Headed relative clauses in generative syntax – Part I

By Valentina Bianchi

1. Introduction
A headed relative clause is a syntactically complex modifier involving abstraction over an internal position of the clause (the relativization site) and connected to some constituent it modifies (the relative "head"). In the standard approach, abstraction is syntactically implemented by means of an unbounded dependency between the relativization site and a relative operator taking scope over the whole clause:

(1) the article which John believes that I wrote

The most important criterion for the classification of relative clauses is the nature of the semantic relation holding between the "head" and the clause itself. Grosu & Landman (1998) extended the familiar restrictive/non-restrictive distinction to the following three-way typology (see also Grosu 2000, 2002 for further refinements):

(a) restrictive relatives are interpreted as interjective modifiers of the nominal "head" and contribute to determining the restriction of the determiner;
(b) non-restrictive (appositive) relatives modify the whole noun phrase "head", rather than contributing to the restriction;
(c) maximizing relatives do not modify the "head": the latter is interpreted within the relative clause, where it provides a degree variable, and an operation of maximalization applies at the clausal level:

(2) the books that there were on the table
(3) MAX [d.there were [d many books] on the table]

In this paper I will not be concerned with maximizing relatives: see the State-of-the-Article by A. Grosu (2002). Note that on Grosu & Landman’s account, this class includes free relatives, as well as correlatives and a subset of internally headed relatives; the latter two will be briefly discussed in §4.

Besides this basic semantic classification, a number of descriptive and typological classifications have been advanced, which distinguish various relativization strategies along the following dimensions:

i. the nature of the relativization site (e.g., gap vs. resumptive pronoun);
ii. the nature of the relative operator (e.g., phonologically overt or not);
iii. the syntactic relation holding between the "head" and the relative clause.


At the level of descriptive adequacy, at least one important fact must be accounted for: different relativization strategies may co-exist within one and the same language, and their distribution is constrained with respect to the nature of the relativization site (Keenan & Comrie 1977) and with respect to the semantic type of the relative clause (Carlson 1977, Cennamo 1997; see §2.2). At the level of explanatory adequacy, however, the great deal of intra- and cross-linguistic variation in the syntax of relativization has not been considered a major challenge. The position commonly adopted – if only implicitly – is that each type of relativization is a unitary phenomenon at the semantic level, but it can be implemented by different syntactic mechanisms (Keenan & Comrie 1977, 63); these mechanisms are made available by UG and do not have to be stated in a construction-specific fashion (Chomsky 1981, 7).

In my view, all the approaches to headed relatives developed in the generative tradition have been confronted with two basic issues. The first issue is what I will call the connectivity problem: the relative "head" seems to play a double role in the overall structure. On the one hand, it is a constituent of the matrix clause: this is shown by the fact that in languages with overt Case marking, it bears the Case assigned by the matrix clause predicate, and satisfies its selectional requirements (cf. Borsley 1997, 2001).
On the other hand, the relative “head” also satisfies the selectional requirements of the predicate internal to the relative clause: this is particularly clear in the case of idiom relativization (Vergnaud 1974/1985).

(5) The headway that John made e was impressive.

Furthermore, with respect to a number of tests, like e.g. anaphor binding and scope assignment, the “head” behaves as if it occurred directly in the relativization site (Vergnaud 1974/1985; Schachter 1973):

(6) The interest in each other, that John and Mary, showed e was fleeting.

The underlying question is how the surface “head” is connected to the relativization site. As we will see, much of the debate on the syntax of relative clauses has revolved around this question; and the history of the problem has had an almost cyclic development.

The second issue I will call the modification problem: this concerns the way in which the relative clause is syntactically related to the modified phrase. Recall that restrictive relatives fall in the restrictive term of the determiner of the “head”, whereas appositive relatives do not. On a certain view of compositionality, this semantic difference has been related to a different syntactic attachment: the restrictive relative is c-commanded by the determiner (Partee 1975); the appositive relative is not. In some approaches, appositive relatives have even been assimilated to parentheticals, attached to the root clause rather than to the “head” (Emonds 1979; McCawley 1982). However, the strict correlation between the syntactic c-command domain of a determiner and its semantic restriction faces some problems, to be discussed in §3.2.

The history of the modification problem is tightly related to the development of X’ theory (from Jackendoff 1977 to Kayne 1994), to the issue of derivation vs. representation (Lebeaux 1988, Chomsky 1993) and to the problem of the interface between syntax and semantics.

A detailed survey of the generative approaches to headed relatives can be found in de Vries (2002, chapter 3 and appendix III); Alexiadou, Law, Meinunger & Wilder (2000) also provides a useful synthetic overview. Here I will sketch out a brief history of each of the two main problems, and then I will point out some empirical issues currently under debate. I will also try to show how throughout the history of these problems, details of implementation and focus on different aspects of the structures were related to the main theoretical concerns of the relevant stages of the “generative enterprise”.

