

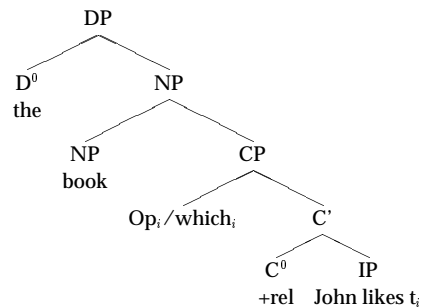
Three Theories of Relative Clauses

1 The Competing Proposals

1.1 The Head External Analysis

- ubiquitous but of unclear origins.
- implicit in Quine (1960), assumed in Montague (1974), Partee (1975), Chomsky (1977), Jackendoff (1977) as well as textbooks like Haegeman (1994) and Heim and Kratzer (1998).
- the *head* NP originates outside the relative clause CP.
- The relative clause CP involves *A'*-movement of a relative operator, which may be overt or covert.

(1) the book [_{CP} Op_i/which_i John likes t_i]



- I am assuming that the relative clause CP is adjoined to the *head* NP and the two combine semantically via intersective modification. This is a common assumption for restrictive relative clauses (but see Bach and Cooper (1978)).
- The site of attachment is independent of the choice of the head external analysis - the analysis is equally compatible with a higher adjunction site for appositive relative clauses (cf. Demirdache (1991)).

- Often the relationship between the head NP and the relative pronoun is indicated by co-indexing them. Unclear why this is needed (at least for restrictive modification) once we have a way to interpret structures like the above.

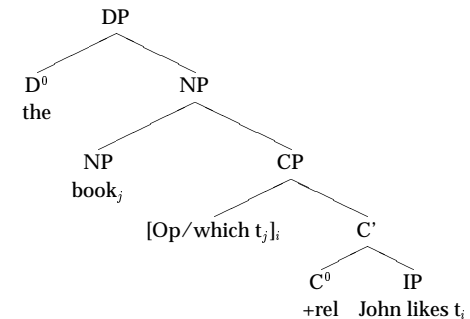
- Since the head NP is never inside the relative clause CP, it cannot be reconstructed into a relative clause-internal position.

1.2 The Head Raising Analysis

- originally proposed by Brame (1968), Schachter (1973), and Vergnaud (1974).
- Recent versions include Áfarli (1994), Kayne (1994), and Bianchi (1999) among others.

The central idea: the *head* NP originates inside the Relative Clause CP.

(2) the [book]_j [_{CP} [Op/which t_j]_i John likes t_i]



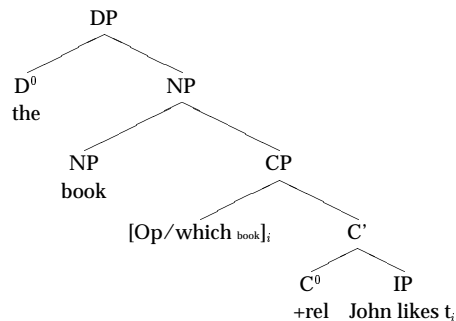
- The final structural position of the head NP varies in different instantiations of the head raising analysis.

- since the *head* NP originates inside the relative clause CP, it is possible to reconstruct it inside the relative clause and interpret it in a relative clause-internal position.

1.3 The Matching Analysis

- originally proposed in Lees (1960), Lees (1961), and Chomsky (1965).
- clarified and extended by Uli Sauerland (cf. Sauerland (1998), Sauerland (2003), among other). His version is sketched below.
- corresponding to the external head there is a corresponding internal head which is phonologically deleted under identity with the external head.
- But the internal head and the external head are not part of a movement chain.

(3) the [book] _{[CP [Op/which_{book}]_i John likes t_i]}



- The matching analysis can be seen as halfway between the head external analysis and the head raising analysis.
 - resembles the head external analysis in that the external head does not originate within the relative clause CP.
 - resembles the matching analysis by having a relative clause internal representation of the external head. Since the external head and its relative clause-internal representation are not related by movement, both must be interpreted.
- The above instantiation assumes that the relative clause-internal representation of the external head is deleted under identity in the [Spec,CP] of the relative clause. An alternative was pursued under the *unbounded deletion* analysis of Grimshaw (1975) and Bresnan (1976) which allows for *in-situ* deletion of the head NP.

2 Some Arguments for the Head Raising Analysis

The following arguments tell us that information about the external head is available inside the relative clause CP.

Since both the head raising analysis and the matching analysis make information about the external head available inside the relative clause CP, these arguments will not in general differentiate between the head raising and the matching analyses.

