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THE RAISING ANALYSIS OF RELATIVE CLAUSES:
EVIDENCE FROM ADJECTIVAL MODIFICATION*

This paper provides a new argument for the raising analysis of relative clauses. This argument is based on the observation that certain adjectival modifiers on the head of a relative clause can be interpreted in positions internal to the relative clause. It is shown that the raising analysis of relative clauses is able to generate the readings corresponding to the relative clause internal interpretation of adjectival modifiers and that two competing analyses of relative clauses, the matching analysis and the head external analysis, are not able to do so.

1. INTRODUCTION

I will show that there are environments where what has been called the external head of a relative clause must originate in a relative clause internal position. My argument is based on the interpretive possibilities available to adjectival modifiers when they appear with the external head of a relative clause. Adjectival modifiers on the external head of a relative clause can receive interpretations which are unexpected under an analysis where they are generated external to the relative clause CP. These interpretations can be generated if the external head is taken to originate in a relative clause internal position and move to its surface position by syntactic movement.

The structure of the article is as follows. I start with a brief introduction to three competing analyses for relative clauses in section 2. Since my analysis uses and provides new evidence for the raising analysis of relative clauses, I review arguments that have previously been given to motivate a relative clause internal origin of the external head of a relative clause in section 3. In section 4 I will provide some data that will motivate a new argument for a relative clause internal origin of the external head. Section 5 provides a semantics for the raising analysis. Section 6 discusses evidence that shows that determiners do not participate in reconstruction

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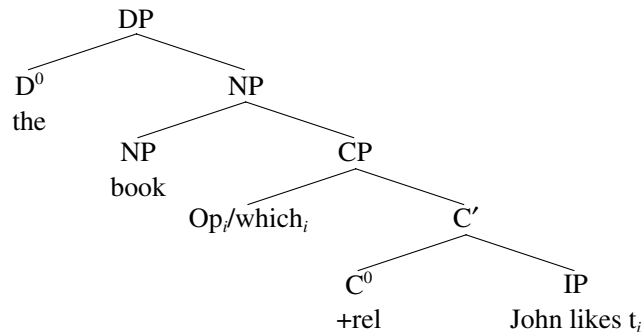
and argues that this constitutes additional evidence for the version of the head raising analysis advocated in this paper. In section 7, certain syntactic problems faced by the head raising analysis as proposed here are discussed and the analysis is modified to handle these problems. Section 8 summarizes the paper.

2. THE COMPETING PROPOSALS

2.1. *The Head External Analysis*

The head external analysis is quite ubiquitous in the literature, so much so that its origins are unclear. Quine (1960) seems to suggest it, and it is assumed in Montague (1974), Partee (1975), Chomsky (1977), Jackendoff (1977). For the current discussion, I assume an instantiation of the head external analysis where 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. The relative clause CP is adjoined to the head NP, and the two combine semantically via intersective modification.

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

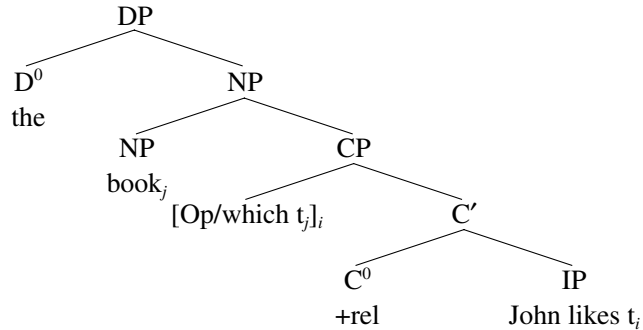


An important feature of the head external analysis is that the head NP is merged external to the relative clause CP. Since the head NP is never inside the relative clause CP, it cannot be reconstructed into a relative clause internal position.

2.2. *The Head Raising Analysis*

The head raising analysis was originally proposed by Brame (1968), Schachter (1973), and Vergnaud (1974). Recent versions include Åfarli (1994), and Kayne (1994), among others. Under the head raising analysis that we are adopting, the head NP originates inside the relative clause CP.

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

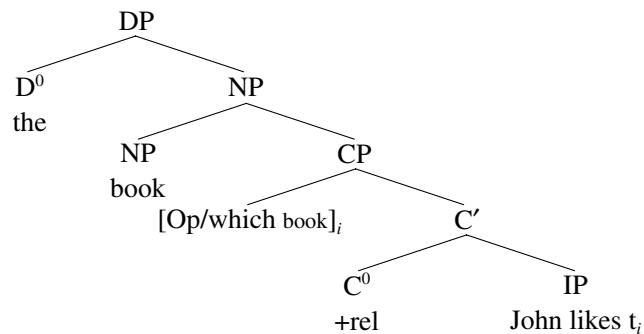


We will return to the details of this analysis in a later section. What is important at this point is that since the head NP originates inside the relative clause CP, it is possible to reconstruct it inside the relative clause and interpret it in a relative clause internal position.

2.3. The Matching Analysis

The matching analysis was originally proposed in Lees (1960, 1961) and Chomsky (1965) and has been discussed and extended in Sauerland (1998). Here I will sketch Sauerland's version. The matching analysis can be seen as halfway between the head external analysis and the head raising analysis. The matching analysis postulates that corresponding to the external head there is an internal head which is phonologically deleted under identity with the external head. However, the internal head and the external head are not part of a movement chain. In fact Sauerland argues that in certain cases, the lexical material of the internal head does not need to be the *same* as the lexical material of the external head. It just needs to be *similar* enough.

- (3) the [book] [
- _{CP}
- [Op/which book]
- _i
- John likes t
- _i
-]



The matching analysis resembles the head external analysis in that the external head does not originate within the relative clause CP. However, the matching analysis does involve 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.

3. EARLIER ARGUMENTS FOR THE HEAD RAISING ANALYSIS

In this section I provide a brief critical summary of some of the arguments that have been previously adduced in favor of a relative clause internal origin for the external head of a relative clause. What these arguments will tell us is 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. When they do so, this will be noted.

These arguments will also be evaluated with respect to the following question: 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.

3.1. *Idioms*

The observation behind the argument from ‘idioms’ for a raising analysis is that the idiom can only appear as part of a larger expression. The larger expression of examples (4–7) is shown in the (a) versions. That the idiom cannot appear outside this context is shown in the (b) versions. However, it 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. This is shown by the (c) versions.

Under a head external analysis, given the unacceptability of the examples in (4b–7b), the acceptability of the examples in (4c–7c) is unexpected and vice versa. The raising analysis is able to explain these facts parsimoniously. Idioms need to appear in a particular environment, as shown by the acceptability of the examples in (4a–7a) and the unacceptability of the examples in (4b–7b). The examples in (4c–7c) are acceptable because the

idiom appears in the relevant environment at some point in the derivation (minimally point of Merge, maybe also at LF).

- (4) (attributed to Brame 1968; ex. (35) from Schachter 1973)
 - a. We made headway.
 - b.*(The) headway was satisfactory.
 - c. The headway that we made was satisfactory.
- (5) (ex. 36 from Schachter 1973)
 - a. She's keeping careful track of her expenses.
 - b.*(The) careful track pleases me.
 - c. The careful track that she's keeping of her expenses pleases me.
- (6) (ex. 37 from Schachter 1973)
 - a. Lip service was paid to civil liberties at the trial.
 - b.*I was offended by (the) lip service.
 - c. I was offended by the lip service that was paid to civil liberties at the trial.
- (7) (attributed to George Bedell; fn. 15 from Schachter 1973)
 - a. He solved the problem in a clever way.
 - b.*The clever way impressed me.
 - c. The clever way in which he solved the problem impressed me.

The argument from idioms is based on an assumption about how idioms are interpreted/stored in the lexicon. We need to assume 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. This assumption is plausible. 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'. This alternative is stipulative.¹

¹ An anonymous reviewer points out the existence of cases like (i) where the idiom is licensed external to the relative clause.

- (i)
 - a. He solved the problem in a clever way that impressed me.
 - b. We made headway that was sufficient.

The reviewer notes that such cases are a problem if the raising analysis is the only analysis available for relative clauses. They are, however, less problematic under the head external

Unlike the other arguments in this section, the argument from idioms favors the head raising analysis and not the matching analysis. If there is an external head which is unrelated to its internal representation except by matching, the problem of how the idiomatic interpretation of the external head is triggered returns. The matching analysis faces the same problem here as the head external analysis. However, the argument from idioms does not rule out either the head external analysis or the matching analysis. All it says is that those analyses are not at play in the examples at hand.

3.2. Subcategorization

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

- (8) (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 (8a) 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 (8b) directly follows from the ungrammaticality of (8d). 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

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 (i.b). Certain questions still remain open. Consider (i.b), 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 doing so is independent of the current discussion. This can be seen by the fact that exactly the same issues arise with *We have made sufficient headway*. However, in section 3.5.2 we will find evidence showing that the head external analysis is not an option at all. I believe that the matching analysis or an extension of it should be able to handle the examples in (i). The identity between the external head and its representation is established at LF under the matching analysis; it is plausible that the identity is established not with the literal form of the idiom, but with whatever its semantic representation is. With such an extension, the matching analysis will be able to handle (i). Finally note that this paper will argue for the availability of both the head raising analysis and the matching analysis. Therefore we can appeal to the matching analysis to handle (i).

about the head NP available internal to the relative clause. Note that this argument, like the argument from idioms, does not rule out the external head analysis in general.

3.3. Evidence from Binding Theory

The argument from binding theory is based on the examples in (9)–(11), which are purported to show that for the purposes of binding theory the external head of the relative clause here behaves as if it was in its (lowest) trace position inside the relative clause.