2. The connectivity problem

2.1 A little history

The initial solution to the connectivity problem (e.g. in Chomsky 1965, 145) was the matching analysis:

I. the relative clause contains a noun phrase coreferential to (or identical to) the commanding “head” (henceforth the relative NP).

II. The relative NP is replaced by the appropriate relative pronoun.

III. The relative pronoun moves to the front of the relative clause.

IV. The relative pronoun is optionally deleted (subject to certain constraints).

The double role of the relative “head” was captured by the presence of two c-referential noun phrases in Deep Structure (the level of representation accessible to semantic interpretation).

A major problem for this approach was the notion of c-referentiality or identity between the “head” and the relative NP. As noted by Stockwell, Schachter & Partee (1973, 428 ff.), when the “head” is generic or quantificational, the quantifier is not included in the relative NP inside the relative clause: in fact, (8) does not entail (9).

(8) All the boys who left early missed the fun.
(9) All the boys left early missed the fun.

The alternative was to take the “shared” constituent to be a proper subpart of the noun phrase “head”, not including the determiner (see §3).

The solution that eventually won out was the one proposed by Jackendoff (1977, 194–197): in the interpretation of restrictive relatives, the relative pronoun is replaced by a variable bound by the determiner of the “head”; in this case, the relative pronoun is neither indefinite nor definite, in fact it is not referential at all. In appositive relatives, instead, the relative pronoun is anaphoric to the whole relative “head”. Jackendoff proposed an interpretive theory whereby the relative pronoun is directly inserted in Deep Structure, rather than replacing a fully specified relative NP.

Even under the interpretive theory, some notion of identity between the “head” and the relative pronoun was required in the analysis of the following paradigm:

(10) a. the book which I read
b. the book that I read
c. the book I read
d. the book [I [COMP which that] I read t]]

As shown in (10d), the relative pronoun is fronted by the rule of wh-movement to the Comp position, which also contains the complementizer that (Chomsky 1977, 85–86). At this point, a deletion rule applies and deletes either the complementizer that (Chomsky 1977, 85–86). At this point, a deletion rule applies and deletes either the complementizer that (Chomsky 1977, 85–86). At this point, a deletion rule applies and deletes either the complementizer that (Chomsky 1977, 85–86). At this point, a deletion rule applies and deletes either the complementizer that (Chomsky 1977, 85–86). At this point, a deletion rule applies and deletes either the complementizer that (Chomsky 1977, 85–86). At this point, a deletion rule applies and deletes either the complementizer that (Chomsky 1977, 85–86). At this point, a deletion rule applies and deletes either the complementizer that (Chomsky 1977, 85–86). At this point, a deletion rule applies and deletes either the complementizer that (Chomsky 1977, 85–86). At this point, a deletion rule applies and deletes either the complementizer that (Chomsky 1977, 85–86). At this point, a deletion rule applies and deletes either the complementizer that (Chomsky 1977, 85–86). At this point, a deletion rule applies and deletes either the complementizer that (Chomsky 1977, 85–86). At this point, a deletion rule applies and deletes either the complementizer that (Chomsky 1977, 85–86).
Filled Comp Filter’ (Chomsky & Lasnik 1977; see also Kayne 1976 on French). Crucially, the deletion rule is subject to the Recoverability Condition, which states that deleted material must be recoverable from the structure. Chomsky & Lasnik (1977, 447) proposed that the relative pronoun of restrictives, as opposed to that of appositives, has no semantic content and therefore can be deleted without violating the Recoverability Condition. This idea was criticized by Maling (1978) and Cinque (1982), because many languages allow for the deletion of the relative pronoun in appositives as well. Kayne (1976, 272) and Cinque (1982) maintained that a relative pronoun can be deleted in that it is non-distinct from the relative ‘head’ (in the sense of Chomsky 1965, 177–184). Cinque also assumed that the relative pronoun must be c-commanded by the ‘head’: this second condition is not satisfied in those appositive relatives that have a parenthetical structure (see §3.1). Thus, recoverability amounted to non-distinctness plus c-command.

Some notion of identity was also required in the unbounded deletion analysis advocated by Grimshaw (1975), Bresnan (1976) and Maling (1976) as an alternative to Chomsky's (1977) successive cyclic wh-movement: the relativized NP is deleted in situ under identity to the ‘head’, across an unbounded distance. Evidence for this approach came from relativization facts of Old and Middle English, where relative pronouns obligatorily pied-piped a preposition to Comp (11a), whereas relative clauses introduced by the indeclinable complementizer allowed for preposition stranding (11b):

(11) a. rod on ðære ðæ Crist wolde ðrowian
cross on which that Christ would suffer

b. ðæs ælmihtigan Godes ðe hi
the-GEN almighty God-GEN that they

on gelyfdon
in believe

‘the cross on which Christ would suffer’

(11) a. rod on ðære ðæ Crist wolde ðrowian
(c) that (they) say that (they) are

not can-2SG imagine the-3 SGSG intelligent-PL
that pro dicen que pro son tł.

that (they) say that (they) are

‘You cannot imagine how intelligent they say

that (they) are’.