A question that is relevant here is: does the external head **have to** have a relative clause internal representation, or is it enough to say that it is **possible** for the external head to have a relative clause internal representation? The larger question is whether the grammar permits more than one analysis for relative clauses e.g. head external as well as raising, or raising as well as matching.

2.1 A Primitive Argument

Headed relative clauses do not allow internal heads.

- (4) a. *The book [[which book] [Matt wrote t]]
 b. *The artist [[[which artist]'s writings] [Paula admires t]]

Unadorned, the head external analysis predicts that (4) should be grammatical.

The closest that I have seen to an explanation is a proposal that having an internal head be overt might cause a binding theoretic violation. But both heads are NPs and it is not clear that they themselves participate in binding theory.

There also seems nothing wrong with such cases semantically except perhaps redundancy, which shouldn't lead to sharp ungrammaticality - it doesn't in cor-relatives. Removing this redundancy does not improve matters.

- (5) *The [rolling pin] [[which metal object] [Robert uses t]] was made by Alessi.

The absence of an internal head follows directly in a head raising/matching analysis.

2.2 Idioms

The logic behind the argument from 'idioms' for a raising analysis goes as follows:

- (i) idiom appears only as part of a larger expression (cf. 6-9a vs. b).
- (ii) But the idiom is able to felicitously appear as the *head* NP of a relative clause where the position it is associated with inside the relative clause (its trace) is part of the larger expression it needs to appear with (cf. 6-9c).
- (6) (attributed to Brame 1968 ms., ex. 35 from Schachter 1973)
- We made headway.
 - * (The) headway was satisfactory.
 - The headway that we made was satisfactory.
- (7) (ex. 36 from Schachter 1973)
- She's keeping careful track of her expenses.
 - * (The) careful track pleases me.
 - The careful track that she's keeping of her expenses pleases me.
- (8) (ex. 37 from Schachter 1973)
- Lip service was paid to civil liberties at the trial.
 - * I was offended at (the) lip service.
 - I was offended by the lip service that was paid to civil liberties at the trial.
- (9) (attributed to George Bedell, fn. 15 from Schachter 1973)
- He solved the problem in a clever way.
 - The clever way in which he solved the problem impressed me.
 - *The clever way impressed me.

Under a head external analysis, given the unacceptability of the examples in (6-9b), the acceptability of the examples in (6-9c) is unexpected and vice versa.

The raising analysis is able to explain these facts parsimoniously. Idioms need to appear in a particular environments as shown by the examples in (6-9a) and the unacceptability of the examples in (6-9b). The examples in (6-9c) are acceptable because the idiom appears in the relevant environment at some point in the derivation (minimally point of Merge, maybe also at LF).

2.2.1 Lexical Assumptions

The argument from idioms is based on an assumption about how idioms are interpreted/stored in the lexicon, namely that the domain of special meaning is local.

In other words, two elements which can be arbitrarily far apart from each other in a structure at the point of Merge cannot be given a special meaning.

The alternative requires stipulating that the special meaning of the idiom is available if

- (i) its parts are merged in a certain local configuration 'ID', or
- (ii) a part of the idiom is the External Head of a relative clause and the *A'*-moved phrase involved in the formation of this relative clause and the remaining parts of the idiom were merged in the local configuration 'ID'.

Allowing for statements like (ii) would require enriching the representational power of the lexicon considerably.

2.2.2 Some Problem Cases

Given the above discussion, one might expect that relative clauses may only have idiom heads if the heads are licensed relative clause internally.

But this is not the case.

- (10) idiom head licensed externally:
- He solved the problem in a clever way that impressed me.
 - We made headway that was sufficient.
 - John pulled the strings that got Bill his job. (from McCawley (1981))
- These cases are problematic if the raising analysis is the only analysis available for relative clauses. They are, however, less problematic under the Head External analysis. Under the Head External analysis, the special meaning of the idiom will be licensed at the point of Merge e.g. by being merged as the object of *make* in (10b).
 - Certain questions still remain open. Consider (10b) where *headway* needs to be given a semantic denotation that can be modified by *that was sufficient*. Providing such a denotation seems non-trivial but the task of providing such a denotation is independent of the current discussion. This can be seen by the fact that exactly the same issues arise in *We have made sufficient headway*.

- Once appropriate assumptions about the denotation of the idiom head have been made, the matching analysis becomes an option for (10). Following Sauerland (1998)/Sauerland (2003), the identity between the external head and its relative-clause internal representation is established at LF and it is plausible that the identity is established not with the literal form of the idiom, but with whatever its semantic representation is.