- (9) (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.
- (10) *The opinion of him_i that John_i has is favorable.
(compare with: The opinion of himself_i that John_i has is favorable.)
- (11) (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 (9)–(11). It predicts that (9) should be ungrammatical and (10) and (11) should be grammatical. The actually observed pattern of (un)grammaticality can be explained under the raising analysis as well as the matching analysis if the external head (or its relative clause internal counterpart under the matching analysis) is interpreted at LF in its trace position. All the binding theoretic examples below are cases where as 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 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.

However, the argument based on the above binding theoretic evidence is not as strong as it might seem at first glance. First, Reinhart and Reuland (1991, 1993) (see also Heycock 1995, pp. 555–556) have argued that anaphors in *picture* NPs are systematically exempt from Condition A of the binding theory. If we accept their argument, (9) can no longer be used

to motivate reconstruction. Further, there are instances where anaphors in picture NPs can take as their antecedent NPs that are clearly non-local.

- (12) 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)

Similarly, the argument for reconstruction based on the existence of Conditions B and C in (10) and (11) 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. 13).

- (13) 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 Condition B effect in (10) and a Condition C effect in (11b). Thus reconstruction is not the only way of explaining the Conditions B and C effects in (10) and (11) respectively. Note that according to the implicit argument story (11a) should not be a Condition 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 (11a) ungrammatical.²

The impact of the argument for the raising analysis (or for the matching analysis) based on binding theory is therefore compromised. It may be the case that the argument based on binding theory is ultimately correct. However, by themselves they do not make a convincing case for reconstructing the external head into a relative clause internal position (or for postulating a relative clause internal counterpart of the external head).

3.4. Amount Relatives

The existence of amount readings provides another reason for assuming a relative clause internal representation of the external head. In (14), for independent reasons, we do not wish to entertain a variable following *there be* (cf. Carlson 1977; Heim 1987; Grosu and Landman 1998).

² The obligatory relative clause internal interpretation of the external head that we see in (10) and (11) is not a general property of relative clauses. There exist cases where the external head seems to be interpreted in a relative clause external position (cf. i).

- (i) In [[pictures of Al_i] which he_i lent to us], he_i is shaking hands with the president. (from Munn 1994 via Safir 1999)

- (14) (from Heim 1987, p. 33; see also 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. It is possible to interpret the external head in the position corresponding to the trace of the relative clause internal A'-movement only under the raising analysis. The same effect can presumably³ be achieved under the matching analysis, where the internal head can be reconstructed into the trace position. Thus the evidence from amount relatives provides independent support to analyses which provide a relative clause internal representation of the external head, namely the raising analysis and the matching analysis.

Reconstruction in amount readings can take the head NP below another scope-bearing element, thus producing scope reconstruction effects. This is the case in (15) and (16).

- (15) (exs. (54a, b) from Sauerland 1998)
- a. No linguist would read the many books Gina will need for vet school.
Possible reading: need > many
 - b. Mary shouldn't even have the few drinks that she can take.
Possible reading: can > few
- (16) I am worried about the twenty-five people likely to come for dinner tomorrow.
Possible reading: likely > 25 people (Irene Heim p.c.)

A head external analysis is unable to derive the relevant readings of (15) and (16). 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.⁴ 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,

³ I wrote "presumably" because it is not obvious to me that the structure under the matching analysis will have the desired semantics.

⁴ The question, however, remains of exactly what kind of object the NP + relative clause denotes and how this object is derived from the relative clause.

provide evidence against the existence of the head external analysis elsewhere.

3.5. *Variable Binding Effects*

3.5.1. *A First Pass*

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

- (17) Exs. (a–c.i) are (70a–c)
- 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.

These facts were noticed for Norwegian by Åfarli (1994) and for Italian by Bianchi (2000); they receive 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. The matching analysis does allow for the relative clause internal representation of the external head to appear in its trace position. This could give us a handle on capturing the pattern of grammaticality in (17) in a manner identical to the head raising analysis. There is, however, one unresolved problem for the matching analysis: under that analysis, the external head must also be interpreted. This head contains a pronoun, and it is not clear to me that binding the counterpart of this pronoun in the relative clause internal representation of the external head counts as binding the pronoun in the external head.

These facts from variable binding thus support the head raising analysis. If the problem with variable binding sketched above can be worked out, they are also compatible with the matching analysis. Like many of the other tests, they do not rule out the head external analysis elsewhere.

3.5.2. *A Stronger Argument*

Further support for the proposal that the external head reconstructs (or a relative clause internal counterpart of it) is provided by Safir's (1999) 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.⁵ For non-wh quantifiers in the operator phrases of relative clauses, Safir finds the following pattern:

- (18) 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]_j [whose depiction of everyone_i]_j he_i 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]_j [whose depiction of everyone_i]_j t_j will offend him_i.
 - iii.*_{CP} [. . . QP_i]_j [[. . . Pron_i . . .] . . . t_j . . .]
 ?*I respect [any writer]_j [whose depiction of everyone_i]_j his_i mother surely wouldn't recognize t_j.
 (Assuming reconstruction, this is a secondary WCO violation.)
 - iv. _{CP} [. . . QP_i]_j [t_j . . . [. . . Pron_i . . .] . . .]
 ? I respect [any writer]_j [whose depiction of everyone_i]_j t_j will offend his_i mother.
 Since the QP is a complement/possessor, 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]_j [whose picture in any civil servant's_i office]_j he_i is truly proud of t_j?
 - ii. _{CP} [. . . QP_i]_j [t_j . . . Pron_i . . .]
 ? There is [at least one politician]_j [whose picture in any civil servant's_i office]_j t_j shows he_i is a Republican.
 - iii. _{CP} [. . . QP_i]_j [[. . . Pron_i . . .] . . . t_j . . .]
 ? I can think of [several politicians]_j [whose picture in any civil servant's_i office]_j his_i job depends upon t_j.

⁵ Safir (1999) notes that the pattern of variable binding with non-wh quantifiers in the operator phrases of relative clauses and with the external heads of relative clauses is also seen with topicalizations.

- iv. [_{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 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.

Examples (18a.i) and (18a.iii) involve *secondary crossover effects* (Postal's (1993) term). Safir provides the following characterization of secondary crossover effects.

If the trace of the pied-piped constituent containing the quantifier c-commands the pronoun to be interpreted as bound, the sentence is acceptable (assuming the quantifier has scope over the fronted constituent), whereas if the trace of the pied-piped constituent containing the quantifier does not c-command the pronoun to be interpreted as bound, the bound reading is not available. (Safir 1999, p. 601)

In (18a.i), there is an instance of secondary crossover and in (18a.iii), there is an instance of secondary weak crossover (WCO). (18a.ii) and (18a.iv) do not involve secondary crossover. Note that the quantifier does not c-command the pronoun at surface structure in either (18a.ii) or (18a.iv). This is presumably what is responsible for the deviance reflected by the '?'. However, its movement at LF to a c-commanding position from which it binds the pronoun does not involve its crossing over the pronoun; this is why the deviance of (18a.ii) and (18a.iv) is minor in comparison to the deviance of (18a.i) and (18a.iii).⁶

As can be seen above, the explanation for the pattern of grammaticality in (18a) depends upon the operator phrase which contains the quantifier originating in the position marked by the trace. The contrast between (18a) and (18b) follows from Lebeaux's (1990) proposal that adjuncts can be merged countercyclically.

The same pattern emerges with the external heads of relative clauses.⁷

⁶ Safir notes that similar facts are found with in-situ quantifiers.

- (i) ((i.a-c) = (34a-c) from Safir 1999)
 a. *He_i tries to forget some review of every poet's_i book.
 b.*?His_i mother is most afraid of one analysis of every poet's_i book.
 c. ?Some review of every poet's_i book is bound to upset him_i.
 d. ?Some review of every poet's_i book is bound to upset his_i mother.

The absence of surface c-command by itself produces only minor deviance (cf. (i.c) and (i.d)). Combined with secondary crossover, it yields ungrammaticality (cf. (i.a) and (i.b)).

⁷ An anonymous reviewer wonders whether the judgments in (19) depend upon whether the relative clause is a *which* relative clause or a *that* relative clause (cf. section 7.4.2). It seems to me that the judgments do not change if we replace *which* with *that* in (19a-c.i, ii), and replace *that* with *which* in (19a-c.ii, iv).

- (19) (___ indicates the relative clause internal gap)
- 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 (or under the matching analysis, its relative clause internal counterpart⁸) is obligatorily reconstructed into the relative clause internal gap position. This assumption captures the similarity in behavior between topicalizations, on the one hand, and the operator phrases of relative clauses and the external head of a relative clause, on the other. The distinction between complements and possessors (19a, b) on the one hand and adjuncts (19c) on the other can be related to Lebeaux's proposal that adjuncts, but not complements (and Safir argues possessors), can be introduced via countercyclic merger.

It is unclear how these facts could be explained otherwise. Semantic accounts of reconstruction (e.g. Sharvit 1999) are able to handle cases where the displaced constituent contains a pronoun. They do not, however, extend to the paradigm in (19) where the displaced constituent contains a quantifier.

Further, if the semantic account could somehow be extended to handle cases like (19a, 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 ((19a, b)) is not found with adjuncts ((19c)). In the absence of reconstruction, the relative clause internal environment is identical in (19a–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.

Thus the argument based on Safir's examples is compatible with both 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 (19).

4. THE INTERPRETATION OF ADJECTIVAL MODIFIERS

I now present a new argument in favor of a relative clause internal origin of the external head. We start with the observation that (20) is ambiguous. The two readings can be characterized as involving a 'high' and a 'low' construal of the adjectival modifier, respectively.

⁸ For a detailed treatment of (19) under the matching analysis see Sauerland (1998, sec. 2.4.2).

