KARLOS ARREGI

CLAUSAL PIED-PIPING*

In Basque, wh-movement can pied-pipe an entire clause. The surface syntax of clausal pied-piping structures suggests that their syntax and semantics should be similar to scope marking constructions as analyzed in the Indirect Dependency approach. However, data having to do with presupposition projection and the interpretation of *how many*-questions show that clausal pied-piping structures are actually more similar to their long-distance wh-movement counterparts than to scope marking constructions. I develop an analysis which takes into account these facts. Specifically, I show that pied-piped clauses must reconstruct, which makes the correct prediction that clausal pied-piping, unlike long-distance wh-movement, is sensitive to negative islands. Finally, I propose that reconstruction is forced by a condition on the interpretation of traces.

1. INTRODUCTION

Ortiz de Urbina (1989, 1993) argues that Basque wh-questions can involve clausal pied-piping. Specifically, a clause containing a wh-phrase can appear in the same position as the wh-phrase would in long-distance wh-movement. He proposes that clausal pied-piping constructions involve (i) wh-movement of the wh-phrase within the embedded clause, and (ii) wh-movement of this clause to the (matrix) interrogative [Spec, CP] (i.e., the canonical position for wh-phrases). The syntax of this construction is discussed in more detail in section 2.

In this paper, I discuss certain interesting semantic properties of clausal pied-piping constructions.[1] In particular, in sections 3–4 I consider Lahiri's (2002) suggestion that clausal pied-piping is semantically equivalent to

[1] All the data presented here are from the dialect spoken in the western coastal town of Ondarroa. Clausal pied-piping seems to be common to all dialects of Basque, and the data presented in section 2 reflect standard judgments in the literature (see Ortiz de Urbina 1989, 1993; Echepare 1997). However, the crucial data discussed in section 4 are, as far as I know, new in the literature.

wh scope marking in languages like Hindi or German.[2] In Lahiri's analysis of scope marking, which is a version of Dayal's (1996) Indirect Dependency approach, the 'expletive' wh-word and the embedded wh-clause form a constituent at LF which is interpreted in the specifier of the interrogative CP. This LF structure is in fact very similar to the overt structure proposed by Ortiz de Urbina for clausal pied-piping. Thus, it is worth considering the possibility that the two constructions have the same LF structure and the same interpretation. However, as I show in section 4, the predictions made by this analysis are not borne out; clausal pied-piping is in fact more similar in interpretation to long-distance wh-movement than to scope marking.

Accordingly, in section 5, I propose that pied-piping in these structures is semantically vacuous. The proposal is implemented by assuming that the pied-piped clause must be reconstructed at LF. As I show there, this analysis makes the correct prediction that clausal pied-piping is sensitive to negative islands, under the assumption that negative islands block certain cases of reconstruction (cf. Beck 1996). Finally, I hypothesize that, in order to explain the obligatoriness of reconstruction, traces cannot be interpreted as variables over propositions.

2. CLAUSAL PIED-PIPING IN BASQUE

In Basque wh-questions, the wh-phrase must be left-adjacent to the main verb. (1) is a sentence with the neutral SOV word order. In (2), where the subject is a wh-phrase, it must be left-adjacent to the verb, giving either OSV or SVO word orders. As shown in (3), any other word order (such as SOV or OVS) leads to ungrammaticality.

(1)   Jonek Miren   ikusi ban.[3]
        Jon.E Miren.A seen   had

        'Jon saw Miren.'

(2) a. Miren   señek   ikusi ban?   b. Señek   ikusi ban Miren?
         Miren.A who.E   seen   had   who.E   seen   had Miren.A

   'Who saw Miren?'   'Who saw Miren?'

---

(3) a.* Señek Miren   ikusi ban?   b.* Miren   ikusi ban señek?
      who.E Miren.A seen had   Miren.A seen had who.E

    'Who saw Miren?'   'Who saw Miren?'

Ortiz de Urbina (1989) argues that this adjacency requirement should
be analyzed as resulting from wh-movement and movement of the verb (and
auxiliary) from I to C, as schematized in (4).[4, 5]

(4)   Wh-movement in Basque
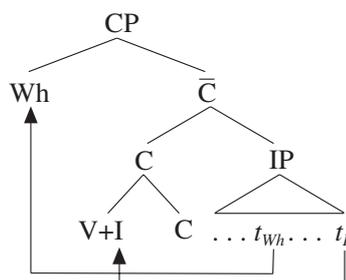
As evidence that Basque has wh-movement, Ortiz de Urbina shows
that the adjacency requirement can involve long-distance dependencies,
i.e. a wh-phrase originating in an embedded clause can be extracted so
that it is left-adjacent to the verb heading the interrogative clause, as illus-
trated in (5, 6). Furthermore, as expected, this movement is sensitive to
islands, as exemplified in (7) with (ungrammatical) extraction from a
complex NP.

(5)   Se$_1$ pentzate su [$_{CP}$ t_1 idatzi   rabela Jonek]?
         what$_1$ you-think   [$_{CP}$ t_1 written has   Jon.E]

         'What do you think Jon wrote?'

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[4]   In this analysis, any phrase to the left of the wh-phrase is left-adjoined to CP, and any
phrase to the right of the verb (and auxiliary) is either IP-internal or right-adjoined to CP.
It is also important to note that what moves to C from I can include more than one
morphological word (i.e., main verb and auxiliary). Ortiz de Urbina assumes that the verb and
the auxiliary form a syntactic unit. See Ortiz de Urbina (1989, 1995) for details.
[5]   In Arregi (2002), I propose a different analysis for Basque wh-questions, in which there
is no overt movement to [Spec, CP]. However, with respect to clausal pied-piping, both
analyses make similar predictions, so this is not important for the arguments presented
here.

(6)   Se₁   pentzate su [CP esan dabela Mirenek [CP t₁ idatzi
        what₁ you-think   [CP said has   Miren.E [CP t₁ written

        rabela Jonek]]?
        has   Jon.E]]

        'What do you think Miren said Jon wrote?'

(7)   * Se₁   ikusi su   [DP [CP t₁ idatzi   raben] gixona]?
         what₁ seen   you-have [DP [CP t₁ written has] man.A]

         'What did you see the man who wrote?'

A possible alternative to long-distance wh-movement is clausal pied-
piping, which is exemplified in (8, 9).

(8)   [CP Se   idatzi   rabela Jonek] pentzate su t_CP?
        [CP what written has   Jon.E] you-think   t_CP

        'What do you think Jon wrote?'

(9)   [CP1 Se   idatzi   rabela Jonek] pentzate su [CP2 esan
        [CP1 what written has   Jon.E] you-think   [CP2 said

        dabela Mirenek t_CP1]?
        has   Miren.E t_CP1]

        'What do you think Miren said Jon wrote?'

In clausal pied-piping structures, the wh-phrase is left-adjacent to the verb
within an embedded clause, and the embedded clause itself is left-adjacent
to the verb heading the interrogative clause. Ortiz de Urbina analyzes
these structures as the result of wh-movement involving pied-piping of
the embedded clause. Pied-piping is licensed by movement of the wh-phrase
to [Spec, CP] within the embedded clause. This analysis is schematized
in (10).