2.2.3 Overall Thrust

- idiom licensed relative clause internally:

- √ head raising, *matching/head external

- idiom licensed relative clause externally:

- √ matching/head external, *head raising

Note though that argument from idioms does not rule out any of the analyses across the board. All it says that particular analyses cannot be at play in particular examples.

2.3 Subcategorization

Larson (1985): headed relative clauses containing a trace in adjunct position, but neither a relative adverb or a stranded preposition, are grammatical only if the head of the relative clause is a *bare-NP adverb*.

- (11) (from Larson 1985) (Roumyana Izvorski p.c.)
- a. the way [Op_i that you talk t_i]
 - b. *the manner/fashion [Op_i that you talk t_i]
 - c. You talk that way.
 - d. *You talk that manner/fashion.

The well-formedness of the operator-variable chain in (11a) depends upon what the *head* NP is. Information about the *head* NP is required internal to the relative clause.

Under a head raising or a matching analysis, the ill-formedness of (11b) directly follows from the ungrammaticality of (11d).

This explanation is not directly available under the head external analysis and Larson, who is assuming the head external analysis, has to introduce a feature-transmission mechanism which makes the relevant information about the *head* NP available internal to the relative clause.

Like the argument from idioms, does not rule out the external head analysis in general.

2.4 Binding Theory Evidence

The following data is taken to show that for the purposes of binding theory the head of the relative clause behaves as if it was in its (lowest) trace position inside the relative clause.

- (12) (exs. 42a, 43a from Schachter 1973)
- a. The portrait of himself_i that John_i painted is extremely flattering.
 - b. The interest in each other_i that John and Mary_i showed was fleeting.
- (13) *The opinion of him_i that John_i has is favorable.
(compare with: *The opinion of himself_i that John_i has is favorable.*)
- (14) (exs. 41b, 42b from Schachter 1973)
- a. *The opinion of John_i that he_i thinks Mary has is unfavorable.
 - b. *The portrait of John_i that he_i painted is extremely unflattering.

The head external analysis makes the wrong prediction with respect to (12-14). It predicts that (12) should be ungrammatical and (13) and (14) should be grammatical.

The actually observed pattern of (un)grammaticality can be explained under the raising analysis if the external head is interpreted at LF in its trace position.

2.4.1 The Idiom Connection

All the binding theory examples below are cases where like in the 'idiom' cases (*paint a portrait of*, *show an interest in*, *have a (Adj) opinion of*) it is plausible that at LF the *head* NP has to form a unit at LF with relative-clause internal material.

This might explain why we get reconstruction of the *head* NP into the relative clause for binding purposes. The argument from binding theory can thus be seen as a special case of the argument from idioms – one that shows that when the head raising analysis is forced, we also get binding theory reconstruction effects.

2.4.2 Picture NPs confound

Reinhart and Reuland (1991)/Reinhart and Reuland (1993) (also Heycock (1999):555-556) have argued that anaphors in *picture* NP's are systematically exempt from Condition A of the binding theory. If we accept their argument, (12) can no longer be used to motivate reconstruction.

Further, there are instances where anaphors in *picture* NP's can take as their antecedent NP's that are clearly non-local.

- (15) The rock star_i said that his wife would not identify [which pictures of himself_i] she had defiantly sent to the tabloids. (ex. 17 from Safir (1999))

2.4.3 Implicit Arguments confound

Similarly, the argument for reconstruction based on the existence of Cond. B and Cond. C in (13) and (14) respectively can also be defused. It can be argued that these external heads involve an implicit PRO, which is controlled by the subject of the relative clause (cf. 16).

- (16) a. *The PRO_i opinion of him_i that John_i has is favorable.
b. *The PRO_i portrait of John_i that he_i painted is extremely unflattering.

This is sufficient to trigger a Cond. B effect in (13) and a Cond. C effect in (14b).

Note that according to the implicit argument line (14a) should not be a Cond. C violation. This is so because the implicit PRO subject of *opinion* will be controlled by *Mary* and not by *he*. Munn (1994) and Safir (1999) do not find (14a) ungrammatical.

→ reconstruction not required to explain Cond. B/C effects.

2.4.4 Some more binding data and an overview

Reconstruction for Condition C is in general not forced.

- (17) a. In [[pictures of Al_i] which he_i lent to us], he is shaking hands with the president. (from Munn 1994 via Safir 1999)
b. the [[pictures of John_i]_j] [he_i likes t_j] (from Sauerland (1998))

The cases where we do find Condition C effects are cases where the head raising analysis is forced for independent reasons - say idioms.