- (20) the first book that John said Tolstoy had written

'High' reading:

In 1990, John said that Tolstoy had written *Anna Karenina*; in 1991, John said that Tolstoy had written *War and Peace*. Hence the NP is *Anna Karenina*.

(I.e., order of *saying* matters, order of *writing* is irrelevant.)

'Low' reading:

John said that the first book that Tolstoy had written was *War and Peace*. Hence the NP is *War and Peace*.

(I.e. order of *writing* matters, order of *saying* is irrelevant.)

Like (20), (21a, b) also have 'high' and 'low' readings.

- (21) a. the only book that John said that Tolstoy had written
 b. the longest book that John said that Tolstoy had written

The NP in (21a) has a reading where what John said can be paraphrased as 'X is the only book that Tolstoy wrote'. This is the 'low' reading. It also has a 'high' reading, which can be paraphrased as 'x is the only book about which John said that Tolstoy had written X.' Likewise, on the low reading of (21b), we can paraphrase what John said as 'X is the longest book that Tolstoy wrote'. The high reading of (21b) picks out the longest book out of the books about which John said that Tolstoy wrote them.

We will show that it is not possible to derive the low readings by using the head external analysis of relative clauses. We then demonstrate how the low readings can be derived using a version of the head raising analysis of relative clauses.

4.1. *Low Readings and the Head External Analysis*

Let us apply the head external analysis, which was introduced in section 2.1, to (22a–c).

- (22) a. the first book that John said that Tolstoy has written
 b. the only book that John said that Tolstoy had written
 c. the longest book that John said that Tolstoy had written

The head NP and the relative clause are both predicates (set-denoting expressions), which combine via intersective modification to create a new predicate (set-denoting expression). The modifiers *first/only/-est* apply to this predicate. This yields the first/only/longest member of the set of books such that John said that Tolstoy wrote them. This is the high reading.

There seems to be no way to put *first/only/-est* in the scope of *say*, which is what the low reading requires. Since under the head external analysis, the NP head of the relative clause does not originate inside the relative clause CP, there is no way to reconstruct it inside the relative clause.

4.2. *Low Readings and the Head Raising Analysis of Relative Clauses*

Under the head raising analysis (introduced in section 2.2), the external head originates inside the relative clause and moves to its surface position. There is therefore a movement chain, and we have the option of deciding which copy of the head NP to interpret.

- (23) the [first/only/longest book]_i [_{CP} *first/only/longest book*_i that [John said [_{CP} *first/only/longest book*_i that [Tolstoy had written *first/only/longest book*_i]]]]] (copies are italicized)
- a. *High reading*: interpret the highest CP-internal copy
 the λx first [book, x] [John said that Tolstoy had written x]
 \approx the first book about which John said that Tolstoy had written it
- b. *Low reading*: interpret the lowest CP-internal copy
 the λx [John said that [first [Tolstoy had written [book x]]]]
 \approx the x s.t. John said that the first book that Tolstoy had written was x .

The LFs for the high and low readings are generated through the independently motivated mechanisms of Copy Deletion and *-est*-Movement (cf. Szabolcsi 1986; Heim 1995; for some details see Appendix A). Given a semantic mechanism for interpreting reconstruction into relative clauses (see section 5), we get the desired truth conditions, which are indicated by the paraphrases in (23).

4.3. *Low Readings and the Matching Analysis of Relative Clauses*

Since the matching analysis (introduced in section 2.3) involves a relative clause internal representation of the external head, it has a better chance of capturing the low readings than the head external analysis. Let us look at how one might go about accounting for the data above.

- (24) The [first/only/longest book] [_{CP} *first/only/longest book*_i that [John said [_{CP} *first/only/longest book*_i that [Tolstoy had written *first/only/longest book*_i]]]]] (copies are italicized)

- a. *High reading*: interpret the highest CP-internal copy
 the λx first [book, x][first [book, x][John said that Tolstoy had written x]]
 Intended interpretation: the first book about which John said that Tolstoy had written it.
- b. *Low reading*: interpret the lowest CP-internal copy
 the λx first [book, x] [John said that [first [Tolstoy had written [book, x]]]]
 Intended interpretation: the x , s.t. John said that the first book that Tolstoy had written was x .

The putative representations that we get for the high and low readings under the matching analysis are substantially similar to the representations that we get for these readings under the head raising analysis (cf. (23)). However, they differ from the representations yielded by the raising analysis in one important respect. Since the external head is related by a process of movement to a relative clause internal position, we do not need to interpret it in its surface position. This option is exploited by the head raising analysis to yield the low reading. The external head and its relative clause internal representation are crucially not related by movement – this is the only thing that distinguishes the matching analysis from the head raising analysis. Therefore the external head must be interpreted in a relative clause external position.

The question that needs to be answered now is whether the matching analysis representations for the high and low readings in (24) actually yield the intended interpretations. Answering this question will require making explicit various assumptions about how reconstructed phrases are to be interpreted. Hence this question will be deferred until section 5, where an explicit semantics for the head raising analysis will be provided.

In the next two sections, evidence is introduced that argues for the details of the derivation of the low readings presented in sections 4.2 and 4.3. The facts under discussion in sections 4.4 and 4.5 show that the external head (or a representation of it) is present inside the relative clause and that it undergoes A'-movement. These facts provide evidence for the common core of the head raising analysis and the matching analysis. They do not distinguish between the two analyses.

4.4. Evidence for Head Raising/Matching from NPI Licensing

So far, we have seen that there is a reading (the low reading) which cannot be derived given the head external analysis of relative clauses, but which

can be derived using a head raising analysis of relative clauses (and possibly a matching analysis, too). This is sufficient to show the inadequacy of the head external analysis, but does not in itself demonstrate that the head raising (or matching) analysis is the mechanism involved in the derivation of the low reading. To show that the head raising proposal sketched here captures indeed how the low reading is derived, we will show that the low reading correlates with certain phenomena that require the presence of the raised modifier in the embedded clause at LF.

According to our proposal, for the low readings, *first/only/-est* are at LF in a position that is distinct from their surface position. On the surface, *first/only/-est* appear as NP-modifiers, external to the relative clause. However, in the LF for the low reading, they are in the embedded clause (the *write*-clause in (23)). We know that *first/only/-est* are able to license negative polarity items (NPIs) (cf. (25)).

- (25) This is the only/longest/first book that I have *ever* read.

If the appropriate configuration for NPI licensing holds at LF, we expect to find reflexes of the reconstruction of *first/only/-est* for the low reading in NPI licensing, and we do. We can force a low reading by putting a negative polarity item in the embedded clause.

- (26) a. the first book that John said that Tolstoy had ever written
 b. the only book that John said that Tolstoy had ever written
 c. the longest book that John said that Tolstoy had ever written

The examples in (26) only display the low reading of *first/only/-est*. (26a) only picks out the *x* such that John said that the first book that Tolstoy had ever written was *x*. This is not surprising given that we know that the licensing of NPIs displays locality effects (cf. Linebarger 1980).⁹

Likewise, the examples in (27) only display the high reading.

- (27) a. the first book that John ever said that Tolstoy wrote
 b. the only book that John ever said that Tolstoy wrote
 c. the longest book that John ever said that Tolstoy wrote

⁹ An anonymous reviewer notes that Linebarger's notion of local licensing is in itself insufficient to derive the locality effects seen in (26). For Linebarger local licensing meant no intervening operator, while the notion of locality operative here seems to be confined to the same clause. Though more work is needed on this, I believe that the difference between Linebarger's and my notion of locality is related to the difference in licensors. Linebarger's cases of licensing across clauses involve negation; cf. (i).

(i) Mary didn't say that Mina had ever been to Boston.

The licensors under discussion here are ordinals, nominal *only*, and superlatives.

The correlation between NPI licensing and low vs. high readings supports our proposal that for the low reading, *first/only/-est* (the NPI licenser) must be interpreted in a position lower than its surface position.

4.5. *A'-Reconstruction and Low Readings*

Both the head raising analysis and the matching analysis have the external head, or in the case of the matching analysis a representation of it, undergoing *A'*-movement inside the relative clause. The derivation of the low reading in both analyses involves *A'*-reconstruction. This aspect of the two analyses receives support from the existence of intermediate readings and the existence of intervention effects. The argument is sketched out assuming a head raising analysis. It carries over to a matching analysis without significant modification.

4.5.1. *Intermediate Readings*

Since the device by which we are relating the head NP to the relative clause internal trace position is *A'*-movement,¹⁰ and *A'*-movement is successive cyclic, we predict the existence of *intermediate* readings – that is, readings that are neither ‘high’(-est) or ‘low’(-est). This prediction is borne out. (28) has an ‘intermediate’ reading.

- (28) the first book that John said that Dan told Mary that Antonia wrote

The LF corresponding to the intermediate reading of (28) is shown in (29).

- (29) the $[_{CP} \lambda x [_{IP} \text{John said } [_{CP} \textit{first} [\text{book}, x] \text{ that } [_{IP} \text{Dan told Mary } [_{CP} \text{that } [_{IP} \text{Antonia wrote } x]]]]]]]$
 \approx the x s.t. John said that the first book that Dan told Mary that Antonia wrote was x . (on the higher reading of this *first*)

The head NP moves through successive cyclic movement from the most deeply embedded clause through the [Spec, CP] positions of all the intervening clauses. *First/only/-est* can associate with any of the intervening clauses. When *first/only/-est* associate with the intermediate clause (the *tell* clause), the result is the intermediate reading in (29).

¹⁰ There are two movements involved in the head raising analysis according to our proposal: there is *A'*-movement internal to the CP, and then there is a head raising movement that extracts the head NP out of the relative clause and adjoins it to the relative clause CP. See section 6.6 for some details.