(10)   *Clausal pied-piping*
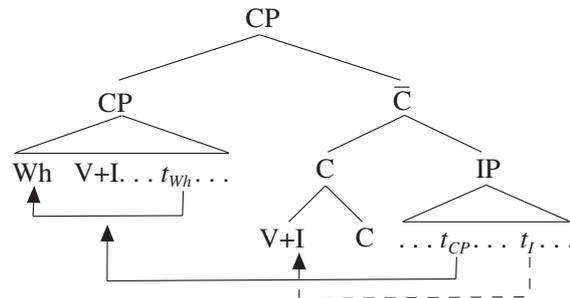
I will assume that this analysis of the syntax of clausal pied-piping is essentially correct. As with any other case of pied-piping, a question that becomes relevant at this point is what motivates pied-piping. In this paper, I argue that it is not semantically motivated, since, in fact, the pied-piped clause is interpreted in its base position. However, before I present the analysis in section 5, in the following two sections I examine an alternative analysis in which pied-piping is semantically relevant. In section 3, I discuss the Indirect Dependency approach to wh scope marking constructions, noting that the structure assumed in this approach is very similar to the overt structure assumed here for clausal pied-piping. This suggests that we should also adopt the Indirect Dependency approach for clausal pied-piping. However, as I show in section 4, clausal pied-piping constructions are in fact more similar to their long-distance movement counterparts, which provides evidence against the Indirect Dependency approach to clausal pied-piping.

3. CLAUSAL PIED-PIPING AND SCOPE MARKING

In Lahiri (2002), it is suggested that clausal pied-piping structures could be taken to be the 'semantic equivalents' of wh scope marking constructions in languages like Hindi or German. In this section, I summarize the Indirect Dependency approach to scope marking, and, making Lahiri's suggestion explicit, I show how it might be applied to clausal pied-piping in Basque.

In a scope marking construction, the wh-phrase does not undergo long-distance movement and the main interrogative clause contains another wh-phrase, typically equivalent to English *what*, which can be taken to 'mark the scope' of the embedded wh-phrase. The wh-phrase in the embedded clause may or may not undergo wh-movement within the embedded clause, depending on whether the language has (overt) wh-movement or not. Scope marking is illustrated in the Hindi sentence in (11) (example (33) in Lahiri 2002).

> (11)   raam   kyaa soctaa hai [$_{CP}$ ki   ramaa kis-se   baat
>   Raam   what think-PR   [$_{CP}$ that Ramaa who-INS   talk
>
>   karegii]?
>   do-FUT]
>
>   'Who does Raam think Ramaa will talk to?'

Two types of analyses have been offered in the literature for the syntax and semantics of scope marking structures.[6] Under the *Direct Dependency* approach, *what* in the interrogative clause is taken to be a kind of expletive element, used in order to indicate overtly the scope of the embedded wh-phrase. At LF, the expletive *what* is replaced by the embedded wh-phrase. Thus, *what* in scope marking constructions is an overt reflex of covert long-distance wh-movement. The Direct Dependency approach is developed, among others, in Tappe (1981), van Riemsdijk (1982), and McDaniel (1989).

An alternative analysis is proposed in Dayal (1994, 1996, 2000).[7] Under this analysis, termed the *Indirect Dependency* approach, *what* in the interrogative clause is not an expletive scope marker. Rather, it is interpreted as a wh-quantifier over propositions. Furthermore, the embedded clause containing the wh-phrase is interpreted as a question (a set of propositions) which provides a restriction for *what*. Thus, the semantics of a scope marking structure like that in (11) is taken to be similar to the sequence of English questions *What does Raam think? Who will Ramaa talk to?* There are different proposals as to how the embedded question provides a restriction for *what*. In Dayal's original analysis (1994, 1996), *what* is not restricted syntactically by the embedded wh-clause (which, she assumes, is adjoined to the right of the matrix clause); rather, *what* introduces a variable over questions which is bound by the embedded wh-clause.[8]

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[6] For several recent analyses of scope marking constructions in different languages, see Lutz et al. (2000). Most articles in this collection can be grouped under either of the two approaches summarized below.

[7] Mahajan (1990, 2000), Fanselow and Mahajan (2000), and Horvath (1997) propose what might be considered an alternative to both the Direct and the Indirect Dependency approaches. As in the Direct Dependency approach, they propose that the matrix wh-phrase *what* is an expletive element. However, what replaces this expletive at LF is not the 'contentful' wh-phrase but the whole embedded clause containing it, making the LF structure of scope marking constructions very similar to the one described for Basque clausal pied-piping in the previous section. These analyses, however, do not provide an explicit account of the interpretation of these sentences. Since the 'contentful' wh-phrase is not in the specifier of the interrogative CP, some additional assumptions are needed in order to assign the wh-phrase the right scope. As discussed in Dayal (2000), depending on which additional assumptions are adopted, this alternative can be subsumed under the Direct or the Indirect Dependency approach.

Sternefeld (2000) also provides an explicit semantics for this type of analysis of scope marking, based on higher-order choice functions. This implementation of Horvath's and Fanselow and Mahajan's approaches makes them, for our purposes, equivalent to the Direct Dependency approach, in that it basically involves quantification over propositions.

[8] See Dayal (1994, 1996, 2000). The specific details of this proposal are not important for what follows. This version of the Indirect Dependency approach and the one discussed immediately below basically make the same predictions for our purposes.

As shown in Herburger (1994), Dayal (2000), and Lahiri (2002), the idea that the embedded wh-clause provides a restriction to *what* can also be implemented in other ways.[9] Specifically, one can assume that the embedded wh-clause provides a restriction to *what* syntactically, i.e. the former is a syntactic complement of the latter at LF.[10] The LF structure of (11) under this approach is that in (12).[11]

(12) $[_{CP}$ $[_{DP}$ kyaa $[_{CP}$ kis-se   ramaa   baat   karegii$]]_1$ raam
      $[_{CP}$ $[_{DP}$ what $[_{CP}$ who-INS Ramaa   talk   do-FUT$]]_1$ Raam

      soctaa hai $t_1]$
      think-PR $t_1]$

As shown in Dayal (2000) and Lahiri (2002), this structure can be interpreted straightforwardly, under the assumption that *what* is a wh-quantifier over propositions. Lahiri's proposal is summarized in (13a). The resulting denotation of the scope marking structure can be paraphrased as in (13b). Note that, in simple cases, the denotation of the scope marking construction is equivalent to the denotation of its long-distance movement counterpart.[12, 13]

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[9] Dayal (2000) argues that this flexibility in implementing the Indirect Dependency approach can account for differences between scope marking constructions in different languages.

[10] How this is done exactly is not important for our purposes. Herburger (1994) proposes that in German, *was* 'what' and the embedded wh-clause form a constituent at D-structure, and that *was* alone undergoes wh-movement overtly. As noted by Lahiri (2002), this analysis must also assume that, at LF, the embedded wh-clause must move to merge with *was*, so that the former can provide a restriction to the latter. On the other hand, Lahiri (2002) also suggests for Hindi that the two elements form a constituent at D-structure, and that the embedded wh-clause is extraposed and (right-)adjoined to the matrix clause. At LF, the extraposed clause is reconstructed, so that it can provide a restriction to *what*. In both implementations, the crucial point is that the two elements form a constituent at LF.

[11] This structure also assumes that all the relevant wh-phrases are interpreted in some [Spec, CP] at LF.

[12] Nevertheless, the Indirect Dependency approach does predict that there are semantic differences between scope marking structures and long-distance movement constructions. This is the topic of section 4.

[13] Following Cresti (1995) and Heim and Kratzer (1998), I assume that the index of a moved element is the "binder" of the trace left behind. Specifically, the structure resulting from movement of X_i, i.e. $[X_i$ $[_Y . . . t_i . . .]]$, is rebracketed as $[X$ $[i$ $[_Y . . . t_i . . .]]]$. In this structure, the constituent $[i$ $Y]$ is interpreted as $\lambda\alpha.\beta$, where α is the same variable as the one chosen as the translation of t_i, and β is the translation of Y. In (13), the index 1 of the DP in the matrix [Spec, CP] is thus adjoined to $\bar{C}$, and is interpreted as the binder (in the above sense) of the trace t_1 of DP. Since t_1 is interpreted as the variable q, and $\bar{C}$ is interpreted as $\lambda p.p = {}^\wedge think'(j, q)$, the constituent $[1$ $\bar{C}]$ is interpreted as $\lambda q.\lambda p.p = {}^\wedge think'(j, q)$.