- (18) *The [[headway on Mary's_i project] [she_i had made t_j]] pleased her boss. (from Sauerland (1998))

2.5 Variable Binding Effects

2.5.1 A First Pass

Quantifiers inside a relative clause are able to bind a pronoun embedded in the external head of the relative clause.

Moreover a relative clause internal is able to bind a pronoun embedded in the external head only if it would have been able to bind the relevant pronoun, were the external head replaced in the relative clause internal gap.

- (19) (a-c.i are 70a-c from Safir 1999)
a. i. [[The picture of his_i mother] that every soldier_i kept ___ wrapped in a sock] was not much use to him.
ii. Every soldier_i kept [a picture of his_i mother] wrapped in a sock.
b. i. John generally has [[an opinion of his_i book] that every novelist_i respects ___].
ii. Every novelist_i respects [John's/an opinion of his_i book].
c. i. ??John generally has [[an opinion of his_i book] that ___ is useful to every author].
ii. ??[John's opinion of his_i book] is useful to every author_i.
(also noticed for Norwegian by Áfarli (1994) and Italian by Bianchi (1999))

The above paradigm receives a straightforward explanation if we assume that the external head of the relative clause can be interpreted in the position of the relative clause internal gap.

Such an explanation is unavailable under the head external analysis and the matching analysis (what would we do with the pronoun in the external head).

These facts from variable binding thus support the head raising analysis. Like many of the other tests, they do not rule out the head external analysis or the matching analysis elsewhere.

2.5.2 Sharvit (1999)'s cases

Sharvit (1999) analyzes cases where a quantifier inside a relative clause is able to bind not just a variable inside the head NP of its relative clause but further away:

- (20) a. [[The picture of his_i mother] that every soldier_i kept ___ wrapped in a sock] was not much use to him_i.
 b. The [[picture of himself_i] [everybody_i likes t_j]] is gracing his_i homepage.

It is clear that reconstructing the head NP to a position inside the relative clause will not explain how the relative clause internal QP can bind a variable in the QP.

One alternative would be to allow for QR out of the relative clause to a position from where binding was possible as is sometimes assumed for inverse linking.

Sharvit (1999) objects to such a solution on the grounds that it violates island conditions on movement. Instead she proposes a rule that combines semantic reconstruction and the formation of a complex quantifier to get the right scope and binding.

→ Irrespective of the mechanism we choose to handle (20), the mechanism will make it unnecessary to reconstruct the head NP into the relative clause just to get variable binding right.

2.5.3 A Stronger Argument

Support for the proposal that the external head reconstructs - support that is not compromised by Sharvit (1999)'s observations - is provided by Safir (1999)'s observation that the external head of a relative clause displays a pattern of variable binding that mirrors the one found with non-wh quantifiers in the operator phrases of relative clauses.

For non-wh quantifiers in the operator phrases of relative clauses, Safir finds the following pattern:

- (21) a. QP is a complement/possessor (ex. 39a-c from Safir 1999)
 i. *_{CP} [...QP_i]_j [Pron_i...t_j...]
 ?I respect [any writer] [whose depiction of everyone]_i he_j will object to t_j.
 (assuming reconstruction, this is a secondary SCO violation)
 ii. _{CP} [...QP_i]_j [t_j...Pron_i...]
 ?I respect [any writer] [whose depiction of everyone]_i t_j will offend him_i.
 iii. *_{CP} [...QP_i]_j [[..Pron_i...]_j...]
 ?*I respect [any writer] [whose depiction of everyone]_i his_i mother surely wouldn't recognize t_j.
 (assuming reconstruction, this is a secondary WCO violation)
 iv. _{CP} [...QP_i]_j [t_j..._j...]
 ?I respect [any writer] [whose depiction of everyone]_i t_j will offend his_i mother.

Since the QP is a complement/possessor, hence it must be introduced by cyclic merger (i.e. merge before move) (cf. Lebeaux 1990, Chomsky 1993). Hence reconstruction effects surface.

- b. QP is an adjunct (ex. 40a-c from Safir 1999)
 i. _{CP} [...QP_i]_j [Pron_i...t_j...]
 ?Can you think of [a single politician] [whose picture in any civil servant's_i office]_j he_j is truly proud of t_j?
 ii. _{CP} [...QP_i]_j [t_j...Pron_i...]
 ?There is [at least one politician] [whose picture in any civil servant's_i office]_j t_j shows he_j is a Republican.
 iii. _{CP} [...QP_i]_j [[..Pron_i...]_j...]
 ?I can think of [several politicians] [whose picture in any civil servant's_i office]_j his_i job depends upon t_j.
 iv. _{CP} [...QP_i]_j [t_j..._j...]
 ?There is [at least one politician] [whose picture in any civil servant's_i office]_j t_j shows that his_i boss is a Republican.