4.5.2. *Intervention Effects*

Our proposal that A'-movement is involved in the derivation of low readings receives further support from the fact that the low readings of modifiers are blocked by the presence of an intervening negation.

- (30) a. This is the first book that John didn't say that Antonia wrote.
 b. This is the longest book that John didn't say that Antonia wrote.
 c. This is the only book that John didn't say that Antonia wrote.

Low readings are also blocked by negative verbs like *doubt* or *deny*.

- (31) a. This is the first book that John denied that Antonia wrote.
 b. This is the longest book that John doubted that Antonia wrote.

Note that the presence of negation or a negative element does not block movement itself. If that were the case, we would lose both the high and the low reading, as both involve movement over the negative element. What the presence of negation blocks is reconstruction of the adjectival modifier. Since reconstruction is required in order to derive the low reading, the presence of negation blocks the low reading but not the high reading.

The environments in (30) and (31) are also environments where certain kinds of A'-dependencies are blocked. Reconstruction across a negative element triggers the Negative Island effect. This is the case with *how many* questions; cf. (32).

- (32) How many dogs did John not feed?
 a. For which *n*: there are *n*-many dogs that John did not feed.
 (available reading; negation does not intervene between the degree operator and the degree variable)
 b. For which *n*: it is not the case that John has fed *n*-many dogs.
 (unavailable reading; negation intervenes between the degree operator and the degree variable)

The observations regarding Negative Islands are due to Ross (1984); the particular correlation between reconstruction across a negation and the Negative Island effect that I have in mind is due to Heim (1992) and Beck (1996). We are not providing a complete explanation of why we find intervention effects with low readings here.¹¹ Our objective is merely to

¹¹ For example, it is not clear why there are no intervention effects with *Which picture of himself_i does Mary deny that John_j admires?*. Further, it is not obvious why the A'-movement involved in the derivation of the 'low' reading is the kind of A'-movement that displays intervention effects.

show that the existence of intervention effects patterns with certain cases of A'-movement, thus lending support to our proposal that the derivation of 'low' readings involves A'-movement and reconstruction.

5. A SEMANTICS FOR THE HEAD RAISING ANALYSIS

5.1. Trace Conversion: Interpreting Reconstructed Phrases

The problem with interpreting the head NP in a relative clause internal position from a semantic perspective is that the types do not fit. NPs are predicates (of type $\langle e, t \rangle$) but the position of reconstruction requires an individual (of type e) or a generalized quantifier (of type $\langle \langle e, t \rangle, t \rangle$).

- (33) the book [Jonah thinks [that Olafur likes]]
 LF with *book* reconstructed into the relative clause:
 the [Jonah thinks [that Olafur likes *book*]]

For example, in (33), how does *likes*, which takes an individual/generalized quantifier argument, take *book*, which is a predicate, as an argument? To get around this problem, we could assume that the predicate can undergo movement to a position where the semantic types are correct, as in (34) (assuming a rule of intersective modification).

- (34) the [book] λx [Jonah thinks [that Olafur likes x]]

Now the types work out. But this is clearly the wrong way to go, because in making the types work out we have undone the reconstruction of the external head.

We need a semantics for reconstructed phrases that does not semantically undo syntactic reconstruction. The semantics for reconstructed phrases developed in Fox (2001) has this property, and I will adopt it for concreteness. Fox (2001) introduces Trace Conversion, an operation that converts copies of a movement chain into interpretable objects. This rule is indeed an innovation, but one that is backed by the considerable empirical coverage it helps us to achieve (cf. Fox 2001). Trace Conversion consists of two sub-operations, namely Variable Insertion and Determiner Replacement.

- (35) Trace Conversion
 a. Variable Insertion:
 (Det) Pred \rightarrow (Det) [Pred $\lambda y(y = x)$]

- b. Determiner Replacement:
 (Det) $[\text{Pred } \lambda y(y = x)] \rightarrow \text{the } [\text{Pred } \lambda y(y = x)]$
 (Pred and $\lambda y(y = x)$ combine by way of intersective modification to yield $\lambda y [\text{Pred}(y) \wedge y = x]$. Applying *the* to $\lambda y[\text{Pred}(y) \wedge y = x]$ yields $\iota \lambda y [\text{Pred}(y) \wedge y = x]$, and we will use **the Pred** x as an abbreviation for this last expression.)

Let us examine how Trace Conversion can help us to interpret (33), repeated below as (36). I will assume that when a copy is deleted, the λ abstraction created as part of the movement is retained (cf. 36b).

- (36) the book [Jonah thinks [that Olafur likes]]
 a. Syntactic structure with internal copies represented:
 the book_{*i*} [[Op book_{*i*}]_{*j*} Jonah thinks [[Op book]_{*j*} that Olafur likes [Op book]_{*j*}]]
 b. Syntactic structure with lowest copy interpreted (other copies deleted):
 the λx [Jonah thinks [that Olafur likes [*Op book*]]]
 (intermediate traces have been ignored)

Applying Trace Conversion to the structure in (36b) yields (37).

- (37) the λx [Jonah thinks [that Olafur likes **the book** x]]
 (**the book** x stands for $\iota \lambda y [\text{book}(y) \wedge y = x]$; the book **identical to** x)

Structure (37), yielded by Trace Conversion, provides the desired semantics. Moreover, it does so without semantically undoing syntactic reconstruction.

5.2. *The Low Reading with a Head Raising Structure*

Now we can put the pieces together. A complete derivation for the low reading is shown in (38).

- (38) the longest book that John said that Tolstoy wrote
 a. The Full Chain:
 the [[longest book] [[Op longest book] that John said [[Op longest book] that [Tolstoy wrote [Op longest book]]]]]
 b. Copy Deletion:
 the λx [that John said that [Tolstoy wrote [Op longest book]]]
 c. Trace Conversion:
 the λx [that John said that [Tolstoy wrote [the longest book x]]]

d. *-est* Movement:

the λx [that John said that *-est* λd [Tolstoy wrote [the *d*-long book *x*]]]

\approx the *x* s.t. John said that *x* is the longest book that Tolstoy wrote.

Structure (38d), which is the structure we have after *-est*-Movement, is to be interpreted with respect to an implicit contextual restriction *C* that provides the domain of comparison. The contextual restriction for (38d) is shown in (39).

- (39) $C = \{ \lambda d$ [Tolstoy wrote [the *d*-long book *w*]],
 λd [Tolstoy wrote [the *d*-long book *x*]],
 λd [Tolstoy wrote [the *d*-long book *y*]],
 \dots ,
 λd [Tolstoy wrote [the *d*-long book *z*]] }

In general, the implicit restriction in such cases is a set of degree predicates only differing in the semantic value of the trace left behind by the head of the relative clause.¹² The morpheme *-est* asserts that its overt syntactic complement at LF, which is a degree predicate, holds of degrees higher than any other degree predicate in the implicit contextual restriction of *-est*. It follows therefore that the subexpression ‘*-est* λd [Tolstoy wrote [the *d*-long book *x*]]’ is equivalent to ‘*x* was the longest book that Tolstoy wrote’. Hence (38d) has the interpretation indicated below it (see Appendix A for details).

It is instructive to apply our semantics to a closely related example brought up by an anonymous reviewer.

- (40) the longest books that John said that Tolstoy wrote

The reviewer expresses the following intuition, which I agree with: Consider a world in which John makes different claims about the identity of Tolstoy’s

¹² Example (i) displays the role played by the head of the relative clause in determining the domain of comparison of the superlative.

- (i) a. the boy that gave the fewest presents to Roland
 $(C = \{ \lambda d$ [*x* gave *d*-few presents to Roland], λd [*y* gave *d*-few presents to Roland], \dots , λd [*z* gave *d*-few presents to Roland]})
- b. the boy that Roland gave the fewest presents to
 $(C = \{ \lambda d$ [Roland gave *d*-few presents to *x*], λd [Roland gave *d*-few presents to *y*], \dots , λd [Roland gave *d*-few presents to *z*])
- c. the present that Roland gave to the fewest boys
 $(C = \{ \lambda d$ [Roland gave *x* to *d*-few boys], λd [Roland gave *y* to *d*-few boys], \dots , λd [Roland gave *z* to *d*-few boys]})

longest book on different occasions. First he says that it was *War and Peace*. Then he says it was *Anna Karenina*. It seems that in such a situation, (40) does not pick out the sum of *War and Peace* and *Anna Karenina*. (40) can only pick out a set of books that John described as Tolstoy's longest on some particular occasion, not different occasions.

Our semantics makes the correct predictions for (40). The structure that we will interpret is (41).

- (41) the λx [John said -est λd [Tolstoy wrote the d -long books x]]
(after Copy Deletion, Trace Conversion, and -est-Movement)

Let us assume that singular entities also enter into the denotation of the plural *books*. In that case, the predicate ' λx [John said -est λd [Tolstoy wrote the d -long books x]]' will have in its denotation two objects. When this predicate combines with *the*, the resulting structure will fail to denote because the uniqueness presupposition of *the* will not be satisfied. On the other hand, if John did at some point say that *War and Peace* and *Anna Karenina* were Tolstoy's longest books, then the predicate will have the unique plural object composed of the sum of the two books in its denotation. The presupposition of *the* will be satisfied and (40) will pick out *War and Peace* and *Anna Karenina*.¹³

The high reading could be derived in a manner parallel to (38), that is, by using the reconstruction option and then interpreting the higher copy. However, this is not the only way to generate the high reading. The high reading can also be generated by merging the adjectival modifier outside the relative clause CP; cf. (42).