(13) a. *The semantics of scope marking*

$$\lambda p.\exists q[\exists x[q = \text{^will-talk}'(m, x)] \ \& \ p = \text{^think}'(j, q)] \equiv$$
$$\lambda p.\exists x[p = \text{^think}'(j, \text{^will-talk}'(m, x)]$$

CP

$\lambda W.\lambda p.\exists q[\exists x$
$[q = \text{^will-talk}'(m, x)] \ \& \ W(q) \ (p)]$
DP

$\lambda q.\lambda p.p = \text{^think}'(j, q)$

$1 \quad \lambda p.p = \text{^think}'(j, q)$
$\overline{\text{C}}$

$\lambda T.\lambda W.\lambda p.$
$\exists q[T(q) \ \& \ W(q) \ (p)]$
DP

$\lambda p.\exists x[p = \text{^will-talk}'(m, x)]$
CP

Raam thinks t_1

what

who Ramaa will talk to
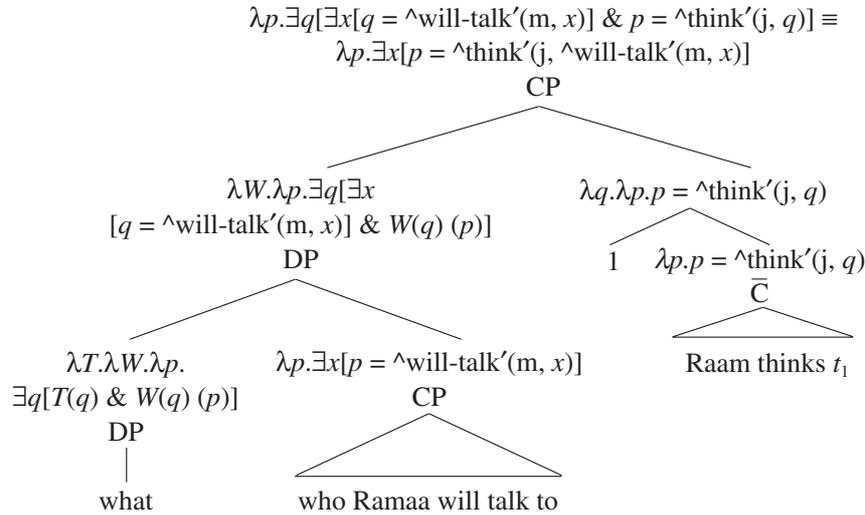
b. Which of the possible answers q to the question 'Who will Ramaa talk to' are such that Raam thinks q?

There are evident parallels between the LF structure of scope marking constructions and the structure for Basque clausal pied-piping proposed by Ortiz de Urbina (1989, 1993). Specifically, the embedded wh-clause in both cases is in a similar syntactic position, and the embedded wh-phrase (*who* in (13)) remains in [Spec, CP] in the embedded clause, rather than moving to the higher clause. Thus, one could assume that the LF structure of clausal pied-piping in Basque is similar to the one shown in (13) for scope marking, with a covert *se* 'what' heading the pied-piping clause. Under this assumption, the clausal pied-piping example in (8), repeated below as (14a), would have the structure in (14b), which would be interpreted in the same way as the scope marking structure in (13), giving (14c).

(14) a. Se   idatzi   rabela Jonek   pentzate su?
       what   written has   Jon.E   you-think

   'What do you think Jon wrote?'

b. [$_{CP}$ [$_{DP}$ *what* [$_{CP}$ What written has Jon]] you-think t]

c. $\lambda p.\exists q[\exists x[q = \text{^write}'(j, x)] \ \& \ p = \text{^think}'(\text{you}, q)] \equiv$
   $\lambda p.\exists x[p = \text{^think}'(\text{you}, \text{^write}'(j, x))]$

I will refer to this analysis of clausal pied-piping as the 'Indirect Dependency approach'. This analysis of clausal pied-piping seems attractive, since it explains why there is pied-piping: the embedded clause provides a restriction to a (covert) wh-quantifier, so they must move together. However, as I argue in the next section, certain predictions made by this analysis are not borne out, which, in turn, motivates an analysis of the phenomenon, developed in section 5, in which pied-piping is in fact semantically vacuous.

4. The Syntax and Semantics of Clausal Pied-Piping

In this section, I discuss the Indirect Dependency approach to clausal pied-piping. Specifically, I show that clausal pied-piping constructions are interpreted in the same way as their long-distance wh-movement counterparts, which means that the Indirect Dependency approach is not on the right track. The argument is based on (i) the presuppositions of questions, and (ii) ambiguities appearing in questions with amount wh-phrases.

4.1. *Presuppositions of Clausal Pied-Piping Structures*

Herburger (1994) notes an important difference between long-distance wh-movement and scope marking in German. The following examples (cf. example (15) in Lahiri 2002) illustrate this difference with Hindi scope-marking and English long-distance wh-movement:

(15) a. *Scope marking*

raam   kyaa soctaa hai [$_{CP}$ ki   ramaa-ne kisko dekha].
Raam what thinks   [$_{CP}$ that Ramaa-E who   saw]

'Who does Raam think that Ramaa saw?'

b. *Long-distance movement*

Who does Raam think that Ramaa saw?

In the long-distance movement structure in (15b), the speaker does not necessarily presuppose that Ramaa saw someone; rather, the speaker presupposes that Raam thinks that Ramaa saw someone. However, in the scope marking structure in (15a), the speaker does presuppose that Ramaa saw someone. Under the assumption that a question like *Who did Ramaa see?* presupposes that Ramaa saw someone, this difference between scope marking and long-distance wh-movement means the following: in the former, the matrix sentence inherits the presupposition; in the latter, it

does not. Consider the structure and interpretation of the two sentences under the Indirect Dependency approach:

(16)   *Scope marking*

    a. [$_{CP}$ [$_{DP}$ kyaa [$_{CP}$ ki   ramaa-ne kisko dekha]]$_1$ raam
       [$_{CP}$ [$_{DP}$ what [$_{CP}$ that Ramaa   who   saw]]$_1$ Raam

       t_1 soctaa hai]
       t_1 thinks   ]

    b. $\lambda p.\exists q[\exists x[q = {}^{\wedge}\mathrm{saw}'(\mathrm{m}, x)] \ \& \ p = {}^{\wedge}\mathrm{think}'(\mathrm{j}, q)]$

(17)   *Long-distance movement*

    a. [$_{CP}$ who$_1$ does Raam think [$_{CP}$ that Ramaa saw t_1]]

    b. $\lambda p.\exists x[p = {}^{\wedge}\mathrm{think}'(\mathrm{j}, {}^{\wedge}\mathrm{saw}'(\mathrm{m}, x))]$

Herburger (1994) and Dayal (1996) argue that this difference between scope marking and long-distance movement follows from the different positions that the embedded clause occupies in the two structures, and from natural assumptions about presupposition projection in questions. In Lahiri (2002), these assumptions are spelled out as follows:

(18)   If *D* is a presuppositional determiner, then a sentence of the form $D\alpha[A\alpha][B\alpha]$ (where α is a variable and *A* and *B* are (1-place) predicates) presupposes the conjunction of $\exists\alpha[A\alpha]$ and any other presuppositions that may be associated with the predicate in the restriction, viz. *A*. (Lahiri 2002, ex. (55))[14]

(19)   If *Q* is a question, then *Q* presupposes that $\exists p[\check{}p \ \& \ p \in Q]$. (Lahiri 2002, ex. (56), adapted from Karttunen and Peters 1976)[15]

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[14] That a sentence of the form $D\alpha[A\alpha][B\alpha]$ presupposes $\exists\alpha[A\alpha]$ is fairly uncontroversial, at least for wh-phrases. Lahiri (2002) also needs to assume that the sentence inherits the presuppositions associated with *A* because, following arguments given in Dayal (1996), he assumes that the denotation of a question is simply the set of possible answers to it (i.e., Hamblin's (1973) denotation for questions), not the set of true answers to it (i.e., Karttunen's (1977) denotation for questions). Under Lahiri's assumptions, if the presuppositions of the restriction of the wh-determiner *what* were not inherited by the matrix question, the latter would simply presuppose that there is a possible answer to the embedded question, but not necessarily a true one, which is what seems to be needed in this case.