Since the QP is an adjunct, it can be introduced by countercyclic merger (i.e. merge after move) (cf. Lebeaux 1990, Chomsky 1993). Hence reconstruction effects do not surface.

The same pattern emerges with the external heads of relative clauses.

(22) ___ indicates the relative clause internal gap (= ex. 66 from Safir 1999)

a. QP is a complement

- i. * [_{EH}...QP_i] [_{CP} [Pron_i...___]]
*[Pictures of anyone_i] [which he_i displays ___ prominently] are likely to be attractive ones.
- ii. [_{EH}...QP_i] [_{CP} [___...Pron_i...]]
[Pictures of anyone_i] [which ___ put him_i in a good light] are likely to be attractive ones.
- iii. *? [_{EH}...QP_i] [_{CP} [[..Pron_i..]...___]]
?[Pictures of anyone_i] [that his_i agent likes ___] are likely to be attractive.
- iv. [_{EH}...QP_i] [_{CP} [___...[..Pron_i..]...]]
[Pictures of anyone_i] [that ___ please his_i agent] are likely to be attractive.

b. QP is a possessor (= ex. 68 from Safir 1999)

- i. * [_{EH}...QP_i] [_{CP} [Pron_i...___]]
*[Anyone_i's pictures] [which he_i displays ___ prominently] are likely to be attractive ones.
- ii. [_{EH}...QP_i] [_{CP} [___...Pron_i...]]
[Anyone_i's pictures] [which ___ put him_i in a good light] are likely to be attractive ones.
- iii. *? [_{EH}...QP_i] [_{CP} [[..Pron_i..]...___]]
?[Anyone_i's pictures] [that his_i agent likes ___] are likely to be attractive.
- iv. [_{EH}...QP_i] [_{CP} [___...[..Pron_i..]...]]
[Anyone_i's pictures] [that ___ please his_i agent] are likely to be attractive.

c. QP is in an adjunct (= ex. 67 from Safir 1999)

- i. [_{EH}...QP_i] [_{CP} [Pron_i...___]]
[Pictures on anyone_i's shelf] [which he_i displays ___ prominently] are likely to be attractive ones.
- ii. [_{EH}...QP_i] [_{CP} [___...Pron_i...]]
[Pictures on anyone_i's shelf] [which ___ put him_i in a good light] are likely to be attractive ones.
- iii. [_{EH}...QP_i] [_{CP} [[..Pron_i..]...___]]
[Pictures on anyone_i's shelf] [that his_i agent likes ___] are likely to be attractive.

- iv. [_{EH}...QP_i] [_{CP} [___...[..Pron_i..]...]]
[Pictures on anyone_i's shelf] [that ___ please his_i agent] are likely to be attractive.

This complicated set of facts receives a straightforward explanation if we assume that the external head is reconstructed into the relative clause internal gap position.

Semantic accounts of reconstruction (e.g. Sharvit 1999) do not extend to the paradigm in (22) where the displaced constituent contains a quantifier.

Further, if the semantic account could somehow be extended to handle cases like (22a, b) on a parallel with cases where the displaced constituent contains a pronoun, it would still not explain why the pattern of ungrammaticality found with complements and possessors (22a, b) is not found with adjuncts (22c). In the absence of reconstruction, the relative clause internal environment is identical in (22a-c). An approach that does not relate the external head (or a relative clause-internal counterpart) via movement to the relative clause internal gap is unable to use Lebeaux's proposal to distinguish between complements and adjuncts.

- The argument based on Safir's examples is compatible with the head raising analysis and the matching analysis. Unlike most of the preceding arguments, it is incompatible with the availability of the head external analysis. If the head external analysis were a possibility, we would not find the correlations that we do in (22).

2.6 Amount Relatives and Scope Reconstruction

The existence of amount readings provides another reason for assuming a relative clause-internal representation of the external head.

In (23), for independent reasons, we do not wish to entertain a variable following *there be* (cf. Carlson (1977), Heim (1987), Grosu and Landman (1998)).

- (23) (from Heim 1987:33, also see Carlson 1977)
The very few books that there were on his shelves were all mysteries.
LF: The very few λd that there were d -many-books on his shelves were all mysteries.

Under the head raising analysis, it is postulated that the external head of the relative clause is reconstructed in its trace position and the abstraction is over a

degree variable.