- (42) the [_{AP} longest [_{NP} book_{*i*} [_{CP} that Olafur said that Asa wrote t_i]]]

Further, since in principle the head external analysis (the non-raising analysis) is freely available, the high reading could also be the result of the exploitation of the non-raising structure.

Finally, the intermediate readings discussed in (28), repeated here as (43), will involve the raising analysis.

- (43) the first book that John said that Dan told Mary that Antonia wrote

¹³ Consider the following situation: At one point John says that *War and Peace*, *Anna Karenina*, and *Kavkas* are Tolstoy's longest books, and at another point of time he says that *Anna Karenina* and *Kavkas* are Tolstoy's longest books. My intuition is that even in this case, (40) fails to denote. This is to be expected if we assume that *the* has a uniqueness presupposition. However, if we assume, as seems well motivated, that *the* has a maximality (and not a uniqueness) presupposition, our semantics predicts that (40) should pick the sum of the three books.

The copy interpreted will be the intermediate copy and the *-est*-Movement will target the *tell*-clause.

5.3. *Low Readings and the Matching Analysis*

We ended the discussion of the matching analysis in section 4.3 having left open the question of whether the structures provided by this analysis were in fact able to generate the low reading. Those structures with the intended interpretations are repeated below as (44).

- (44) The [first/only/longest book] [_{CP} *first/only/longest book*_i that [John said [_{CP} *first/only/longest book*_i that [Tolstoy had written *first/only/longest book*_i]]]]] (copies are italicized)
- a. *High reading*: interpret the highest CP-internal copy
the λx first [book, x] [first [book, x] [John said that Tolstoy had written x]]
Intended Interpretation: the first book about which John said that Tolstoy had written it
 - b. *Low reading*: interpret the lowest CP-internal copy
the λx first [book, x] [John said that [first [Tolstoy had written [book, x]]]]
Intended Interpretation: the x s.t. John said that the first book that Tolstoy had written was x .

Now that we have a way of interpreting reconstructed phrases, we can evaluate whether the structure in (44) that the matching analysis provides us for the low reading has the intended semantics.

- (45) a. Structure with the external head and the lowest copy:
the [longest book] λx [John said that [Tolstoy had written [Op longest book]]]
- b. Structure after Trace Conversion:
the [longest book] λx [John said that [Tolstoy had written [the longest book x]]]
 - c. Structure after *-est*-Movement:
the [longest book] λx [John said that -est λd [Tolstoy had written [the d -long book x]]]

Does the structure in (45c) have the intended interpretation indicated in (44b)? At first glance it seems that it does. Consider a situation where John said that *War and Peace* was Tolstoy's longest book. Then the sub-expression ' λx [John said that -est λd [Tolstoy had written [the d -long book

$x]]]$ ', which I will call CP_1 , picks out *War and Peace*. Further combination with the external head *longest book* again picks out *War and Peace* (or more precisely the singleton set containing *War and Peace*). Finally the determiner *the* applies and we get *War and Peace*.

However, a closer look reveals that the semantics of the structure in (45c) is not identical to the interpretation indicated in (44b). First note that the subexpression that excludes the determiner and the external head in (45c) (= CP_1) is the same as in the head raising analysis (cf. 38d). This predicate denoted by CP_1 can in principle pick out more than one book. Imagine a situation where John is given to making claims about which book by Tolstoy was the longest. The predicate denoted by CP_1 should in this case pick out all those books which John has at one time or other deemed to be the longest book written by Tolstoy.

The intuition is that in case John has been making claims that vary from time to time, *the longest book that John said that Tolstoy ever wrote* is infelicitous. This is exactly what the head raising analysis predicts. Under the head raising analysis, CP_1 , which picks out more than one book, is a complement of *the*. Since the argument of *the* must have a unique element in its denotation, the undefinedness under these circumstances of *the longest book that John said that Tolstoy ever wrote* follows.

Let us see what the matching analysis predicts. Under the matching analysis CP_1 is not directly a complement of *the*. Instead we have the following structure:

- (46) the [[longest book] CP_1]

The predication is that combining the external head *longest book* with CP_1 should restore uniqueness. Out of the many books in the denotation of CP_1 , after combining with *longest book* we should be left with whatever book is longest. Then the resulting predicate should be able to combine felicitously with *the*. However, as discussed above, the intuition in this case is that the interpretation yielded by the matching analysis is unavailable. In the context under question, the entire DP is felt to lack a denotation. I conclude therefore that the matching analysis does not provide structures that can generate the low reading.

Since the structures provided by the matching analysis yield unattested readings, we can also conclude that at least in these examples the matching analysis is not available. In other words, structures like (45b, c), repeated here as (47a, b), must not actually be available to the semantic system.

- (47) a. Structure after Trace Conversion:
 the [longest book] λx [John said that [Tolstoy had written [the
 longest book x]]]

- b. Structure after *-est*-Movement:
 the [[longest book] λx [John said that *-est* λd [Tolstoy had written
 [the *d*-long book *x*]]]

Given the unavailability of (47), it could be concluded that the matching analysis is incorrect, that is, that relative clauses never have the kind of structure it assigns to them. However, I will not actually draw this conclusion here, for the following reasons. The discussion in section 3.5.2 has ruled out the head external analysis. In section 7.4.2, we will see well-formed relative clauses which will be shown not to require the head raising analysis for interpretation. By elimination, those relative clauses must require the matching analysis. So I will instead argue that the structures in (47) are unavailable to the semantic system because of the way *longest*, *book*, and the relative clause CP combine. For restrictive modification only (48a), where *longest* modifies *book* and the CP, is possible. (48b) is not a possible structure for the purposes of restrictive modification.¹⁴

- (48) a. the longest [[book] [_{CP} . . .]]
 b. the [[longest book] [_{CP} . . .]]

Given that (48a) is the only structure available under the matching analysis, it follows that the internal head cannot include *longest*. After all, *longest* is not part of the external head. Consequently, the matching analysis never actually produces the structure in (47).¹⁵ The upshot of the above discussion is that the matching analysis may well be available in examples like *the longest book that John said. . . .* It is just that none of the structures that it provides us with yield the low reading.

¹⁴ Once we assume *-est*-Movement (see Appendix A), the unavailability of (48b) is not obvious. After *-est*-Movement, we are left with *d-long book CP*; both [*d-long* [*book CP*]] and [[*d-long book*] *CP*] seem reasonable and interpretable. A possibility that is compatible with *-est*-Movement and the availability of (48b) is that the matching between the external head and the internal head applies at LF. This is what Sauerland (1998) has argued on independent grounds. At LF, *-est*-Movement has already taken place and so there is no *-est* in the external head. Since there is no *-est* in the external head, there can be no *-est* in the internal head either. The central problem with the illegitimate structures in (47) is that they involve two *-est*'s: one inside the relative clause and one outside. The discussion here shows that the matching analysis does not allow for such illegitimate structures to be generated.

¹⁵ Note that structures very much like (48b) are produced by the head raising analysis, but in that case *longest book* gets to its surface position by movement and has the option of reconstruction to a lower position.

6. ONLY NPs RECONSTRUCT

One important aspect of the structure that I am proposing for the raising analysis of relative clauses is that the constituent that raises out of the CP is an NP and not a DP. The determiner that provides quantificational force to the entire relative clause complex is merged external to the CP. This aspect is common to other analyses for relative clauses that assume raising (cf. Schachter 1973; Kayne 1994; Bianchi 2000), but it is not universally assumed. An alternative structure given by Aǵarli (1994) is shown in (49).

- (49) . . . [_{TP} NP_i [T' [_T som] [_{VP} . . . t_i . . .]]]
 (Ex. 14, Aǵarli 1994, p. 85; Aǵarli assumes that in Norwegian relative clauses TP plays the role CP is assumed to play in English relative clauses.)

Even though Aǵarli does not make a distinction between NPs and DPs, it is clear that what he is raising is the entire DP and not a subpart of it. I will provide a new argument that shows that it is the NP that is raised and not the entire DP.

Initial evidence for the proposal that NPs, and not DPs, raise is provided by (50).

- (50) Every book that there was on the table was obscene.
- a. Head external analysis:
 [Every [book [Op_j that [there was t_j on the table]]]] was obscene.
 The sample trace t_j will trigger the Definiteness Effect.
 - b. Head raising analysis; the whole DP raises out of the relative clause:
 [[Every book]_i [that [there was t_i on the table]]] was obscene.
 - c. Head raising analysis; only the NP raises out of the relative clause:
 [Every [book_i [[Op t_i]] that [there was t_j on the table]]] was obscene.

For reasons involving the Definiteness Effect, a head external analysis is not plausible for (50) (cf. Heim 1987). The head raising analysis could involve raising of the whole DP *every book* out of the relative clause (= 50b), or the raising of just the NP *book*, with *every* merged externally (= 50c). Now if (50) involved the raising of the DP *every book* from the postcopular position, we would expect (50) to be ungrammatical due to the Definiteness Effect. Since this is not the case, it cannot be a DP that

is raising out of the relative clause CP. We are now left with the option in (50c), which involves raising of the NP out of the relative clause. (50c) does not trigger the Definiteness Effect. At no point is *every book* in the postcopular position (unlike 50b). In addition, the trace in the postcopular position is not a simple trace (unlike 50a).¹⁶

Arguments related to case assignment also force upon us the conclusion that it is the NP, and not the whole DP, that raises out of the relative clause. Consider (51) in the context of the head raising analysis.

(51) The book which John likes is good.

If the DP *the book* was raising from the complement position of *likes* to become the matrix subject, it would end up bearing both nominative and accusative case. This should lead to ungrammaticality. Our proposal, however, correctly predicts that (51) should be grammatical. The DP headed by the null operator bears accusative case and the DP headed by *the* bears nominative case. The NP *book* does not enter into case assignment by itself.