(Spanish; Rivero 1980, 437)

b. *Marie n’est pas la comédienne que

Marie is not the comedian-FSG that

son père était t.
her father was

(Spanish; Vergnaud 1974, 65)

c. *Marie n’est pas le comédien

Marie is not the comedian-MSG que

son père était t.
that her father was

(French; Vergnaud 1974, 65)

It is impossible here to discuss the details of this analysis (see Bianchi 1999, chapters II–III). The reasons why it was soon dismissed are not easy to assess, and are perhaps related to a ‘mainstream effect’: Chomsky’s (1977) theory of wh-movement, which unified various unbounded dependencies and locality constraints, was a higher-order theoretical achievement, and the evidence illustrated in (5), (6) and (12) fell out of focus.

A parallel and independent development was the approach to unbounded dependencies in the
framework of unification-based grammars (GPSG and later HPSG), based on the percolation of nonlocal features, and incorporating an idea of Gazdar (1981): the trace in the relativization site is endowed with a nonlocal SLASH feature, which is inherited by the containing phrases up to the point where it is bound off by an appropriate filler (either the relative pronoun itself, or a pied-piped phrase). Furthermore, the relative pronoun is endowed with a nonlocal REL feature, which percolates to the top of a pied-piped phrase and ultimately gets its value the index of the relative “head” modified by the relative clause (see Pollard & Sag 1994, ch. 5). An important modification, proposed in Pollard & Sag (1994, ch. 9) and Sag (1997), was the elimination of traces: the relativization site is the argument slot itself, which gets endowed with the SLASH feature by a lexical rule.

Within the Chomskyan tradition, the wh-movement analysis of the paradigm in (10) remained essentially unchallenged up to such works as Safir (1986), Fabb (1990), Rizzi (1990, chapter II), Demirdache (1991), Toribio (1992). The data coverage was considerably extended: cross-linguistic surveys were attempted in the early Seventies (Peranteu, Levi & Phares 1972; Andrews 1975, ch. 1), and subsequent research was extended to less familiar relativization strategies (see also §4).

A particularly important development was the analysis of resumptive relatives featuring a pronoun in the relativization site, as in the following Irish example (see Suñer 1998 for a recent cross-linguistic overview):

(13) am gírseach ar ghoid na siogaí’í
the girl aN stole the fairies her
‘the girl whom the fairies stole’ (McCloskey 1990, 240)

Resumptive relativization was assumed not to involve movement, because it does not respect island constraints (Chomsky 1977, Borer 1984, Safir 1986); it was analysed in terms of a representational chain connecting the resumptive pronoun to a null operator base-generated in Comp (except for Perlmutter 1972, who analysed resumptive pronouns as undeleted shadow pronouns). Chao & Sells (1983) and Sells (1984) drew an important distinction between resumptive pronouns proper, like the one in (13), and intrusive pronouns that appear only within syntactic islands as a last resort repair of an island violation (see Kroch 1981). Safir (1984) pointed out that resumptive relatives, contrary to wh-movement relatives, do not show Weak Crossover effects.

McCloskey (1990) provided empirical evidence in support of the non-movement derivation of resumptive relatives, based on Irish data. In Irish, relative clauses with a gap in the relativization site have a special complementizer (aL in the gloss of (14)) in all the Comp positions intervening between the relativization site and the highest Comp of the relative clause. This supports a successive cyclic movement derivation (contra McCloskey 1979; see also Watanabe 1997, Sasaki 2000 for recent discussion):

(14) an t-aimn a hínnsadh dúinn a bhí
the name aL was-told to-us aL was
on the place
‘the name that we were told was on the place’
(McCloskey 2001, 5)

On the other hand, resumptive relatives feature a distinct complementizer in the highest Comp of the relative clause (aN in the gloss of (13)) and typically show no signs of a successive cyclic derivation: they involve a representational A’ chain between the resumptive pronoun and a base-generated null operator (see however McCloskey 1990 and 2001 on the possibility of “mixed” chains).

Note that this view of resumption introduces a bifurcation in the realm of unbounded dependencies: these can be established either via movement or via representational binding. See Cinque 1990, Safir 1996 and McCloskey 2001, among others, for various developments of this hypothesis. On the relevance of resumptive relativization in the acquisition of relative clauses, see Labelle (1990), Guasti & Shlonsky (1995).

An alternative approach, consistent with a purely derivational view of unbounded dependencies, was proposed by Demirdache (1991): resumptive pronouns are in situ relative pronouns that move in covert syntax (LF) and cliticise to C*. The crucial piece of evidence is the observation that Hebrew resumptive pronouns can be overtly fronted to an IP-adjoined position (15a) and then cliticize to C*, in the absence of the lexical complementizer Se (15b).