Reconstruction in amount readings can take the *head* NP below another scope bearing element thus producing scope reconstruction effects.

- (24) (exs. from Sauerland 1998:54a, b)
- No linguist would read the many books Gina will need for vet school.
possible reading: need > many
 - Mary shouldn't even have the few drinks that she can take.
possible reading: can > few
- (25) a. I am worried about the twenty five people likely to come for dinner tomorrow.
possible reading: likely > 25 people (Heim p.c.)
- I telephoned the [two patients] [that every doctor will examine]. ($\forall > 2$)
(vs. I telephoned two [patients] [that every doctor will examine], ($*\forall > 2$)) (from Bianchi (1999))

A head external analysis is unable to derive the relevant readings of (24) and (25). A head raising analysis (and presumably the matching analysis) has more success since it provides us with a way of putting the external head under the scope of a relative clause-internal operator.

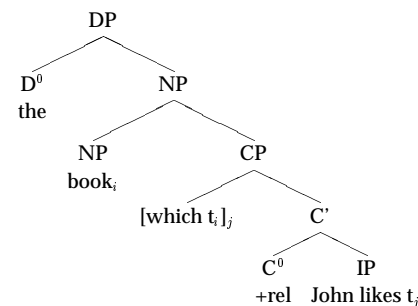
An analysis that employs semantic reconstruction could also work but I do not know any worked out proposal that takes this line.

- We see therefore that the derivation of amount readings requires a head raising, or a matching, analysis. The existence of amount readings does not, however, provide evidence against the existence of the head external analysis elsewhere.

3 The Structure Proposed for the Raising Analysis

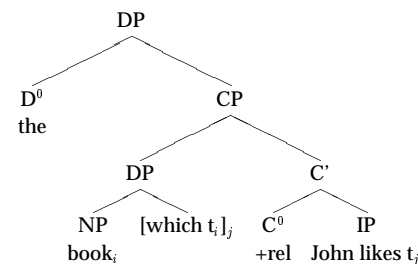
3.1 The Structure: First Version

(26) the book which John likes



This proposal is similar to the structure proposed in Kayne (1994). The innovation is that in (26), the NP *book* ends up outside the CP. In this structure, *which John likes* forms a constituent that excludes *book*. This is in contrast to Kayne's proposal (cf. 27).

(27) the book which John likes



There seems to be evidence that *which John likes* does form a constituent. For one, it can be co-ordinated.

- (28) the picture [which Bill liked] and [which Mary hated]
(ex. 49 from Borsley (1997), also see Bianchi (2000):132)
- (29) the [picture of his,]ⱼ [[[which tⱼ] every freshmanᵢ likes] and [[which tⱼ] every sophomore, dislikes]] (ex. 25 from Bhatt (1999):18)

3.2 Some Problems

The head raising analysis as sketched faces two primary problems. Both problems are related to the step where the *head* NP moves out of the relative clause CP and adjoins to it.

• **Unbounded Possessor Extraction:** the movement in question is an unorthodox one which involves extractions of unboundedly deeply embedded possessors.

- (30) Assumption: *which* with a covert [+human] complement is pronounced *who* (cf. Kayne 1994, fn. 12, pg. 154)
- a. the $[[_{NP} \text{student}]_i [_{CP} [\text{which } t_i]_j C^0 [\text{Jonah likes } t_j]]]$
Pronounced: 'the student who Jonah likes'
 - b. the $[[_{NP} \text{student}]_i [_{CP} [[\text{which } t_i]'s \text{ brother}]_j C^0 [\text{Jonah likes } t_j]]]$
Pronounced: 'the student whose brother Jonah likes'
 - c. the $[[_{NP} \text{student}]_i [_{CP} [[[\text{which } t_i]'s \text{ brother}]'s \text{ friend}]_j C^0 [\text{Jonah likes } t_j]]]$
Pronounced: 'the student whose brother's friend Jonah likes'

• **Projecting Movement:** the second problem relates to the nature of the landing site of the problematic movement. When the *head* NP moves out of the relative clause CP, it is an instance of a projecting movement i.e. an instance of movement where the moving phrase and not the target projects.

See Chomsky (1995):4.4.2/Chomsky (1998):5:pg. 51 where it is built into the derivational mechanism that in cases of movement, it is always the target that projects.

3.3 The Matching Analysis as an alternative

For the above reasons, it has been proposed that the relationship between the *head* NP and the complement of the relative operator is one of *matching* (and deletion) and not actual movement i.e. the matching analysis.