[15] In fact, Lahiri (2002), following Karttunen and Peters (1976), uses the word 'implicates', rather than 'presupposes', in (19) (his 56). In this part of the article, Lahiri uses the terms 'presuppose' and 'implicate' interchangeably. I have changed Lahiri's particular formulation of (19) simply for consistency in the terminology.

The scope marking structure in (16) contains the wh-determiner *kyaa* 'what', whose restriction is the embedded wh-question *ki ramaa-ne kisko dekha* 'Who did Ramaa see?'. As with any other wh-determiner, we can assume that *kyaa* is presuppositional. Thus, by (18), the matrix sentence inherits the presuppositions of the embedded wh-question. By (19), this embedded question presupposes that there is a true answer to it, i.e. that Ramaa saw someone. Therefore, the matrix sentence also presupposes that Ramaa saw someone. Furthermore, the whole clause also presupposes that Raam thinks that Ramaa saw someone. The denotation of a scope marking structure such as (16) under the Indirect Dependency approach can be paraphrased as "Which of the possible answers *p* to the question 'Who did Ramaa see' are such that Raam thinks that *p*?". As can be seen clearly in the paraphrase, the whole clause presupposes that Raam thinks that there is a true answer to the question, i.e. he thinks that Ramaa saw someone.[16]

On the other hand, in the long-distance movement structure in (17), the relevant wh-determiner is *kisko* 'who', whose restriction is, if anything, something like λ*x.x is a person.* Thus, by (18, 19), (17) simply presup-

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[16] Although Lahiri's assumptions make the right predictions for Hindi scope marking, it seems that they are not entirely correct for German scope marking. Consider the following scope marking structure in German:

(i)   Was   glaubt   der Georg, [CP wen die Rosa geküßt hat]?
        what believes   the Georg [CP who the Rosa kissed   has]

        'Who does Georg believe Rosa kissed?'

According to two speakers I have consulted, (i) is not felicitous in a context in which both the speaker and hearer know that Rosa did not kiss anyone, but that Georg does think so. However, in a somewhat richer context, the judgment is different. Specifically, even if it is known that Georg has false beliefs about Rosa, (i) is felicitious as long as the embedded question is somehow salient in the discourse. For instance, this can occur if there are other people apart from Georg that share the same (false) belief. As a consequence, focusing *Georg* makes (i) felicitous in a context in which Georg has false beliefs, since it helps to bring out a context in which other people have the same false beliefs. The embedded question can also be made salient if Georg's beliefs about who kissed whom are the topic of conversation. Thus, focusing *Rosa* also makes (i) felicitous, since it helps to bring out a context in which George's beliefs about who kissed whom are the topic of conversation.

It is clear that Lahiri's specific assumptions do not predict these judgments. (i) should be infelicitious in any context in which Georg has false beliefs about Rosa. Although I cannot offer a detailed account of these facts here, it seems that the Indirect Dependency approach is better equipped to deal with the data than the Direct Dependency approach: in the former, but not in the latter, the embedded clause is interpreted as a question. Since in the Direct Depenendency approach there is no embedded question, it would be hard to imagine how to state (in a non-*ad hoc* manner) the requirement that the embedded question be salient. I would like to thank Kai von Fintel and Michael Wagner for their help in interpreting the German data.

poses that there is a person that Raam thinks that Ramaa saw; it does not presuppose that Ramaa saw someone.

Under the Indirect Dependency approach to clausal pied-piping, one might expect the same difference of interpretation between Basque clausal pied-piping and long-distance movement. However, this is not the case. Consider the minimal pair of Basque questions in (20a, 21a), similar to the one in (15). Their interpretation under this hypothesis would be as in (20b, 21b), respectively.

(20)   *Long-distance movement*

   a. Sein₁   pentzaten dau Mirenek [CP Jonek il   banela t₁]?
       who.A   thinks   Miren.E [CP Jon.E killed had   t₁]

       'Who does Miren think Jon killed?'

   b. $\lambda p.\exists x[p = {}^\wedge\text{think}'(m, {}^\wedge\text{killed}'(j, x)]$

(21) *Clausal pied-piping*

   a. [CP Sein il   banela Jonek] pentzaten dau Mirenek tCP?
       [CP who.A killed had   Jon.E] thinks   Miren.E tCP

       'Who does Miren think Jon killed?'

   b. $\lambda p.\exists q[\exists x[q = {}^\wedge\text{killed}'(j, x)] \ \& \ p = {}^\wedge\text{think}'(m, q)]$

The clausal pied-piping structure in (21a) does not presuppose that there is someone that Jon killed; rather, it has the same presupposition as the long-distance wh-movement structure in (20a), namely, that there is someone that Miren thinks that Jon killed. That this is the case is shown by the fact that both (20a, 21a) are felicitous when preceded by (22), which denies that Jon killed someone:

(22)   Jonek es   eban iñor   il,   bañe Mirenek
       Jon.E not had   anyone killed but   Miren.E

       pentzaten dau seosein   il   banela.
       thinks   someone.A killed had

       'Jon didn't kill anyone, but Miren thinks that he killed someone.'

In the Indirect Dependency analysis, it is predicted that the clausal pied-piping structure (21) presupposes that Jon killed someone, and that Miren thinks that Jon killed someone. On the other hand, the long-distance movement counterpart (20) only presupposes that Miren thinks that Jon killed someone. Since the clausal pied-piping structure in fact does not presuppose that Jon killed someone, we must assume that it is at least

possible for the clausal pied-piping construction in (21) to have the same (LF) structure as its long-distance counterpart in (20).[17]

4.2. *'How Many' Questions*

When an amount wh-phrase (such as *how many . . .*) undergoes long-distance movement over a scope-bearing element (e.g., an intensional verb), the resulting question is ambiguous. Consider the English example in (23).

(23)   [How many books]₁ do you think [$_{CP}$ Bill read t_1]?

    a. *many > think*

       What is the number of books such that you think that Bill read those books?

    b. *think > many*

       What is the number *n* such that you think that Bill read *n*-many books?

Let us assume that *how many NP* can be divided into a wh-part (*how*), interpreted roughly as *what number n*, and a (non-wh) quantifier part (*many NP*), interpreted roughly as *n-many NP* (see, e.g., Obenauer 1984; Heim 1987; Cresti 1995; Rullmann 1995; Beck 1996). We can represent the ambiguity in (23) in terms of the placement (at LF) of the quantifier part. In the reading in (23a), the quantifier is interpreted in the matrix clause, and thus has scope over the verb *think*. In the reading in (23b), the quantifier part is interpreted in the embedded clause, and thus has scope under *think*. We can assume therefore, that the LF structures for the readings in (23a, b) are those in (24a, b), respectively.

(24) a. [$_{CP}$ what *n* [*n*-many books₁ [you think [$_{CP}$ Bill read t_1]]]]

    c. [$_{CP}$ what *n* [you think [$_{CP}$ *n*-many books₁ [Bill read t_1]]]]

As shown in Lahiri 2002, this ambiguity does not exist in scope marking constructions in Hindi. Consider the example in (25) (Lahiri's (68)).