(15) a. kol gever [IP Se [IP t ohevet ]] every man that him Rina loves
b. kol gever [IP t [IP rina ohevet ]] every man that Rina loves

From this perspective, the asymmetry between gap and resumptive relativization concerns the level of representation at which A’ movement applies, parallel to the asymmetry between moved vs. in situ interrogative phrases (Huang 1982; see also Cole & Hermon 1994 for relevant discussion). One prediction of Demirdache’s approach is that resumptive pronouns can never co-occur with wh-relative operators (but see Boeckx 2001, 65). A question that remains open is why in situ relative operators lack a morphological wh-feature and are akin to personal or demonstrative pronouns (see Suñer 1998, 355–60).

Shlonsky (1992) examined the distribution of resumptive relativization with respect to gap relativization in Hebrew and Palestinian Arabic. In Hebrew, resumptive pronouns are banned from the highest subject position of the relative clause (see also McCloskey 1990, Suñer 1998); they optionally alternate with a gap in direct object and embedded subject
positions, and are obligatory in possessive or prepositional complement position. The core of Shlonsky’s proposal is that resumptive pronouns always constitute a last resort that UG makes available whenever a movement derivation is impossible. This last resort option is required for relativization into a possessive or prepositional complement position, which disallow movement. The apparently optional alternation between a gap and a pronoun in the direct object position and in embedded subject positions is reduced to the availability of two types of complementizer: a “pure” complementizer, whose Spec qualifies as an operator (A’) position, and a complementizer endowed with agreement features (morphologically overt in Arabic), whose Spec qualifies as an A position. The “pure” complementizer generally allows for A’ movement to SpecCP. In the case of the agreement-bearing complementizer, A movement to SpecCP is possible only from the highest subject position, due to Relativized Minimality (Rizzi 1990); hence a last resort resumptive pronoun is always excluded. A movement from the lower direct object and embedded subject positions, however, is blocked by Relativized Minimality, and a resumptive pronoun must be inserted as a last resort. Shlonsky’s proposal is especially interesting in that it copes with a set of phenomena that fall under Keenan & Comrie’s (1977) NP Accessibility Hierarchy; on the other hand, note that his notion of last resort requires a theory of grammar with transderivational power (see Collins 1997 for relevant discussion).

An independent line of analysis relates the realization of resumptive pronouns to the discourse prominence or accessibility of the referent of the relative “head”; see especially Prince (1990) and Ariel (1999). Besides resumptive vs. gap relativization, the nature of the complementizer position also played a crucial role in the analysis of other aspects of “surface” variation, for instance, in Rizzi’s (1990, chapter II) analysis of that vs. zero relatives. Hoekstra (1992) proposed a split Complementizer system to account for the different distribution of wh- vs. demonstrative relative pronouns in Dutch; see also Alber (1994), Bianchi (1999), Rizzi (1997), Zwart (2000).

Chomsky’s (1993) minimalist paper constituted a turning point in the history of the connectivity problem. Connectivity effects like (5) and (6) were analyzed by Barss (1986) as a chain effect. Chomsky (1993) proposed an alternative derivational analysis based on the copy theory of traces. Under this hypothesis, movement leaves as traces literal copies of the moved element that fail to be phonologically spelled out, but remain available in the LF branch of the derivation (see also §2.2).

Chomsky’s approach to connectivity effects was taken by Kayne (1994, 86) to support a revised version of the raising analysis. The motivation for Kayne’s proposal was directly related to the modification problem in the framework of his antisymmetry theory (§3.1), but his proposal crucially relied on the hypothesis that the “head” originates directly in the relativization site and moves to SpecCP of the relative clause. Thus, the relativization chain is completely assimilated to a standard A′-movement chain, leaving identical copies of the relative “head” in the relativization site as well as in any intermediate chain link; this accounts for reconstruction effects like (5) and (6):

(16) the [CP [interest in each other] [that [John and Mary]t+k showed <[interest in each other]t+k]]

One problem for this approach is the status of the wh-relative pronoun. Kayne (1994, 87–92) assumed that in non-wh-relatives like (10b–c) the raised “head” originates as a determinerless NP (17a). In wh-relatives like (10a), instead, the “head” consists of the wh-morpheme in the D′ position taking the NP as its complement; the wh-phrase moves to SpecCP, and the NP subsequently moves to the Spec of the wh-phrase itself (17b):

(17) a. the [CP [NP book] [that [IP I read <[book]>]]]
   b. the [CP [DP NP book][which tNP] [CPt+C∞ I read <[which book]>]]

The difference between wh- and non-wh-relatives is not a matter of phonetic deletion but involves different constituent structures of the raised “head”. This aspect of Kayne’s proposal was criticized by Borsley (1997). Borsley argued convincingly that with respect to a number of tests the relative “head” in non-wh-relatives behaves as a DP rather than as a determinerless NP. Bianchi (1999) and de Vries (2002) independently proposed that the relative “head” is always generated as a DP with a relative morpheme in the D′ position; the two approaches differ as to the way in which the relative D′ is phonologically deleted in non-wh-relatives.