However, there are two arguments against adopting the matching analysis as a standalone analysis for relative clauses.

3.3.1 The Argument from Deletion

Ellipsis is typically optional. However the deletion of the internal head is obligatory.

This argument is not that strong. It relies on the assumption that the process by which the internal head is deleted *is* the kind of elliptical deletion that we are used to elsewhere e.g. VP-ellipsis.

As Kennedy (2000) argues convincingly, there is at least one other domain where we find an obligatory elliptical process with exactly the properties that we need for the matching analysis of relative clauses. This domain is comparative deletion.

- (31) (exs. 1a, 3a from Kennedy 2000)
- a. The galaxy contains more stars than the eye can see.
 - b. *The galaxy contains more stars than the eye can see stars.

The analysis that Kennedy (2000) proposes from comparative deletion is shown in (32).

- (32) The galaxy contains more stars than $[_{CP} [_{DP} \text{stars}]_i \text{ the eye can see } [_{DP} \text{stars}]_i]$

There is *A'*-movement within the comparative. Unlike ordinary *A'*-movement where the head of the chain is pronounced, in comparative deletion, both copies are deleted under identity with the CP-external *stars*. Kennedy calls this kind of deletion 'movement deletion' as opposed to 'ellipsis deletion.'

Movement deletion differs from ellipsis deletion in two important ways.

- (i) it is obligatory – if it is possible, it is necessary.
- (ii) it is also local unlike ellipsis deletion which can be non-local.

- (33) a. Comparative Deletion, Movement Deletion, Only local resolution:
Now that the remodeling has been completed, the space station is longer than it used to be, and it is wider than it is $[_{AP} \dots]$.

local resolution: AP = *wide*, contradictory
*non-local resolution: AP = *long*, non-contradictory, but unavailable

- b. VP Ellipsis, Ellipsis Deletion, Non-local resolution possible:
Jones didn't meet all the people she wanted to, but I bet she liked the ones she did.

local resolution: *did = liked*, tautological
non-local resolution: *did = met*, informative

The fact that the deletion of the relative clause-internal chain in relative clauses is obligatory and that the external head is the one that is overtly realized fits the pattern found with comparative deletion. The locality effects found with comparative deletion are also present in relative clauses.

- (34) John studies marsupials and I study every kind of mammal that is found in Australia.

(cannot be used in a situation where I only study marsupials.)

- The objections raised against the matching analysis based on deletion do not hold once we recognize the properties of movement deletion.

3.3.2 The Argument from Interpretation

The second argument against the Matching Analysis also springs from a property of ellipsis and this is a property of ellipsis that stays constant whether we have movement deletion or ellipsis deletion.

The property is that in ellipsis, while only one phrase is pronounced, both phrases are interpreted. In contrast, in relative clauses we find cases where the *head* NP seems to be interpreted wholly relative-clause-internally:

- (35) The headway that John made was impressive.

As we saw earlier, such cases are best explained by a head raising analysis.

- If the arguments from interpretation hold up, we can conclude that there are at least some cases where we need the head raising analysis and where a matching analysis is unavailable.

However, we cannot conclude that a matching analysis is not available in general. In fact, there are certain cases where the raising analysis is inapplicable and the matching analysis is the only analysis available.

3.4 Fixing the Problems for the Raising Analysis

3.4.1 The Problem of Projecting Movement

Two ways of handling the problem of Projecting Movement.

- The first way questions the assumption that it is always the target of movement that projects. Iatridou, Anagnostopoulou, and Izvorski (2000) point to the fact that free relatives whose *wh*-word is nominal are themselves nominal (Bresnan and Grimshaw (1978), Groos and van Riemsdijk (1981)). They suggest that free relatives and relative clauses could be instances of projecting movement. It is plausible that the grammar does not rule out projecting movement across the board. Whether it is the target or the moving phrase that projects may be determined by selectional restriction of the immediately higher node. For example, if the immediately higher predicate selects for a question CP, projecting the *wh*-phrase would cause a category clash. Iatridou, Anagnostopoulou, and Izvorski (2000) suggest that when there are no such restrictions, the category of the moved element may be able to determine the category of the projected phrase. Relative clauses are arguably such an environment. They are not directly selected for by a higher head. Further, it may actually be necessary for them to be 'nominal' in order to combine with the head NP by intersective modification if the discussion in Iatridou, Anagnostopoulou, and Izvorski (2000) about the crosslinguistic availability of intersective modification is on the right track.