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[17]   Note that this argument shows that a clausal pied-piping structure can have a similar structure and interpretation as its long-distance movement counterpart, but it does not show that such pied-piping structure cannot be analyzed as in the Indirect Dependency approach. This is because the presuppositions of the long-distance movement structure are weaker than those of the Indirect Dependency structure. This aspect of the argument presented above (and of the one presented in the next subsection) is discussed in section 5.1.

(25)   rameS   kyaa   soctaa hai   [$_{CP}$ ki   raam-ne   kitnii
        Rames   what   thinks   [$_{CP}$ that Raam-E   how many

        kitabeN   paRhiiN]?
        books   read-PST]

   a.* *many > think*

    * What is the number of books such that Rames thinks that Raam
        read those books?

   b. *think > many*

    What is the number *n* such that Rames thinks that Raam read
        n-many books?

As shown in (25), *many* can have narrow scope with respect to *think* but
it cannot have wide scope over *think*. Under the Indirect Dependency
approach, the scope marking sentence in (25) would have the LF struc-
ture in (26), and the interpretation in (27).

(26)   [$_{DP}$ what [$_{CP}$ what *n* [*n*-many books$_2$ [Raam read t_2]]]]$_1$ Rames
        thinks t_1

(27) $\lambda p.\exists q[\exists n[q = $ that j read *n*-many books$] \& p = $ ^think$'$(r, q)] $\equiv$
        $\lambda p.\exists n[p = $ ^think$'$(r, that j read *n*-many books)]

In (26, 27), *many* is interpreted under the scope of *think*, thus giving the
interpretation in (25b). Furthermore, since *many* must be interpreted under
the scope of *what n*, which, in turn, must be interpreted under the scope
of the 'expletive' *what*, it is not possible to derive an LF structure in
which *many books* is higher in the structure than *think*. Therefore, the
Indirect Dependency approach, as desired, cannot derive wide scope of *many*
over *think*.

Under the Indirect Dependency approach to clausal pied-piping, the
same prediction is made. However, this prediction is not born out. Clausal
pied-piping structures have the same ambiguities as their counterparts in
long-distance wh-movement. (28) contains relevant Basque examples.

(28) a. *Long-distance movement*

    [Semat   argaski]$_1$ desiriu   rau   Jonek   [$_{CP}$ erakusti
        [how many picture]$_1$ decided   has   Jon.E   [$_{CP}$ to-show

    lagunai t_1]?
        friends.D t_1]

    'How many pictures did Jon decide to show his friends?'

b. *Clausal pied-piping*

[$_{CP}$ Semat   argaski erakusti lagunai] desiriu   rau
[$_{CP}$ how many picture to-show friends.D] decided has

Jonek t_{CP}?
Jon.E t_{CP}

'How many pictures did Jon decide to show his friends?'

Both sentences display the ambiguity discussed above for English wh-movement. The two relevant readings are paraphrased in (29).

(29) a. *decide > many*

What is the number *n* such that Jon decided to show *n*-many pictures to his friends?

b. *many > decide*

What is the number of pictures such that Jon decided to show those pictures to his friends?

That both sentences have the two readings in (29) can be shown by examining possible answers to the questions in specific contexts. Consider the context described in (30).

(30)   After his trip to New York, Jon has decided to show some of the pictures he took to his friends. Since he does not want to bore them with too many pictures, he has decided that he will show only forty of them. Furthermore, he has also decided that, among the ones he will show, he will include twenty specific ones that are particularly beautiful.

In this context, the answer to both of (28a, b) can be either *forty*, which would correspond to the reading of the question where *many* takes scope under *decide* (i.e. (29a)), or *twenty*, which would correspond to the reading in which *many* takes scope over *decide* (i.e. (29b)).

If we were to assume that the clausal pied-piping example in (28b) had an LF structure and interpretation similar to the one proposed by the Indirect Dependency approach for scope marking, it would not be possible to derive the interpretation where *many* has scope over *decide* (i.e. (29b)). Thus, we must assume that it is at least possible to assign the clausal pied-piping construction in (28b) the same LF structure as the long-distance movement construction in (28a).

More complex structures lend further support to this conclusion. For instance, consider the examples in (31).

(31) a. *Long-distance movement*

[Semat   argaski]$_1$ esa   tzu Jonek [$_{CP}$ desiriu   rabela
[how many picture]$_1$ said has Jon.E [$_{CP}$ decided has

[$_{CP}$ erakusti lagunai t_1]]?
[$_{CP}$ to-show   friends.D t_1]]

'How many pictures did Jon tell you he decided to show his
friends?'

b. *Clausal pied-piping*

[$_{CP}$ Semat   argaski erakusti lagunai] esa   tzu   Jonek
[$_{CP}$ how many picture to-show friends.D] said has Jon.E

[$_{CP}$ desiriu   rabela t_{CP}]?
[$_{CP}$ decided has t_{CP}]

'How many pictures did Jon tell you he decided to show his
friends?'

Both these sentences have the expected three readings, which are para-
phrased in (32).[18]

(32) a. *many > tell > decide*

What is the number of pictures such that Jon told you he decided
to show those pictures to his friends?

b. *tell > many > decide*

What is the number *n* such that Jon told you that there are
n-many pictures that he decided to show to his friends?

c. *tell > decide > many*

What is the number *n* such that Jon told you that he decided
to show *n*-many pictures to his friends?

5. RECONSTRUCTING PIED-PIPING STRUCTURES

Based on the conclusions reached above, in this section I develop an analysis
of clausal pied-piping constructions in which they have the same LF struc-

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[18]   In fact, the widest scope reading (32a) is a bit difficult in both sentences. However, as
noted by Fox (2000) (who attributes the observation to Kai von Fintel), for English long-
distance wh-movement, this reading is much more salient if the adverbial *on arte* 'until
now, already' is added after the matrix verb *esa tzu* 'has said' in (31). In any case, both
sentences in (31) are identical in this respect.

ture as their long-distance movement counterparts. More specifically, I propose that the pied-piped clause is obligatorily reconstructed to its base position (after extraction of the wh-phrase). In section 5.1, I present the analysis, and show how it derives the properties of clausal pied-piping discussed in section 4. In section 5.2, I argue that the reconstruction analysis makes correct predictions with respect to the interaction between negation and clausal pied-piping, and suggest that obligatory reconstruction of the pied-piped clause is derived from a condition on the interpretation of traces.

5.1. *A Reconstruction Analysis of Clausal Pied-Piping*

In section 4, I argued that the correct analysis of clausal pied-piping must assume that a clausal pied-piping construction can involve an LF structure similar to the one involved in long-distance wh-movement, i.e. (33), where CP2 is the pied-piped (and reconstructed) clause.

(33) $[_{CP1} Wh_1 \ldots [_{CP2} \ldots t_1 \ldots]]$

In the remainder of this paper, I assume this LF structure for clausal pied-piping, and show how it can be derived via reconstruction. However, it should be noted that it is not clear whether this is the only LF structure available for this construction. In particular, even though the arguments given in section 4 show that clausal pied-piping can have an LF similar to long-distance movement, they do not argue conclusively that it cannot involve the structure proposed in the Indirect Dependency approach. This is due to the fact that, with respect to the properties examined there, the long-distance movement structure gives rise to more interpretative possibilities than the one assumed in the Indirect Dependency approach. First, the scope ambiguities available for *how many* phrases in long-distance movement structures are not available for scope marking structures (see section 4.2). Second, as discussed in section 4.1, the presuppositions associated with long-distance movement structures are weaker than those arising in scope marking structures in the Indirect Dependency approach. Consider (34) in this respect.

(34)   [_{CP} Sein   il   banela Jonek] pentzaten dau Mirenek t_{CP}?
         [_{CP} who.A killed had   Jon.E] thinks   Miren.E t_{CP}

         'Who does Miren think Jon killed?