Another view of the problem was independently proposed by Åfarli (1994), who argued that wh-relatives, contrary to that-relatives, do not give rise to connectivity effects like (5) and (6). Åfarli hypothesized a raising derivation for that-relatives only, and retained the usual relative operator analysis for wh-relatives (see Bianchi 1999, 71–74 for discussion).

Another problem for the revised raising analysis, stressed by Borsley (1997, 2001), is the status of the raised “head” with respect to the Case and selectional requirements of the matrix clause (cf. the discussion around (4)). On Vergnaud’s original analysis, the “head” was promoted to a nominal position of the matrix clause; in the revised raising analysis, instead, the “head” is raised to a peripheral position but not actually promoted into the matrix clause. The matrix Case and selectional requirements on the raised “head” are mediated by the external determiner (the in (17)): this selects the relative CP (see §3.1), and also establishes an “almost selectional” relation with the “head” raised to SpecCP. This analysis assumes that the left periphery of the relative clause is transparent for agreement relations with the external structure.
(see Harbert 1982, Bianchi 1999, chapter 3 for some evidence based on Case attraction phenomena, and Borsley 2001 for a criticism).

A related problem is the trigger of raising, and more specifically, of the movement of NP to the left of the relative Determiner in (17b). Kayne (1994, 90), Bianchi (1999, 77–79) and de Vries (2002, 116–126) assumed that this step is triggered by the need for the NP to establish a checking/agreement relation with the external Determiner. For Zwart (2000), instead, the trigger is semantic: after raising of the relative DP to SpecCP, the NP strands the relative D* and moves to a higher CP layer where it receives a restriction interpretation (i.e. its denotation is intersected with that of the relative clause).

Borsley (1997, 2001) pointed out that the last two problems do not arise in the standard analysis (or, for that matter, in any analysis in which the relative “head” is generated outside the relative clause: cf. also Platzack 2000, Schmitt 2000, Citko 2001).

Yet another problem is the possibility of extending the raising analysis to appositive relatives. Kayne (1994) argued that appositives show reconstruction effects for anaphor binding, parallel to (5), and proposed a raising derivation (see §3.1 for details). Bianchi (1999, ch. 4 and forthcoming) called into question the reality of reconstruction effects in appositives (see also §2.2). Alternative non-raising derivations consistent with the Antisymmetry theory were explored by Bianchi (1999, ch. 5), Koster (2000), Platzack (2000) and de Vries (2002, chapter 6); see below §3.1.

Kayne’s revised raising analysis had a strong impact, as shown by the papers in Alexiadou, Law, Meinunger & Wilder (2000), as well as Alexiadou & Anagnostopoulou (2001), Bhatt (2000), Bianchi (1999), Borsley (1997, 2001), Hornstein (2000), Kalluli (2001), Safir (1999), among many others. One advantage of this analysis is that it can establish a relation between headed relatives and some head-internal relativization strategies like correlatives and internally headed relatives (cf. Bianchi 2000, Mahajan 2000, Kayne 1994, 95–97; see §4).

On the other hand, the raising analysis cannot easily account for resumptive pronouns that apparently fill the relativization site. Bockck (2001) proposed that the resumptive material is initially attached to the relative “head” and is stranded by the movement of the latter (see Aoun, Choueiri & Hornstein 2001 for a similar idea). Various alternative views of resumptive pronouns are explored in Bianchi (forthcoming), Brohier (1995), McCloskey (2001), Pesetsky (1998), Rouveret (2000), Safir (1996, 1999), Sharvit (1999), Suñer (1998), de Vries (2002, 165–169).

It is fair to say that the revival of the raising analysis had mainly theoretical motivations. The next step was Sauerland’s (1998, 60–88) detailed analysis of connectivity effects in restrictive relatives. Based on Munn (1994) and Safir (1999), Sauerland argued that these connectivity effects are not completely equivalent to those found in interrogative wh-chains: although the relative “head” shows reconstruction effects for anaphor binding, idiom interpretation and scope assignment, it does not show Principle C effects:

(19) the pictures of John, he, likes

Therefore, Sauerland argued that restrictive relatives allow for a matching structure in which the internal “head” is elided in PF under identity with the external “head”. However, this is not literal identity: in particular, the internal “head” of (19) may contain a pronoun coreferential to the R-expression John rather than the R-expression itself (cf. the vehicle change of Fiengo & May 1994 and Safir 1999). This is how the Principle C effect is avoided (see Munn 1994, 403 for an alternative):

(20) the picture of John, 3x he, likes [x, picture of him]

A raising structure – with an empty external “head” and a fully specified internal “head” in the relativization site at LF – only obtains in a subset of “special interpretation” relatives, where it is forced by some independent LF requirement: when the “head” contains a pronoun to be bound by a quantifier internal to the relative clause, as in (21), and when it has an amount, kind or possibility modal interpretation (Sauerland 1998, 68–69). In these structures, Principle C effects do emerge (cf. (24) below).