In a related discussion in Bhatt (1999), I have argued that projecting movement of the sort that I am proposing takes place very generally:

- (36) reduced relatives as involving projecting movement out of AP, PP, AspP, and IP respectively.
- a. the $[_{NP} [_{NP} \text{firemen}]_i [_{AP} t_i \text{ available}]]$
 - b. the $[_{NP} [_{NP} \text{books}]_i [_{PP} t_i \text{ on the table}]]$
 - c. the $[_{NP} [_{NP} \text{girls}]_i [_{AspP} t_i \text{ constructing the robot}]]$
 - d. the $[_{NP} [_{NP} \text{man}]_i [_{IP} t_i \text{ to fix the sink}]]$

- The other way of handling the problem of projecting movement re-examines the need for projecting movement. The empirical observation was that we needed a raising analysis where the relative clause formed a constituent that excluded the NP head. A projecting movement is not the only way to satisfy this requirement. An alternative phrase structure that satisfies this requirement is proposed in Bianchi (2000).

- (37) $[_{DP} \text{ the } [_{CP} [_{NP} \text{ picture}]] [_{C'} C^0 [_{XP} [_{DP} \text{ which } t_{NP}] X^0 [_{IP} \text{ Bill liked } t_i]]]]]$
(ex. 15 from Bianchi 2000:130, Bianchi does not specify the nature of X^0)

Bianchi's modification gives us the right tree geometry but not the right order, at least in Norwegian (Áfarli 1994) and Hindi.

- (38) a. Norwegian (ex. 23c from Áfarli 1994:88)

Det huset der som John bor
 the house Rel SOM John lives
 ‘the house where John lives’

- b. Hindi

vo tasviir jo ki Bill-ko pasand hai
 Dem picture Rel Comp Bill-Dat like Prs
 ‘that book which Bill likes’

The modified version of Bianchi’s structure is shown in (39).

- (39) $[_{DP} \text{ the } [_{XP} [_{NP} \text{ picture}]]] [_{X'} \text{ X}^0 [_{CP} [_{DP} \text{ which } t_{NP}]]] C^0 [_{IP} \text{ Bill liked } t_i]]]$

3.4.2 The Problem of Unbounded Possessor Extraction

The problem simply put seems to be that in deriving examples like (40) by a raising analysis, we need to postulate a very unusual extraction.

- (40) the $[[_{NP} \text{ student}]_i [_{CP} [[[\text{which } [_{NP} \text{ student}]_i] \text{'s brother}] \text{'s band}]_j] C^0 [\text{Jonah likes } t_j]]]$
 Pronounced: ‘the student whose brother’s band Jonah likes’

My amendment is inspired by Áfarli (1994)’s analysis of Norwegian relative clauses. He argues that relative clauses in Norwegian can be divided into two classes depending upon whether they involve a Raising Analysis or not.

In particular, he argues that relative clauses that involve an overt relative pronoun (*der*-relatives) are not derived by the Raising analysis, while relative clauses that do not involve an overt relative pronoun (*som*-relatives) are derived by the Raising analysis.

- (41) (ex. 28 from Áfarli 1994:89)

- a. *der*-relative

Det av husa der Jon bor
 that of houses-the Rel Jon lives
 ‘the house where Jon lives’

- b. *som*-relative

Det av husa som Jon bor
 that of houses-the SOM Jon lives
 ‘the house where Jon lives’

(*som*-relatives show reconstruction effects, *der*-relatives do not.)

While Áfarli’s proposal for Norwegian does not carry over fully to English (something that is noted in passing by him), I believe that his insight is essentially correct: the raising analysis may not be available for certain kinds of relative clauses in English.

In particular, it may be ruled out across the board in cases which involve complex pied-piping i.e. cases where anything larger than the Relative Phrase moves to [Spec,CP]. The Raising analysis would be unavailable in such cases for the simple reason that the ‘head externalization’ movement in such cases would involve an illegitimate movement.

Based on Áfarli’s discussion and the discussion in this paper, the difference between English and Norwegian can be stated as follows: English allows extraction of the complement of all relative operators, while Norwegian allows only for the extraction of the complement of the null operator.

Áfarli (1994) also notes that the data from English *wh*-relatives with respect to the availability of a head raising analysis is not as clear as that from Norwegian *wh*-relatives, which clearly rule out a head raising analysis. He speculates that in a language like English where the relative pronoun and a complementizer never appear together, the possibility of a reanalysis of the pronoun as a complementizer cannot be ruled out - though we would probably need to assume some complementizer agreement: *who* would be the [+human] relative C^0 , *which* the [-human] relative C^0 , and *that/φ* the unmarked relative C^0 .

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