Under the Indirect Dependency approach, (34) would presuppose that Jon killed someone and that Miren thinks that Jon killed someone. On the

other hand, if (34) has the LF structure in (33), it has the weaker presupposition that Miren thinks that Rosa killed someone.

Thus, given that a long-distance movement structure has more interpretative possibilities than its Indirect Dependency counterpart, one could assume that clausal pied-piping structures are ambiguous between the two corresponding LF structures. In the Indirect Dependency structure, the embedded wh-clause would be the complement of a covert *what*, and pied-piping occurs because this *what* requires a complement which is interpreted as a question. In this case, the sentence would only have the more restricted readings available to scope marking constructions. On the other hand, in the long-distance movement structure, only the wh-phrase is interpreted in the Spec of the matrix CP, which means that pied-piping in this case is semantically vacuous. In this case, the sentence would display the less restricted interpretative possibilities associated with long-distance movement structures.

In order to show whether clausal pied-piping can involve the structure proposed by the Indirect Dependency approach, we would need some property which, according to the Indirect Dependency approach, would make a scope marking construction grammatical in a context where its long-distance movement counterpart is ungrammatical. I have not been able to find such property in the literature on scope marking constructions. In the analysis developed below, I concentrate only on the long-distance movement structure for clausal pied-piping, and leave the question of the availability of the Indirect Dependency structure for clausal pied-piping as a topic in need of further research.

In order to derive the LF structure in (33), I propose that clausal pied-piping structures involve reconstruction. Consider the example in (35a). Its LF structure, as shown in (35b), is derived in two steps: (i) the wh-word moves out of the pied-piped clause, so that it has scope over the matrix sentence; and (ii) the remnant clause is reconstructed to its base position.[19] The denotation of the resulting structure is (35c).

(35) a. [$_{CP}$ Se   idatzi   rabela Jonek] pentzaten dau Mirenek t_{CP}?
         [$_{CP}$ what written has   Jon.E] thinks   Miren.E t_{CP}

         'What does Miren think Jon wrote?'

---

[19] Under the Copy Theory of movement (cf. Chomsky 1993), reconstruction in this case would consist in deleting the upper copy of the moved CP. Translating the present analysis into these terms would involve spelling out certain details of the Copy Theory, a task which extends beyond the scope of this paper. I leave this as a question for future research.

b. what [[$_{CP}$ t_{Wh} written has Jon.E] thinks Miren.E t_{CP}] →
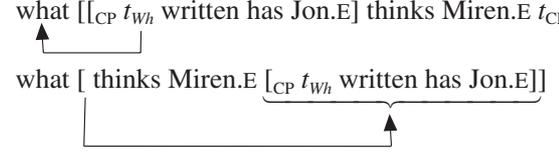
what [thinks Miren.E [$_{CP}$ t_{Wh} written has Jon.E]]

c. $\lambda p.\exists x[p = {^\wedge}think'(m, {^\wedge}write'(j, x))]$

Semantically, the most important difference between this analysis and the Indirect Dependency approach is that, in the former, there is no quantification over propositions. Accordingly, there is no (empty) wh-quantifier over propositions, and the embedded clause is interpreted as a proposition, not as a question.

Since, in this analysis, clausal pied-piping involves the same LF structure as long-distance wh-movement, it is clear how the properties discussed in the previous section are derived. Under the assumptions discussed in section 4.1, the fact that the two constructions have the same LF structure makes the correct prediction that they involve the same presuppositions. With respect to *how many* questions, consider one of the examples that were discussed in section 4.2, repeated below as (36). As shown there, this sentence displays the scope ambiguity in (37).

(36)   [$_{CP}$ Semat   argaski erakusti lagunai] desiriu   rau
       [$_{CP}$ how many picture to-show friends.D] decided has

       Jonek t_{CP}?
       Jon.E t_{CP}

       'How many pictures did Jon decide to show his friends?'

(37) a. *decide > many*

       What is the number *n* such that Jon decided to show *n*-many pictures to his friends?

     b. *many > decide*

       What is the number of pictures such that Jon decided to show those pictures to his friends?

After extraction of the wh-phrase *semat argaski* 'how many pictures' and reconstruction of the pied-piped CP, (36) has the structure in (38).

(38)   [Semat   argaski]$_1$ [desiriu   rau Jonek [$_{CP}$ t_1 erakusti
       [how many   picture]$_1$ [decided   has Jon.E [$_{CP}$ t_1 to-show

       lagunai]]
       friends.D]]

Since this structure is the same as in long-distance movement, the scope ambiguity is derived in the same way. If the non-wh quantifier part (*many pictures*) is reconstructed into the embedded CP, the matrix verb will have scope over it, giving the reading in (37a). If it does not reconstruct, it will have scope over the matrix verb, giving the reading in (37b) (see section 4.2 for details).

Thus, the reconstruction approach defended here correctly derives the properties of clausal pied-piping examined in section 4. However, it is important to note that (35b) is not the only LF that would give the desired interpretation for (35a). More specifically, if the pied-piped CP were not reconstructed, as in (39), the interpretation of the sentence would actually be the same, i.e. (35c).

(39) $[Se_2$ $[[_{CP} t_2$ idatzi   rabela Jonek] [pentzaten dau
        [what$_2$ $[[_{CP} t_2$ written   has   Jon.E] [thinks

        Mirenek t_{CP}]]]
        Miren.E t_{CP}]]]

In order to see how this is the case, consider the interpretation of the structure in (39) at the point of the lower segment of the matrix CP (where x is the variable bound by the wh-phrase *se* 'what'):

(40) $\lambda p.p = ^think'(m, ^write'(j, x)]$
                                CP

        ^write$'(j, x)$ $\lambda q.\lambda p.p = ^think'(m, q)$
           CP

                              1        $\lambda p.p = ^think'(m, q)$
                                              $\overline{C}$

        t_2 Jon wrote t_2

                                       Miren thinks t_1

As shown in (40), interpreting the embedded CP in the higher position has no effect for interpretation. Since the moved CP and its trace are of the same type (i.e. $\langle s,t \rangle$), this movement has no effect on scope. Thus, the structure with no reconstruction gives the same interpretation as the structure with reconstruction. It is important to note that, even though the moved CP is interpreted in the raised position, this structure is very different from the one proposed in the Indirect Dependency approach. Whereas in the Indirect Dependency approach this CP is interpreted as a question (which

provides a restriction to the covert *what*), in this analysis it is interpreted as a proposition.

Nevertheless, I would like to propose that clausal pied-piping does involve reconstruction, and that the LF structure in (39) is not possible. In section 5.2, I present evidence that this is indeed the case, and conclude with some considerations as to why this should be so.

5.2. *Reconstruction and Negative Islands*

The hypothesis that clausal pied-piping involves reconstruction allows us to explain one further property of these structures that has not been mentioned so far, namely, that this type of movement cannot occur across negation. As shown by the contrast in (41), while long-distance movement is allowed across negation, clausal pied-piping is not.[20]

(41) a.*[$_{CP}$ Sein jun danik] es tau esan Mirenek t_{CP}?
    [$_{CP}$ who gone has] not has said Miren.E t_{CP}

    'Who didn't Miren say left?'

  b. Sein$_1$ es tau esan Mirenek [$_{CP}$ t_1 jun danik]?
    Who$_1$ not has said Miren.E [$_{CP}$ t_1 gone has]

    'Who didn't Miren say left?'