(21) a. the book on her, desk that every professor, liked best
   b. LF: the [e] [CP [e ix every professor, liked [x book on her, desk] best]

It is impossible here to fully report Sauerland’s discussion of reconstruction effects. See also Citko (2001), Cresti (2000) and Fox (2002) for a generalization of the matching analysis, Bhatt (2000) for a criticism.

This brief history of the problem is extremely sketchy and incomplete, but it served two purposes. The first one was to show how the focus of attention shifted to different sets of data along the way. In the course of this process, genuinely new data were discovered; however, it is my impression that at various turning points, the abandonment of one approach in favour of another one was motivated more by theory-internal concerns than by the pressure of irreducible new evidence. The second purpose was to highlight the almost cyclic development up to this date: it started out with a matching analysis and eventually came back to it.

2.2 Some empirical issues related to the connectivity problem

In this section I wish to point out some interesting empirical ramifications of the connectivity problem.

(a) Observation 1. In contemporary English, wh-relative pronouns are obligatory in appositive relatives, optional in restrictive relatives (subject to stylistic factors), marginal or impossible in maximalizing relatives (Carlson 1977, Heim 1987, Grosu & Landman 1998):
(22) a. This book, which/*that I read thoroughly, is by Ian McEwan.
b. The book which/that I read thoroughly is by Ian McEwan.
c. I took with me every book which there was on the table.

(b) Observation 2. In anti-pronominal contexts (Postal 1994), e.g., in the existential there construction, appositive relativization is excluded (23a) and amount relativization is possible (23b) (Carlson 1977, Heim 1987, Grosu & Landman 1998). According to Carlson (1977), restrictive relativization is excluded, cf. (23c) (whose determiner is incompatible with a maximalizing interpretation); however, restrictive relativization seems to be allowed in anti-pronominal contexts when the “head” has a kind interpretation, as in (23d-e) (cf. the “special interpretations” of Sauerland 1998, and Grosu 2002).

(23) a. *This book, which there was _ on the table,...
b. I took with me every book that there was _ on the table.
c. *Five/Most/several men there were _ here disagreed. (Carlson 1977, 525)
d. The beer that there was _ for sale was too expensive (Sauerland 1998, 69)
e. the kind of people that I expected there would be _ at the party

(c) Observation 3. Principle C effects under reconstruction are not found in appositive relatives like (24a) (Bianchi 1999, ch. IV and forthcoming; Safir 1999), nor in normal restrictive relatives like (24b), but they emerge in “special interpretation” restrictive relatives like (24c, d) and in amount relatives like (25e) (Bianchi forthcoming, Sauerland 1998):

(24) a. this picture of John, which I think he _ likes _
b. the picture of John, he _ likes _ (Sauerland 1998, 76)
c. *The headway on Mary’s project she _ had made _ pleased the boss.
(Sauerland 1998, 76)
d. *The letters by John _ to her, that he _ told every girl _ to burn _ were published.
(Sauerland 1998, 71)
e. *It would have taken us all year to read the letters for John _ he _ expected there would be _
(Sauerland 1998, 72)

(d) Observation 4 (Bianchi, forthcoming). In a sample of 11 languages, optional resumptive pronouns alternating with gaps are not found in maximalizing relatives; if a language allows them in restrictive relatives, it also allows them in appositives, but not vice-versa. When they appear in restrictive relatives, they force a specific interpretation of the “head” (cf. Doron 1982, Sells 1984). An example is the following paradigm from Hebrew:

(25) a. ha-bendod Sel-i _ Se rina _
the-cousin _ of-mine, that Rina


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Concerning restrictive relatives, the above data suggest that they tend to pattern with maximalizing relatives when the “head” has a “special” (non-specific?) interpretation, and with appositive relatives otherwise. However, the data are yet controversial and require further investigation.

All of these phenomena are sensitive to Grosu & Landman’s typology. As mentioned in §1, the restrictive/non-restrictive divide has often been discussed in connection with the modification problem, but not in connection with the nature of the relativization site.