6.1. *The Non-Reconstruction of Determiners*

In the version of the head raising analysis of relative clauses that we have adopted, it is the NP (and associated adjectival modifiers) that raises out of the relative clause CP. The D^0 is merged external to the structure created by the adjunction of the raised NP to the relative clause CP. Low readings arise by reconstruction of the adjectival modifier into a position lower than its surface position. Within our proposal, only the NP (and associated adjectival modifiers) have the option of reconstruction. Since the D^0 originates in its surface position, it cannot participate in reconstruction.

If a particular element could appear both as an adjectival modifier and as a determiner, we would expect it to have low readings only in its adjectival guise. This prediction is borne out, thereby providing a new argument that the raising analysis of relative clauses involves the raising of NPs and not DPs.

High and low readings are available with numeral modifiers when they occur with *the*, with numeral-like uses of *few/many* when they occur with *the*, and with adjectives in general.

¹⁶ There is an assumption here that the null relative determiner Op in (50c) does not count as definite for the Definiteness Effect. The matching analysis is not ruled out in (50); I assume that the constituent that undergoes relative clause internal movement under the matching analysis would be [Op book].

- (52) a. the two books that John said that Tolstoy had finished
 b. the few books that John said that Tolstoy had finished
 c. the many books that John said that Tolstoy had finished

Since numerals and *many* do not license NPIs, we cannot use NPI licensing as a diagnostic for the existence of the low readings of (52a, c). Luckily, *few* does license NPIs and we can use it to confirm the existence of low readings.

- (53) a. the few books that John ever said that Tolstoy had finished (high)
 b. the few books that John said that Tolstoy had ever finished (low)

When *few/many/numerals* are used without a *the*, the low readings disappear.

- (54) a. two books that John said that Tolstoy had finished
 b. few books that John said that Tolstoy has finished
 c. many books that John said that Tolstoy has finished

The absence of the low reading in (54) can be confirmed using the NPI test.¹⁷

- (55) a. few books that John ever said that Tolstoy had finished (high)
 b.*few books that John said that Tolstoy had ever finished (low)

This is precisely what is predicted by our proposal. In the absence of *the*, *two/few/many* function as determiners. They are merged external to the relative clause CP and cannot be reconstructed inside the CP. The low reading, which requires reconstruction, is therefore absent.

Since it is plausible that English has a null plural determiner, we need to account for why this null determiner cannot function as the external determiner in (54) allowing *two/few/many* to function adjectivally and thus have low readings. I believe the difference is due to the incompatibility of numeral modifiers with the English null determiner. This is because the null plural determiner has indefinite semantics, and numeral modifiers in English are only compatible with the definite determiner.

- (56) the two books/*most two books/*some two books/* ϕ two books

¹⁷ The * in (55b) refers to the low reading. The judgment reported here is that somewhat marginally the determiner *few* is able to license an *ever* in the embedded clause. However, the low reading is still unavailable. I believe that NPI licensors differ in the ability to license NPIs across clauses. Adjectival *few* can only license locally, while the determiner *few* can license across clauses, albeit somewhat marginally.

Therefore (54) is unable to make use of the null plural determiner option to generate the low reading.¹⁸

6.2. *Crosslinguistic Variation in the Determiner System*

We have related the absence of low readings in (54) to the fact that there are no null determiners in English with which numeral modifiers and *few/many* can occur. Therefore we predict that if we had a language where numeral modifiers (including *few/many*) were able to appear with null

¹⁸ So far we have seen low readings with superlative adjectives, ordinals, nominal *only*, and numerals. At first glance, it seems that something like the high vs. low distinction is also found with evaluative adjectives.

- (i) the wonderful books that Siouxsie said that Lydia had written

Example (i) seems to be ambiguous depending upon whether *wonderful* is speaker-oriented or oriented to the subject of *say*. Under this reading, the speaker could use (i) sarcastically. The speaker may not believe that the books are wonderful, just that Siouxsie said that they are.

In fact, we do not even need an adjective to get this reading, as the following example (Manfred Krifka p.c.) points out.

- (ii) The idiot that John said broke the coffee pot was me.

Under the most prominent reading of (ii), the speaker is not assessing himself/herself as an idiot. What the speaker is asserting is that John said that an idiot broke the coffee pot and that the speaker is the person who broke the coffee pot.

However, it is not clear that the ambiguity of (i) and (ii) has a structural source. In particular, an anonymous reviewer notes that a non-speaker-oriented reading is unavailable for (i) unless a scare quotes intonation is present. Moreover, given a scare quotes intonation, an adjective can have a sarcastic reading even when there is no question of high vs. low.

- (iii) the wonderful book that Lydia had written

Further, another anonymous reviewer notes that in the absence of scare quotes intonation, *the former president that John said he met* just doesn't seem to permit a low reading, while *the tallest president that John said he (ever) met* does. There are also cases where the availability of the low reading seems conditioned by factors external to the syntax of the DP.

- (iv) (Bernhard Schwarz p.c.)
- a. The unicorn John said he found turned out to be a kangaroo.
(judged acceptable, i.e. low reading is possible)
 - b. The unicorn John said he found is in our backyard now.
(the animal in our backyard must be a unicorn, i.e. no low reading)

This suggests that whatever is going on with plain NPs and evaluative adjectives is not syntactically governed in the same way as the cases under discussion in the main text.

determiners, low readings would be available in the counterpart of (54) in this language. Serbo-Croatian¹⁹ seems to be such a language.

- (57) dve knjige koje/sto je Jovan rekao da je Nada
 two books which/that is Jovan said that is Nada
 kupila
 bought
 ‘two books that Jovan said Nada bought’
 ‘the two books that Jovan said Nada bought’ (on the low reading)

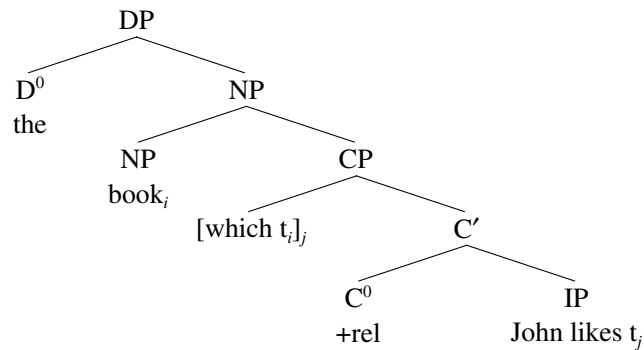
It has been argued by Stjepanović (1998) and Zlatić (1998) that Serbo-Croatian has no determiners. They argue that what have been usually classified as determiners are actually adjectives. According to them, there are no overt determiners in Serbo-Croatian. I interpret this as meaning that covert determiners are always available in Serbo-Croatian. This availability of covert determiners allows the numeral modifiers (including *few/many*) to be interpreted adjectivally. Therefore they are able to receive low readings.

7. THE STRUCTURE PROPOSED FOR THE RAISING ANALYSIS

7.1. *The Structure: First Version*

The head NP and the relative operator of which the head NP is a complement move to [Spec,CP] via A'-movement. From [Spec, CP], the head NP moves out of the CP and adjoins to it.

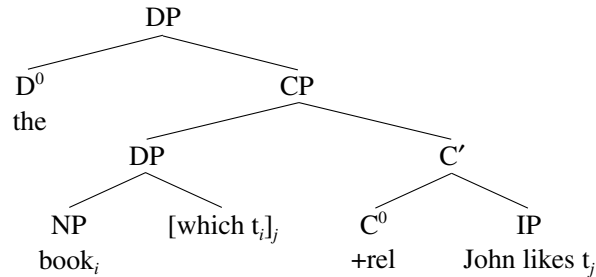
- (58) the book which John likes



¹⁹ Thanks to Željko Bošković for pointing out to me the Serbo-Croatian facts and their relevance.

This proposal is similar to the structure proposed in Kayne (1994). The innovation is that in (58), 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. (59)).

(59) the book which John likes



In Kayne's structure, *which John likes* does not form a constituent that excludes *book*. However, there seems to be evidence that *which John likes* does form a constituent. For one, it can be coordinated.

(60) the picture [which Bill liked] and [which Mary hated]
(ex. (49) from Borsley 1997; see also Bianchi 2000, p. 132)

For Kayne, the head external structure for relative clauses is not an option because it involves right adjunction and therefore violates antisymmetry. We have also seen empirical evidence against the head external analysis in section 3.5.2. We are still left with the head raising and the matching analyses. If both these analyses are in principle available to the syntactic system, then (60) is not a problem. It would just involve a matching analysis. However, there are cases where for independent reasons we might want a head raising analysis and which are structurally similar to (60). For instance in (61), the head NP must be interpreted internal to the relative clause to meet the c-command condition on variable binding.

(61) the [picture of his_i]_j [[which t_i] every freshman_i likes] and
[[which t_j] every sophomore_i dislikes]] (ex. 25 from Bhatt 1999,
p. 18)

Example (61), therefore, shows that we need a raising analysis where the relative clause forms a constituent that excludes the head NP. The derivation of (61) involves the movement of *which picture of his* to the [Spec, CP] of each relative clause, followed by across-the-board movement of *picture of his* to its surface position.

7.2. *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.

The first problem is that the movement at issue is an unorthodox one which involves extractions of unboundedly deeply embedded possessors. I will refer to this problem as the problem of *unbounded possessor extraction*.²⁰

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

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, that is, an instance of movement where the moving phrase and not the target projects. None of the types of movement that we are familiar with, e.g., *wh*-movement, raising, and head raising, involve a projecting movement. In all these cases, it is the target that projects. Chomsky (1995, sec. 4.4.2., 1998, sec. 5, p. 51) builds into the derivational mechanism that in cases of movement, it is always the target that projects. I will refer to this problem as the problem of *projecting movement*.

