interface. In particular, the fact that the relative “head” is clearly internal to the dependent clause squares well with Grosu & Landman’s claim that in maximalizing structures the “head” is interpreted CP-internally (cf. (3)). As for the modification problem, it has been argued that the relation between the correlative clause and the correlate in the matrix clause is quantificational binding rather than restriction (Srivastav, 1991; Dayal, 1996).

However, some analyses have tried to assimilate either of these structures to headed relatives. For instance, Cole (1987) argued that internally headed relatives have a phonetically empty external “head”; Kayne (1994, 95–97) recasted Cole’s proposal in terms of his general raising analysis for headed relatives. Haudry (1973) suggested a diachronic derivation of embedded headed relatives from correlatives in some Indo-European languages, a proposal also developed in Bianchi (1999, 2000) in an elaboration of Kayne’s (1994) approach; Mahajan

(2000) provided a unified analysis of Hindi correlatives and post-nominal relatives, *contra* Srivastav (1991).

### 5. Concluding remarks

Relative clauses constitute an extremely intriguing empirical domain, both because of the complexity of the data and of the theoretical relevance of the construction (especially with respect to the syntax-semantic interface). This domain has also constituted one of the hottest arenas for the comparison of different theoretical approaches (consider for instance the Chomsky/Bresnan debate on unbounded dependencies, or the debate on rightward adjunction related to the antisymmetry hypothesis).

Needless to say, this State-of-the-Article represents the personal view of the field of the present author, and inevitably reflects personal idiosyncrasies and limitations. For one thing, I have not discussed non-generative approaches to the same empirical domain. Furthermore, I have tried to delineate the development of specific hypotheses through various stages of research, rather than attempting a global comparison of different analyses. This was a methodological choice. Personally, I doubt that any analysis will ever be able to subsume the whole complexity of the facts even within a narrow empirical domain. Each analysis is designed to

account for certain aspects of a domain, and leaves others unaccounted for. But the choice of the “core” data to be analysed is to some extent arbitrary, for we cannot know *a priori* which set of data is fully representative of the empirical domain under investigation; and, as I have tried to illustrate above, the way an analysis is designed is crucially affected by more general theoretical concerns.

I believe that a real comparison of different analyses is only possible with respect to an unambiguously identified set of data – a “fragment” of one or more languages. Such a fragment-based comparison may be useful, in that it can bring to light the weaknesses in one approach; but this does not necessarily entail that the alternative approach is globally superior, though this type of inference is quite common in the literature... It is a pity that the scientifically useful comparison of theories and methods is often turned into a scientifically purposeless competition of theories and methods.

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