In this respect, Postal’s (1994) work on extraction dependencies was innovative. Postal argued that certain dependencies (including appositive relativization) are banned from anti-pronominal contexts because they necessarily involve a silent definite pronoun in the gap position (cf. Perlmutter’s shadow pronouns). Other dependencies, including restrictive relativization, have a silent resumptive pronoun only optionally; in particular, the silent pronoun is required when the extraction crosses a weak island. This explains why a dependency crossing a weak island cannot terminate in an anti-pronominal context:

(27) *the kind of people that I wondered whether there would be _ at the party
Finally, a subset of dependencies (including comparatives and free relatives) do not allow for a silent definite pronoun; perhaps this class also includes amount relatives (which Postal 1994 does not explicitly distinguish from restrictives; see Bianchi, forthcoming for discussion).

Heim (1987) proposed a different perspective on the data in (23). On her account, restrictive relativization is excluded from the existential there context porque the relativization site must contain an individual variable, which is inherently strong and violates the Definiteness Constraint. Amount relativization instead involves partial reconstruction of the “head” and a degree variable in the relativization site, which does not violate the Definiteness Constraint. Frampston (1991) argued that an A′ chain crossing a weak island necessarily involves an individual variable: this is why (27) violates the Definiteness Constraint. This line of analysis has been developed by Rizzi (2001), Bianchi (forthcoming), Sauerland (1998): in amount (and “special”/non-specific) A′ chains, the NP part of the “head” is only represented in the relativization site; in other restrictive relatives, all the copies of the NP are available in the LF representation. The lowest degree of “structure sharing” between the surface “head” and the relativization site amounts to sharing a referential index only (Bianchi forthcoming): this is equivalent to (non-accidental) coreference, and it seems an appropriate solution for appositive relatives (cf. Jackendoff 1977, Grosu 2002).

This line of analysis can establish a relation between the data in (23) and the reconstruction effects in (21) and (24). An alternative semantic reconstruction mechanism was proposed by Sharvit (1997, 1999), based on Chierchia’s (1993) functional dependencies (see also Alexopoulou & Heycock, forthcoming).

Another facet of the connectivity problem is the phenomenon of pied-piping:

(28) the person [whose mother’s dog] we were all fond of

The pied-piped noun phrase has a contradictory status. On the one hand, it must stand for a wh-phrase: otherwise, it would not be allowed to appear in a left-peripheral position. On the other hand, at the interface with the semantic system it should not be represented in the left-peripheral position: the latter should contain only the relative pronoun, acting as a sort of lambda-abstractor.

In order to solve this paradox, Safir (1986) distinguished the A′ binding relation holding between the moved phrase and the gap from the R-binding relation between the “head” and the relative pronoun. Fabb (1990) proposed an analysis of pied-piping based on a complex coindexing mechanisms, which was criticized by Borsley (1992). In the copy theory of traces, the obvious solution is to delete the higher occurrence(s) of the pied-piped phrase at LF and fully reconstruct it in the base position (cf. Chomsky 1993). In HPSG, pied-piping is analysed in terms of an unbounded (REL) dependency distinct from the extraction (SLASH) dependency. See also Sharvit (1998) for a solution in terms of semantic reconstruction.

In my opinion, none of these proposals addresses the more basic question of why pied-piping exists in the first place (see Chomsky 1995, 265). Furthermore, it is not clear why pied-piping is more liberal in relative clauses than in interrogatives, and even among relatives, it is more liberal in appositives than in restrictives (see Cinque 1978, 1982; Fabb 1990; Ishihara 1984; Ross 1967, 197 ff.; Stockwell Schachter & Partee 1973, 456–465).

2.3 Concluding remarks

The core of the connectivity problem is how the relative “head” is related to the relativization site. We have briefly reviewed a number of solutions, based on a variety of formal mechanisms: matching plus deletion; coindexing between the “head” and a relative operator; movement leaving copy-traces; nonlocal features percolation; gap vs. silent resumptive pronoun. I believe that independent of the specific implementation, recent research is converging on the idea that the amount of reconstruction effects that are found in a relative clause depends on its semantic interpretation; thus, the connection between the relative “head” and the relativization site is different in appositive vs. restrictive vs. maximalizing (and “special interpretation”) relatives. How the difference can be best expressed is still an open question for further research.
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); Afarli (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 liner 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. [NP [N [S' man] who came to dinner]]
   b. [NP [N [artP the ] [S' man] 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...
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-adjointed 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,

\[
\text{Art}'' \rightarrow \text{N''} \rightarrow \text{S'(appositive)}
\]

\[
\text{N''} \rightarrow \text{S'(restrictive)}
\]

\[
\text{Art}'' \rightarrow \text{N''} \rightarrow \text{S'(appositive)}
\]

\[
\text{N''} \rightarrow \text{S'(restrictive)}
\]

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:

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

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) \[
\text{Art}''' \rightarrow \text{N''} \rightarrow \text{S'(appositive)}
\]

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 parenthetical 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 root node. 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, who drives a Cadillac, is insane.

(37) * Everyone, bought a suit, which suited him.