²⁰ It may be the case that the movement of the external head out of the relative clause seems unusual only because the other cases of phrasal movement we are comparing it to all involve DP, and not NP, movement. Unlike DP movement, NP movement does not have to obey the usual constraints on case and θ -roles. This is so because plausibly DPs, and not NPs, receive case and θ -roles. So it should not be surprising if NP and DP movement have different properties. If this suggestion is on the right track, then the question will arise as to why (and whether) NP movement is only found in relative clauses.

7.3. *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. This is the matching analysis which was introduced in section 2.3. Since the external head in the matching analysis is not related to its relative clause internal representation by movement, the problems discussed in the previous section do not arise. However, there are two arguments against adopting the matching analysis.

7.3.1. *The Argument from Deletion*

The first argument against the matching analysis is that it does not explain why it is the external head that is pronounced and not the internal head. In contrast, the fact that it is always the external head that is pronounced receives a natural explanation under the head raising analysis. The external head under the head raising analysis is the highest copy of a chain created by overt movement and in general, it is the highest copy of such a chain that is pronounced. Since the external head and its relative clause internal representation are not related by movement, such an explanation is not available. Further, the process by which the relative clause internal representation of the external head is deleted is generally taken to be a kind of ellipsis (cf. Sauerland 1998; Cresti 2000). However, unlike other kinds of elliptical reductions which are optional, 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.

- (63) (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 for comparative deletion is shown in (64).

- (64) The galaxy contains more stars than [_{CP} [_{DP} stars]_i the eye can see [_{DP} 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. It is obligatory: if it is possible, it is necessary. It is also local, unlike ellipsis deletion, which can be non-local.

- (65) a. *Comparative deletion, movement deletion* (only local resolution):
 Now that the remodelling has been completed, the space station is longer than it used to be, and it is wider than it is [_{AP} ____].
 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 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.

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

If the internal head of the relative clause *that is found in Australia* could have a non-local antecedent, e.g. *marsupial*, then given that marsupials are a proper subset of mammals, *every kind of mammal that is found in Australia* would have a reading where it meant *every kind of marsupial that is found in Australia*. Clearly such a reading is absent. Assuming that the process of deletion applying to the matching analysis is movement deletion and not elliptical deletion, this follows. The conclusion, then, is that the objections raised against the matching analysis do not hold once we recognize the properties of movement deletion.²¹

²¹ Even though the head external analysis of relative clauses has to be abandoned given the discussion in section 3.5.2, it is worth noting that the head external analysis of relative clauses would need to be supplemented with something similar to the theory of deletion needed for the matching analysis. We need to block cases like **the boy [[which boy]_i Jonah likes t_i]* or even **the boy [[which human]_i Jonah likes t_i]*. So it is not the case that the matching analysis is in some sense more expensive than the head external analysis.

7.3.2. *The Argument from Interpretation*

The second argument against the matching analysis also springs from a property of ellipsis; this is a property 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. One such case is the case of idioms (see section 3.1).

(67) The headway that John made was impressive.

Such cases are best explained by a head raising analysis.

We also saw that the representation provided by the matching analysis for the low reading does not correspond to the actual interpretation. Instead it yields an unattested reading. See section 5.3 for details. The correct interpretation is provided by the head raising analysis, as is shown in section 5.2.

We can now conclude that there are at least some cases where we need the head raising analysis and where a matching analysis is unavailable. However, I do not think that we can conclude that a matching analysis is not available in general. For example, there is nothing that would in principle block the matching analysis in (68).

(68) the book that John said that Tolstoy wrote

Interpreting both the external head and its relative clause internal representation does not lead to any problems in (68).

7.4. *Fixing the Problems for the Raising Analysis*

Thus far I have shown that while the structure for relative clauses that I am proposing seems to encounter certain problems, the alternative matching analysis is unable to derive low readings. In the following sections, I will modify my proposal so that it will no longer face the problems discussed here. The problem of projecting movement will be addressed first, followed by the problem of unbounded possessor extraction.

7.4.1. *The Problem of Projecting Movement*

I will discuss 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 et al. (2000) point to the fact that free relatives whose *wh*-word is nominal are themselves nominal (Brensnan 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 et al. (2000) about crosslinguistic availability 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; that is, it is not restricted to movement out of CP. In particular, I have argued that different kinds of reduced relatives constitute environments where there is projecting movement out of AP, PP, AspP, and IP respectively.

- (69) 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).

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

The relative clause *which Bill liked* forms a constituent XP that excludes the NP head *picture*. Bianchi’s structure satisfies the aforementioned requirement. However, while it provides us with the correct tree geometry, the order of functional projections that it assumes (CP above XP) yields undesirable results. In Bianchi’s structure, the NP head is in [Spec, CP]. The prediction then seems to be that in a language which allows doubly

filled COMP's, we should get orders like *the picture that which Bill liked*. This is not what we find in Norwegian (Åfarli 1994) and Hindi.

(71) a. Norwegian (ex. (23c) from Åfarli 1994, p. 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'

Instead of the order predicted by Bianchi's structure, the observed order is *the picture which that Bill likes*. This suggests that the additional functional projection must be above the CP. If we assume that the additional functional projection is some kind of nominal head, the resulting object will also be a nominal functional projection. Then it will be able to satisfy the requirement that only nominal phrases can combine via intersective modification with nouns (cf. Iatridou et al. 2000).

The modified version of Bianchi's structure is shown in (72).

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

7.4.2. *The Problem of Unbounded Possessor Extraction*

The problem, simply put, seems to be that in deriving examples like (73) by a raising analysis, we need to postulate a very unusual extraction.

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

My amendment is inspired by Åfarli's (1994) analysis of Norwegian relative clauses. Åfarli 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 in fact derived by the raising analysis.

- (74) (ex. (28) from Åfarli 1994, p. 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’

While Åfarli’s proposal for Norwegian does not carry over fully to English (something that he notes in passing), 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 – that is, 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 would involve an illegitimate movement.²²

If the raising analysis is unavailable in cases that involve complex pied-piping, the prediction is that the low reading that we discussed in section 4.2 should also not be available in these instances. This does seem to be the case.

- (75) the first movie whose score John said that Shostakovich composed
- a. *High reading* (available):
 the first movie whose score John ever said that Shostakovich composed
- b. *Low reading* (unavailable):
 *The first movie whose score John said that Shostakovich ever composed

We can use NPI licensing to isolate the high and the low reading. Since the low reading is not possible with complex pied-piping, putting an NPI in the embedded clause (cf. 75b) leads to ungrammaticality.

²² Based on Åfarli’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. See also footnote 23.

The minimal pair in (76) shows that it is complex pied-piping that is responsible for the absence of the low reading in (75). (76a) involves complex pied-piping; the ungrammaticality of (76a.ii) shows that the low reading is unavailable. (76b) differs minimally from (76a) in that it does not involve complex pied-piping. It also allows for the low reading, as can be seen by the grammaticality of (76b.ii).

- (76) a. the first man a picture of whom John said that Mary liked
- i. *High reading* (available):
the first man [[a picture of whom] John ever said that Mary liked]
 - ii. *Low reading* (unavailable):
*the first man [[a picture of whom] John said that Mary ever liked]
- b. the first man John said that Mary liked a picture of
- i. *High reading* (available):
the first man [John ever said that Mary liked a picture of]
 - ii. *Low reading* (available):
the first man [John said that Mary ever liked a picture of]

So we do not need to postulate a raising analysis in the offending cases. Consequently the problem of unbounded possessor extraction disappears. Since we have already ruled out the head external analysis (cf. the discussion in section 3.5.2), I assume that (75) and (76a) involve the matching analysis. Note that applying the matching analysis to (75) and (76a) does not lead to low readings (cf. section 5.3).²³

²³ An anonymous reviewer provides another way of looking at the contrast in (76), suggesting that it could be related to the observations about the impossibility of *wh*-words in amount relatives (cf. Carlson 1977; Heim 1987). Since both low readings and amount relatives plausibly involve the head raising analysis, the reviewer wonders whether there is a difference between *wh*-relatives (in general) and *that*-relatives. The reviewer then notes that for *her/him*, there are clear contrasts between *that*-relatives and *wh*-relatives with respect to the availability of low readings.

- (i) a. i. the first book that John said that Tolstoy ever wrote
ii.*?the first book which John said that Tolstoy ever wrote
- b. i. the first Russian that John said that he ever met
ii.*?the first Russian which John said that he ever met

If the contrasts in (i) turn out to be robust and general, they would suggest, as Áfarli (1994) noted, that only *that*-relatives and not *wh*-relatives involve the head raising analysis.

Though further investigation is needed, it seems to me that at least some *wh*-relatives allow for low readings and hence the head raising analysis. It is possible that there is actual dialectal

8. SUMMARY

I have shown in this paper that certain DPs involving relative clauses have readings that can be generated using a head raising analysis of relative clauses.

- (77) the longest book that John said that Tolstoy ever wrote
 (\approx the x s.t. John said that x was the longest book that Tolstoy ever wrote)

The derivation of the reading indicated in (77) involves reconstruction of *first book* into the *write*-clause. The relevant LF is shown in (78).

- (78) the λx [John said -est λd [Tolstoy wrote the d -long book x]]

In section 5, I discuss a mechanism proposed in Fox (2001) which allows us to interpret reconstructed phrases. Applying this mechanism to the LFs provided by the head raising analysis (cf. 78), it is shown in section 5.2 that these LFs do generate the low readings. It is also demonstrated in section 5.3 that these readings cannot be generated under the head external analysis or the matching analysis.