I would like to propose that the ungrammaticality of (41a) is due to a negative island effect. More specifically, under the assumption that negation blocks reconstruction of pied-piped material (see Heim 1992; Beck 1996), and that, by hypothesis, clausal pied-piping involves reconstruction of pied-piped material, it is predicted that clausal pied-piping is blocked by negation.[21]

Beck (1996) discusses certain types of wh-phrases, such as *how many*,

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[20]   As is usual in negative questions, (41b) sounds odd in the absence of a proper context. Its status improves if the number of potential answers to the question is restricted by context. For instance, the question is felicitous if Miren was talking about four people, but only said about two of them that they had left. In this context, the question is a request for the identities of the other two people. In contrast, (41a) is clearly ungrammatical, even in the context just described.

[21]   The fact that clausal pied-piping is blocked by negation might be seen as counter-evidence to the claim made in the previous section that this construction is different from scope marking. As is well known, negation also blocks scope marking (see Dayal 1996; Beck 1996). However, as shown below, these facts can be accommodated rather naturally within the reconstruction approach, so they cannot be used as evidence for the Indirect Dependency approach to clausal pied-piping.

how often, and *why*. As is well known, questions involving these phrases lack certain expected readings when wh-movement is across negation, as exemplified in (42) with *how many*.[22]

(42)   [Semat   etxe]₁ es   eban ikusi Jonek t_1?
        [how-many house]₁ not had   seen Jon.E t_1

        'How many houses didn't Jon see?'

     a. For which *n*: There are *n* houses that Jon didn't see.

     b.*For which *n*: It is not the case that Jon saw *n* houses.

The expressions in (42a, b) are informal paraphrases of the two expected readings for (42), under the assumption that *how many* involves a wh-part and a non-wh part (see section 4.2). In (42a), the non-wh part takes scope over negation; in (42b), it takes scope under negation. As shown in (42), this second reading is not possible. We can represent these two readings syntactically as in (43).

(43) a. *many > not*
        [$_{CP}$ what$_n$[[t_n-many houses]₁ [Jon didn't see t_1]]]

     b.**not > many*
        [$_{CP}$ what$_n$[Jon didn't see [t_n-many houses]]]

In both structures, the wh-part is extracted out of the moved DP. Furthermore, in (43b), the rest of the DP is reconstructed below negation.[23] Under these assumptions, the unwanted reading represented in (42b, 43b) is ruled out by Beck's (1996) *Minimal Negative Structure Constraint* (MNSC), which rules out sentences in which negation intervenes between a trace created at LF and its antecedent, as schematized in (44).

(44)   * [XP₁[. . . Neg . . . [. . . t_1^{LF} . . .]]]

In (43b), reconstruction results in an LF trace (t_n) which is separated from its antecedent by negation, so it is ruled out by the MNSC. On the other

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[22]   The literature on negative islands (and on other so-called 'weak islands') and their effect on certain kinds of wh-movement is extensive, including Ross (1984), Obenauer (1984), Kroch (1989), Rizzi (1990), Frampton (1991), Szabolsci and Zwarts (1993), Cresti (1995), and Rullmann (1995).

[23]   In (43b), the DP is reconstructed to object position. However, if we assume that it is interpreted as a generalized quantifier, it should reconstruct to a position where it can be interpreted as such, e.g. to *v*P. This detail is not important, and I have ignored it for ease of exposition.

hand, in (43a), t_n is not separated from its antecedent by negation, and t_1 was not created at LF.[24]

Returning to clausal pied-piping, we see clearly now what is wrong when negation is involved. The relevant sentence is (41a), repeated here as (45).

(45)   * [$_{CP}$ Sein jun   danik] es   tau esan Mirenek t_{CP}?
       [$_{CP}$ who gone has] not has said Miren.E t_{CP}

       'Who didn't Miren say left?'

Under the hypothesis that clausal pied-piping involves reconstruction of the pied-piped CP, the LF structure of this sentence is as in (46).

(46)   [sein$_1$ [*es* tau esan Mirenek [$_{CP}$ t_1 jun   danik]]]
       [who$_1$ [*not* has said Miren.E [$_{CP}$ t_1 gone has]]]

Structure (46) violates the MNSC, since, after reconstruction, *es* 'not' intervenes between *sein* 'who' and its trace. If, on the other hand, reconstruction of the pied-piped CP were not obligatory, (45) could have the LF structure in (47), which does not violate the MNSC; that is, *es* 'not' does not intervene between the wh-phrase and its trace.

(47)   [sein$_1$ [[$_{CP}$ t_1 jun   danik] [*es* tau esan Mirenek t_{CP}]]]
       [who$_1$ [[$_{CP}$ t_1 gone has] [*not* has said Miren.E t_{CP}]]]

Since (45) is ungrammatical, I conclude that (47) is not a possible LF structure for it, and that clausal pied-piping necessarily involves reconstruction of the pied-piped CP.

Thus, the interaction between negation and clausal pied-piping offers evidence that the latter involves reconstruction at LF. The question that becomes relevant now is why this is the case. I would like to hypothesize that it is the result of condition (48) on the interpretation of traces.

(48)   Traces can only be of type e.[25, 26]

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[24]   Beck (1996) attributes to Heim (1992) the idea that reconstruction is the crucial factor in ruling out the relevant readings of these sentences. There are other accounts of these facts in the literature, including Kroch (1989), Rizzi (1990), Rullmann (1995), and Szabolsci and Zwarts (1993). I leave it as a question for future research whether any of these analyses can also account for the properties of clausal pied-piping that I am discussing here. Other alternative analyses of similar data are found in Frampton (1991) and Cresti (1995), both of which are discussed below.

[25]   (48) assumes that the variable bound by *how* (interpreted as *what number n*) in *how many* questions, which ranges over numbers, is of type e. If it were of any other type, (48) would incorrectly rule out all *how many* questions (among other things).

[26]   A similar condition is proposed in Frampton (1991) and in Cresti (1995). See below for discussion.

In fact, (48) forces reconstruction of any phrase which cannot be interpreted as of type e. In the specific case of clausal pied-piping, the moved CP is generated as a complement of verbs which take propositions as internal arguments. Thus, if the CP were not reconstructed, its trace would have to be interpreted as a variable over propositions (type $\langle s,t \rangle$), which is not allowed by (48). The consequence is that reconstruction of the CP is forced in this case.

In contrast, (48) does not force reconstruction of (pied-piped) DPs, since their traces are typically interpreted as variables over individuals (of type e). Consider the example of pied-piping of DP in *how many* questions. As we saw above, the pied-piped DP can be interpreted without reconstruction. In fact, the reading not involving reconstruction is the only one available when negation intervenes between the DP and its trace (cf. (42), (43)). Something similar occurs with pied-piping of DPs by genitive wh-phrases like *whose*, as in the Basque examples in (49).

(49) a. [$_{DP}$ Señen etxi] ikusi ban Jonek t_{DP}?
     [$_{DP}$ whose house] seen had Jon.E t_{DP}

    'Whose house did Jon see?'

   b. [$_{DP}$ Señen etxi] es eban ikusi Jonek t_{DP}?
     [$_{DP}$ whose house] not had seen Jon.E t_{DP}

    'Whose house didn't Jon see?'

As in all cases of pied-piping seen so far, the wh-word *señen* 'whose' must be extracted from the pied-piped DP, giving the structures in (50).

(50) a. [Señen$_1$ [[$_{DP}$ t_1 etxi] [ikusi ban Jonek t_{DP}]]]
     [whose$_1$ [[$_{DP}$ t_1 house] [seen had Jon.E t_{DP}]]]

   b. [Señen$_1$ [[$_{DP}$ t_1 etxi] [*es* eban ikusi Jonek t_{DP}]]]
     [whose$_1$ [[$_{DP}$ t_1 house] [*not* had seen Jon.E t_{DP}]]]

In (50a), the remnant DP can be reconstructed or not. The interpretation of the sentence with either structure is in fact identical, since the DP and its trace are of the same semantic type (namely, e). On the other hand, in (50b), reconstruction would lead to a violation of the MNSC (since negation would intervene between *señen* 'who' and its trace inside the reconstructed DP). The fact that this sentence is grammatical shows that, with pied-piped DPs, an LF structure that does not involve reconstruction must be possible.