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-adjointed to the NP-projection, and hence it is c-commanded by the D\(^o\) head, whereas an appositive relative is adjoined to the whole DP, so that it is higher than D\(^o\). 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. \[_{\text{DP}} D^o \ [\text{NP} \ [\text{CP}]]\] (restrictive)

b. \[_{\text{DP}} D^o \ [\text{NP}] \ [\text{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\(^o\) head can select for non-nominal maximal projections (for instance, in his analysis of the English Poss-ing structure). Kayne argued that the D\(^o\) 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. \[_{\text{DP}} \ [\text{CP} \ [\text{that} \ [\text{IP} \ Bill \ bought \ [\text{book}]]]]\] =>

b. \[_{\text{DP}} \ [\text{CP} \ [\text{book}] \ [\text{that} \ [\text{IP} \ Bill \ bought \ t]]]\]

In support of the selection hypothesis, Kayne reproduced 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\(^\circ\)) and complementizer (C\(^\circ\)) heads (42a). Prenominal adjectives are derived by raising to SpecCP the adjectival phrase rather than the nominal ‘‘head’’ (42b):

(42) a. \[_{\text{DP}} \ [\text{CP} \ [\text{book}] \ [\text{I}^\circ \ [\text{IP} \ t]] \ [\text{I}^\circ \ [\text{IP} \ on \ the \ shelf]]]]\]

b. \[_{\text{DP}} \ [\text{CP} \ [\text{yellow}] \ [\text{I}^\circ \ [\text{I}^\circ \ t]] \ [\text{I}^\circ \ t]]\]

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\(^\circ\) head, Kayne argued that in certain structures it is spelled out as the preposition diždelo. 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\(^o\) 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® 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®; this position he identified with Spec,DP:

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® "head" (without raising); an appositive relative instead involves an empty N® 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® [NP N® [CP Op ... ]] ] (restrictive)
(46) [DP D® [NP DP [N® [CP Op ... ]] ] ] (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® takes as a complement the conjunction of the NP “head” and the relative CP (both of type <e,t>); Koster (2000) argued that the relative clause is connected to the "head" by a Boolean operator of asyntetic specification performing set intersection (in the restrictive interpretation) or set union (in the appositive interpretation):

(47) [NP [NP a woman] : [CP who 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 external pronominal head (DP2 in (48)), and is connected to the relative "head" (DP1) 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 DP2 and the referent of DP1:

(48) [&.P [DP1 Annie], [&: [DP2 Ø k [CP whok is our manager]]]]

This proposal accounts for the backgrounded status of the specifying appositive, for the referential independence of the ‘‘head’’ DP1, 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 DP1. Finally, islandhood for binding is shared by other specifying appositions, 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 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 was asleep]] was he, willing to discuss it?
   b. [Which claim [that John made ]] was he, willing to discuss it?

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 counter cyclic 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]?!

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], entered [the room], last night [that I had just finished painting], [who had blond hair].

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, [VP [IP I]] [saw a painting] yesterday] [a painting] (QR)
   b. [We, [VP [IP I]] [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, [an argument] yesterday [that supports John’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, countercyclical 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 extrapoosed 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, all the details at once
     [that he might be interested in]. (Haider, 1993)

Kayne proposed a standing 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 Borsley (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 \([\text{AgrOP}\ \text{een vrouw}]\) gezien
     I have a woman seen
     \([:\text{CP}\ \text{die alles wist}]\)
     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 \([\text{AgrOP Jan gezien}]\ [\text{en} [\text{NP Marie}]]\)
     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 specification 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 [\text{NP a painting}] yesterday, (that is,)
     \text{a painting} \text{ADJ 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 [\text{VP likes} [\text{QP every boy} [\text{CP that Mary does [\text{VP e}]}}]]
    b. \text{every boy} \text{CP that Mary does} \text{VP e}, John
    \text{VP likes t}.
that Mary.

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 and the woman who

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] came in and [a woman] went out

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) [CP [jo larki], khari hai] [vo, 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 maximizing 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 maximizing 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...

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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A Selected Bibliography on Headed Relative Clauses


CHOMSKY, N. (2001b) Beyond explanatory adequacy. Manuscript, MIT.


Relative clauses. Syntax involves arranging words to create logical phrases, clauses, and sentences. This is a big topic, so we'll be covering a lot, including: dependent and independent clauses; simple, complex, compound, and compound-complex sentences; and phrases and clauses.

2002. Headed relative clauses in generative syntax, Part I. Glot International 6.7: 197–204. E-mail Citation ». Concise but in-depth discussion of theoretical issues in the syntax of relative clauses. Contains a headed relatives bibliography. Part 2 in Glot International 6.8: 235–247. de Vries, Mark. 2002. The syntax of relativization. PhD diss., University of Amsterdam. E-mail Citation ». A rich source of data containing a systematically organized overview of relative clauses in the Germanic and Romance (standard) languages. The first half of the book contains an elaborate discussion of theoretical issues. (Published PhD dissertation, Catholic University of Brabant.)