The discussion in section 6 shows that only NPs have the option of reconstructing into the relative clause. We also see evidence to the effect that the relative clause CP forms a constituent that excludes the external head (contra Kayne 1994). The structure in (79) is adopted to represent these findings.

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

This structure is a modification of Bianchi's (2000) structure for the raising analysis. The postulation of the X^0 , a nominal head, allows us to avoid the problem of projecting movement discussed in section 7.4.1. The nominal nature of X^0 allows the XP it heads to surface as a complement of *the*, and the X' it heads to combine with the NP via intersective modification (cf. Iatridou et al. 2000).

To avoid the problem of unbounded possessor extraction, we assume

variation here. As Heim (1987) observes, there is a difference in the acceptability of *wh*-relative pronouns in amount relatives, too. Safir (1982) finds them acceptable, while Carlson (1977) does not. 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.

in section 7.4.2 that in cases of non-trivial pied-piping (i.e., anything other than a relative pronoun) the head raising analysis is unavailable. The absence of low readings in the case of non-trivial pied-piping provides evidence for this assumption.

We are also able to conclude that while the matching analysis is unable to derive the low readings that we are interested in, it may still play a role elsewhere in the syntax. The same conclusion cannot be drawn about the head external analysis. In light of the discussion of the data from Safir (1999) in section 3.5.2, we can conclude that the head external analysis is not available anywhere. It is just not an option available to the syntactic system. So in the end we are left with the matching analysis and the head raising analysis. There are environments where only the matching analysis is available (non-trivial pied-piping), environments where only the head raising analysis is available (idioms, low readings), and environments where, for all we know, both are possible.²⁴

²⁴ The reader familiar with the literature on reconstruction will have noticed the conspicuous absence of Condition C data in the preceding discussion. The correlation between scope reconstruction and Condition C effects in A and A'-movement discovered by Fox (1999, 2000) and Romero (1997) suggests that we might find such a correlation with relative clauses also. However, the data seems to be murky and as far as I am able to tell, Condition C effects do not seem to surface consistently when the external head is reconstructed into the relative clause.

- (i) a. the [first picture of John_i] [that he_i ever said that Mary liked]
(high reading, OK for all speakers)
- b. *the [first picture of John_i] [that he_i said that Mary ever liked]
(low reading, * for some speakers, OK for others)

Since Sauerland 1998, we have a good handle on why Condition C reconstruction effects do not surface where the matching analysis is available. Under the matching analysis, the external head and its internal representation are related by ellipsis and not movement, and we know independently that in ellipsis, pronouns can satisfy (weak) identity with names. This phenomenon has been dubbed 'Vehicle Change' by Fiengo and May (1994). Sauerland (1998) argues that the absence of Condition C effects under the matching analysis can be related to the phenomenon of Vehicle Change.

Unfortunately, we have already excluded the matching analysis for the low readings (see section 5.3). The head raising analysis makes the right predictions for those speakers who rule out coreference in (i.b) but not for those who allow coreference there. I do not have any concrete proposal as to why this may be so. I refer the reader to Safir (1999), where a proposal is advanced for unexpected obviations of Condition C effects under reconstruction.

9. APPENDIX A: MOVEMENT OF *FIRST/ONLY/-EST*

There is independent evidence provided by Szabolcsi (1986) and Heim (1995) that shows that superlative *-est* moves to associate with focus.²⁵ The examples in (80) show that indeed, *-est* associates with focus (cf. Ross 1964; Jackendoff 1972; Szabolcsi 1986; Gawron 1996; Heim 1995):

- (80) a. **Joan_F** gave Caterina the most expensive present.
 ≈ Some people gave Caterina presents. Of all those presents, the present that was given by Joan was the most expensive.
- b. Joan gave **Caterina_F** the most expensive present.
 ≈ Joan gave some people presents. Of all those presents, the present given to Caterina was the most expensive.

Depending upon where the focus falls, we get truth-conditionally distinct readings (cf. (80a) vs. (80b)). Furthermore, the association of *-est* with focus is constrained by syntactic islands (cf. (81)).

- (81) (* indicates the unavailability of the indicated reading)
- a. **Bill_F** expected [PRO to get the fewest letters].
 True if: Bill expected to get 2 letters, Jane expected to get 3, and Polly expected to get 5 letters.
- b. **Bill_F** wanted [PRO to get the fewest letters].
 True if: Bill wanted to get 2 letters, Jane wanted to get 3, and Polly wanted to get 5. (*de dicto* reading)
- c. **Bill_F** demanded [that you get the fewest letters].
 True if: Bill demanded that you get 2 letters, Jane demanded that you get 3 letters, and Polly demanded that you get 5.
- d.*/??? **Bill_F** said [that you get the fewest letters].
 Not necessarily true if: Bill said that you got 2 letters, Jane said that you got 3, and Polly said that you got 5.
- e. ***Bill_F** likes the student who John gave the fewest presents to.
 Not necessarily true if: Bill likes the student who John gave 2 presents, Jane likes the student who John gave 3 presents, and Polly likes the student who John gave 5 presents.

²⁵ Szabolcsi and Heim's discussion carries over largely to ordinals like *first* and to nominal *only*. Like superlative *-est*, they associate with focus. For reasons that I do not understand, speakers find it easier to get association with focus readings with superlatives than with ordinals and nominal *only*. Likewise, many speakers are unable to get 'long-distance' association with focus readings with ordinals and nominal *only*.

- f. ***Bill_F** made the claim that you got the fewest letters.
 Not necessarily true if: Bill made the claim that you got 2 letters, Jane made the claim that you got 3, and Polly made the claim that you got 5.

Szabolcsi (1986) and Heim (1995) argue that the paradigm in (81) reflects LF-movement of *-est* and the assumption that *-est* can only associate with a focus that it *c*-commands at LF. In order for *-est* to associate with the focus on *Bill*, it has to move to a position where it *c*-commands *Bill*. In the case of (81e, f), this would involve movement of *-est* out of an island. In fact the conditions on the movement of *-est* seem to be even stricter. The contrast between (81c) and (81d) suggests that while *-est* can move out of a subjunctive clause, it cannot move out of a finite clause. Therefore, *-est* is unable to associate with focus on *Bill* in (81d–f). The LFs for the structures in (81) are shown in (82).

- (82) a. *-est* λd Bill_F expected [PRO to get *d*-few letters]
 b. *-est* λd Bill_F wanted [PRO to get *d*-few letters]
 c. *-est* λd Bill_F demanded [that you get *d*-few letters]
 d.**-est* λd Bill_F said [that you got *d*-few letters]
 e.**-est* λd Bill_F likes [the student who John gave *d*-few presents]
 f.**-est* λd Bill_F made [the claim that you got *d*-few letters]

The LFs in (82) seem to suggest that *-est* moves to a position where it takes a proposition as a complement. This is one of the proposals discussed by Heim (1995). Some details of this proposal are displayed in (83).

- (83) $est(C)(P) = 1 \Leftrightarrow \exists d[P(d) \wedge \forall Q[Q \neq P \wedge Q \in C \rightarrow \neg Q(d)]]$
 (*P* is a property of degrees, *C* a set of such properties. *-est* has no external argument under this analysis.)
 John is angriest at Mary
 LF: [C-*est*] λd [John is *d*-angry at Mary]
 Depending upon the context (and associated focus marking), *C* can be:
 (a) the set of degree properties of the form $\lambda d[x$ is *d*-angry at Mary]
 (b) the set of degree properties of the form λd [John is *d*-angry at *x*] (from Heim 1995)

Heim pursues this analysis because it is able to explain the effects of focus. However, there are also cases where what *-est* associates with does not seem to be focused in any obvious sense. These are the cases where

the associate of *-est* is a covert element like a *wh*-trace, a relative clause trace, or a PRO.

- (84) a. Who_i does John think t_i got the fewest presents?
 LF: Who_x [John thinks [*est* λ*d* [*x* got *d*-few presents]]]
- b. the boy who_i John thinks t_i got the fewest presents
 LF: the boy who_x [John thinks [*est* λ*d*[*x* got *d*-few presents]]]
- c. John wants [PRO to get the fewest presents].
 LF: John wants *est* λ*d* [PRO to get *d*-few presents]

If we want to extend the focus-based analysis in (83), we have to postulate focussed traces or another mechanism that will generate the appropriate domain restrictions.²⁶

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²⁶ With *wh*-traces, it may be plausible to appeal to the semantics of focus. With relative clauses and control constructions, such an appeal is less plausible. Certain focus-sensitive elements like *only* do not associate with traces (cf. (i)).

- (i) a. John only kissed Chris_F.
 (*only* can associate with focus on *Chris*)
- b. Who_i did John only kiss t_i?
 (*only* cannot associate with t_i)

An alternative approach is pursued by Szabolsci (1986) and Heim (1995). According to this approach, the property shared by focussed elements, questions, relative clauses, and control constructions is predicate-hood. Thus *-est* movement targets the predicates created by focus movement, or A'-movement. Control constructions may be predicative by themselves; that is, the PRO may be semantically vacuous. A version of this analysis is shown in (ii).

- (ii) $est(C)(R)(x) \Leftrightarrow \exists d [x \in C \wedge R(x, d) \wedge \text{H}29y[y \neq x \wedge \neg R(y, d)]]$
 ≈ Of the contextually salient alternatives, *x* has *R* to the highest degree.
 (*-est* has an external argument) (from Heim 1995)

The analysis in (ii) is not in principle incompatible with my proposal for relative clauses. The question of which one of these two analyses is ultimately correct is a thorny one, but not one that bears directly upon the discussion here.

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