Thus, condition (48) on the interpretation of traces accounts for the fact that, while pied-piping of CPs is blocked by negation, pied-piping of DPs

is not. Further support for this condition comes from data involving predicate/argument asymmetrics in reconstruction discussed by Barss (1986), Huang (1993), and Heycock (1995). As shown by those authors, reconstruction of predicates, as opposed to arguments, is always obligatory. Thus, coreference between *John* and *he* in (51a) is not possible, since reconstruction of the predicate *proud of John* would result in a Condition C violation. Similarly, reconstruction of the predicate *proud of John* in (51b) to its base position is blocked by negation.[27] The fact that the sentence is not grammatical provides further support for the hypothesis that predicates must reconstruct.

(51) a.*[How proud of John$_1$]$_2$ do you think he$_1$ is t_2?

    b.*[How proud of John]$_1$ do you think Mary isn't t_1?

Condition (48) also makes the correct prediction in this case: since predicates are of type $\langle e,t \rangle$, not type e, predicate movement in (51) cannot leave a trace, and must therefore reconstruct.

A condition similar to (48) has been postulated previously in the literature. Specifically, Frampton (1991) proposes that a trace contained in an island must be of type e if it is not bound inside the island.[28] In fact, he uses this condition to account for the fact that reconstruction of *how many* phrases into weak islands (including negative islands) is blocked (see Frampton 1991 for details). Since this proposal accounts for generalizations which are very similar to the ones I am discussing here, yet the account itself is different from the one I am adopting, it is worth considering it in the light of the clausal pied-piping data.

Recall that, if we did not assume condition (48), it would be possible to interpret clausal pied-piping without syntactic reconstruction. The LF structure of a clausal pied-piping structure would then be as in (52).

(52)   [Wh_1 [$_{CP}$ t_1 . . .]$_2$ . . . t_2]

In (52), the trace of the moved CP, t_2, would be of type $\langle s,t \rangle$. This is allowed in Frampton's analysis as long as there is no island intervening between CP and t_2. If, on the other hand, negation intervenes between CP

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[27] I would like to thank David Pesetsky for pointing out the relevance of this sentence.

[28] Frampton's specific proposal is not stated in these terms. First, he assumes that movement can create two kinds of objects: (i) chains, and (ii) operator-variable pairs. Objects of type (i) are created when movement does not cross any island. Objects of type (ii) are created when movement crosses one or more islands. His specific condition on the interpretation of traces is that, for objects of type (ii), the trace must be interpreted as an individual variable. As can easily be seen, Frampton's statement of the condition, under these assumptions, and the one given in the text above amount to the same thing.

and t_2, Frampton's condition is violated, since negation creates islands which are relevant under his assumptions. Thus, in a structure in which there is no reconstruction, Frampton's analysis can account for the negative island data.

However, this analysis does not rule out a structure in which the pied-piped clause is syntactically reconstructed. The relevant structure in this case would be (53), where CP is the reconstructed CP containing a trace of the extracted wh-phrase.

(53) $[Wh_1 \, [. \, . \, . \, Neg \, . \, . \, . \, [_{CP} \, t_1 \, . \, . \, .]]]$

Frampton's proposal would rule out (53) only if t_1 is not interpreted as an individual variable – that is, only if Wh_1 is not a quantifier over individuals. However, as we saw above, negation always blocks clausal pied-piping, even if the relevant wh-phrase is a quantifier over individuals (cf. example (45)). Thus, in order to rule out (53), we need to rule out reconstruction into negative islands independently of conditions that are imposed on the interpretation of traces. Once this is assumed, Frampton's condition can be simplified to the one I proposed in (48). Thus, I conclude that clausal pied-piping provides evidence in favor of condition (48) and for Beck's (1996) analysis of reconstruction into negative islands.[29]

Nevertheless, there are apparent problems with (48). There are cases in which it seems quite plausible that a trace is interpreted as a variable ranging over propositions. The most obvious case is that of *what* when it is generated as a complement to a verb whose internal argument is interpreted as a proposition, as in (54).

(54)   What$_1$ does John think t_1?

It seems that in the most natural analysis of (54), *what* would be interpreted as a quantifier over propositions, binding its trace, which would accordingly be interpreted as a propositional variable (of type $\langle s,t \rangle$). Similarly, in the Indirect Dependency approach to scope marking (see section 3), *what* is also interpreted as a quantifier over propositions (whose restriction is the embedded wh-clause), which binds a trace interpreted as a propositional variable.

However, it is worth noting that, even though these structures appar-

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[29]   This conclusion is valid insofar as we accept the assumption that syntactic reconstruction is possible. If, on the other hand, syntactic reconstruction were forbidden altogether, Frampton's condition would be enough to account for the clausal pied-piping data. In fact, these are roughly the assumptions adopted in Cresti (1995). However, given that there are convincing arguments in the literature that syntactic reconstruction is possible (see, among others, Romero 1996; Fox 2000), I will not discuss this possibility here.

ently involve quantification over propositions, the quantifier used (*what*) is nominal with respect to syntactic category. This might suggest that the relevant condition on traces should perhaps be syntactic, rather than semantic, in nature. In fact, a constraint of this sort was already proposed by Safir (1982, section 3.3). Specifically, he proposed that variables in A-positions are always NPs. This allowed him to explain facts having to do with the distribution of embedded clauses.[30]

On the other hand, if the fact that apparent cases of quantification over propositions involve nominal morphology is not accidental, it might suggest that our assumptions about the semantics of sentences like (54) are wrong, and that they in fact involve quantification over individuals.[31] If this observation is on the right track, it suggests a rather tight relation between semantics and morphology. In particular, questions like (54) involve a morphologically nominal wh-quantifier, so its trace must be of type e. This is not possible with clausal pied-piping, since there is no nominal quantifier involved. As a consequence, the pied-piped clause leaves behind a trace of type $\langle s,t \rangle$, which forces reconstruction under (48).

I believe that this is a line of research worth pursuing, but it is well beyond the scope of the present paper. Thus, at the moment, I leave it as an open question whether condition (48) can be used to explain the fact that clausal pied-piping must involve reconstruction.

6. CONCLUSION

In this paper, I have proposed that clausal pied-piping involves reconstruction of the pied-piped CP. First, based on two different arguments, I have shown that these constructions are interpreted in a very similar way to their long-distance counterparts. Furthermore, based on negative island data, I have also argued that the pied-piped CP is reconstructed at LF.

Nevertheless, questions remain. As I showed in the previous section, the fact that the pied-piped CP must reconstruct could be derived from a strong condition on the interpretation of traces, which only allows them to be interpreted as variables over individuals. This allows us to capture important differences between pied-piping of DPs and CPs, and can also

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[30] The main problem that I see with this alternative is that it would not force reconstruction of predicate DPs. As shown by Heycock (1995), predicate DPs, just like other predicates, and unlike arguments, also display obligatory reconstruction effects. If the restriction on traces were stated in terms of syntactic category, rather than semantic type, this fact would need a separate explanation.

[31] As shown by Chierchia (1984), it is possible to conceive of (embedded) sentences as denoting individuals.

be used to explain the well-known fact that predicates always reconstruct. But although this proposal is in the spirit of recent work on reconstruction (see, among others, Fox 2000; Romero 1997; Beck 1996), more research is needed to support the conclusion.

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4088 Foreign Language Building
Department of Linguistics
University of Illinois at Urbana-Champaign
707 South Matthews Avenue
Urbana, IL 61801-3625
USA
E-mail: karlos@alum.mit.edu