

Feature Percolation and Clausal Pied-Piping

Jon Ortiz de Urbina
University of Deusto

0. Introduction

This article presents a description and analysis of some asymmetries observable in clausal pied-piping structures in Basque.* These structures are interesting from a cross-linguistic point of view, in that they fill a gap in the paradigm of phrasal categories that can be pied-piped by an operator contained in them. At the same time, the asymmetries I will describe below enable us to test concrete proposals about the percolation mechanisms available for operator features. The article is organized as follows. Section 1 examines the set of SPEC positions which can pied-pipe the phrasal category they modify, and introduces Weibelhuth's (1989) analysis of the apparent inability of *wh*-words in SPEC, CP to transmit their operator status to the whole clause they specify. Section 2 points out some of the conceptual and empirical problems of this analysis. After introducing the basic facts of clausal pied-piping in Basque, Section 2.1 presents an asymmetry in the data whereby pied-piping seems to be blocked in selected interrogative complements but not in non-selected ones. Two alternative accounts of this paradigm are contrasted in Sections 2.2 and 3, providing evidence which indicates operator features are no longer syntactically active after being passed on in percolation configurations, and examining the interaction between total and partial interrogative selection and pied-piping. Section 4 examines the apparent lack of specifier/complement asymmetries in other cases of pied-piping, proposing *wh*-words move to (SPEC, DP), a standard pied-piping position. Finally, Section 5 sketches a possible parametric explanation for the availability of clausal pied-piping in Basque as opposed to its absence in Germanic or Romance languages.

* I would like to thank Itziar Laka, Howard Lasnik, Amaya Mendikoetxea, Javier Ormazabal, Beñat Oyharçabal, David Pesetsky, Esther Torrego and Myriam Uribeetxebarria for their comments and attention. Usual disclaimers apply. Parts of this work were presented at the M.I.T. Informal Seminars on Basque Linguistics, Summer Courses of the University of the Basque Country and at the First Generative Grammar Colloquium at Miraflores, Madrid, March 1991.

1. *Specifiers as pied-pipers*

In pied-piping structures, an expression containing an operator displays the same syntactic behavior observed by operators themselves. Thus, wh-operators such as *who* in (1a), move to SPEC of CP, perhaps to receive a scope domain, and the same syntactic movement can be observed for expressions like *which man* in (1b), which, although not operators by themselves, contain operators in certain structural positions:

- (1) a. *Who_i did you see t_i*
 b. *Which man_i did you see t_i*

A standard way of looking at this phenomenon is to assume that the operator feature of an item like *which* in (1b), the same feature present in *who* in (1a), can percolate up to the maximal projection containing it, the DP expression. Then, syntactically at least, the whole DP will undergo the same movement which independent operators like *who* in (1a) undergo, most conspicuously, movement to SPEC of CP.

Feature percolation is not possible from any structural position. It has often been observed that it is typically SPEC positions that behave as pied-pipers with respect to the maximal projection they specify. Thus, the sentences in (2), where the X^{max} containing an interrogative specifier has moved to SPEC of CP, are acceptable, while the corresponding ones in (3), with interrogative complements, are not (in the non-echo reading):

- (2) a. *Whose problem did he solve?* (DP)
 b. *How tall is she?* (AdjP)
 c. *How far did you get?* (AdvP)
- (3) a. **The problems of what did you solve?*
 b. **Proud of whom is he?*
 c. **Far from where did she go?*

Although the contrast between (2) and (3) is clear, the generalization it assumes is both too weak and too strong as a description of pied-piping in general. On one hand, wh-specifiers are not the only pied-pipers, since wh-complements of prepositions, as in (4), figure prominently among pied-pipers in many languages, especially so since preposition stranding is cross linguistically quite limited:

- (4) *With whom did you go?*

On the other hand, not all interrogative specifiers display the ability to pipe the projection they specify. Leaving the slippery problem of VP specifiers aside, SPEC of functional projections like IP, and apparently CP, cannot function as pied-pipers:¹

- (5) a. **That who met John did Mary know?*
 b. **What John said do you know?*

Before turning to the task of stating a more precise generalization accounting for these asymmetries, it is interesting to note that this 'transparency' of specifiers with respect to interrogative features can also be observed with other types of operator features like negation. Thus, Laka (1989) claims that negative polarity items have to be syntactically licensed at S-structure by the presence of a c-commanding negative element. This would account for the asymmetry observed in (6) between object and subject polarity items:

- (6) a. **Anybody didn't see him*
 b. *He didn't see anybody*

Presumably, the difference between (6a) and (6b) lies in the fact that negation c-commands the negative polarity item *anybody* in the latter, but not in the former. There are some apparent counterexamples to this claim, since in a sentence like (7) the negative element does not c-command the negative polarity item, even though the sentence is grammatical:

- (7) *Nobody's mother liked any professor*

Notice, however, that the negative element *nobody* occupies the specifier position of the subject DP, and if its operator feature is assumed to percolate up to the maximal projection DP, then the negative polarity item *any* will be c-commanded by what now counts as the licenser, i.e., the whole DP. A gain, this percolation does not take place from a complement position, providing a pattern similar to the one observed in (2), (3):

¹ Germanic languages have some restricted clausal pied-piping in infinitival (mainly appositive) relatives (see van Riemsdijk 1985 and Ishihara 1984) as in *Parities to attend to which one has to be invited*, but not with finite interrogative structures. Clausal pied-piping with interrogative pronouns has been described for Imbabura Quechua in Cole 1982, although given the tenseless embedding strategies of Quechua, it is not clear we are dealing with CP's. Weibelhuth states that the gap SPEC,CP represents in the set of pied-pipers could be accidental. Indeed, this article shows clausal pied-piping does exist. However, my main concern will be explaining its impossibility within indirect questions.

- (8) a. *Nobody's mother liked any professor*
 b. **The mother of nobody liked any professor*
- (9) a. *Whose problems did you solve?*
 b. **The problems of what did you solve?*

The similarity extends even further, since operators (negative or interrogative) deeply embedded within specifiers can exhibit the same type of behavior described above. Thus, in (10) movement to SPEC of CP or licensing of a commanded negative polarity item is triggered by an operator located in the specifier position of the maximal projection (DP) within the specifier of yet another DP:

- (10) a. *Nobody's mother's friends liked any professor*
 b. **Whose mother's friends did he meet?*

Therefore, the contention that operators in specifier position can percolate their feature to the maximal projection containing them seems to have good empirical support.

Webelhuth (1989) claims that a generalization which accounts for the positions which can act as pied-pipers can be stated using θ -theory, provided one assumes prepositions do not θ -mark their complements, but merely transmit a verbal θ -role to them. If so, only non θ -marked specifiers or complements would qualify as pied-pipers. This would include specifiers of DP, AdjP and AdvP, but not of IP, under the assumption that VP θ -marks the latter specifier. It would also exclude complements, under the assumption that N, Adj, and V θ -mark their complements, while P's don't. There remains one important gap, however, namely, SPEC of CP, since it doesn't seem to function as a pied-piper even though it is not θ -marked. In order to explain the unacceptability of sentences like (5b), Webelhuth (1989) makes some assumptions on the structure of embedded questions in Germanic languages, which, when combined with his theory of percolation, block pied-piping in sentences of this type.

Webelhuth (1989) assumes that percolation from SPEC is subject to a constraint to the effect that it is possible only if the X' specified by the operator 'is unmarked for the relevant feature', as in the configuration (11):

- (11)
- $$\begin{array}{c} X'' \\ \diagup \quad \diagdown \\ [+wh] \quad X \\ \diagup \quad \diagdown \\ \text{SPEC} \quad X \\ [+wh] \quad [+uw] \end{array}$$

If X⁰ is marked [-wh], SPEC would not be able to percolate its [+wh] feature up to the maximal projection X". The case under consideration is that of indirect questions, where percolation is apparently not possible, judging from the unacceptability of (5b), repeated here for convenience:

- (5b) **What John said do you know?*

In order to prevent the generation of a sentence like (5b), Webelhuth assumes that in Germanic languages 'the phonologically inert WH-complementizer ... [in sentences like (5b)] ... is marked [-wh], and hence blocks the attempt of its specifier to percolate the feature [+wh] to the whole clause' (1989:311). Embedded interrogative structures, therefore, must remain in their complement position. (5b) is ungrammatical, since in order for the embedded CP to behave like an operator and move to the matrix SPEC, it must have received the operator feature from the interrogative element in specifier position, which is not possible due to the particular percolation theory assumed by Webelhuth. Notice that the assumption that indirect questions in the Germanic languages contain [-wh] complementizers is not intuitively too appealing, and begs an analysis of interrogative selection in general, since standard analyses crucially require indirect questions to match the [+wh] selection of verbs like *know*. On top of this, in the following section, I will claim the analysis is also empirically incorrect. In order to support this, I will show that clausal pied-piping with interrogative operators is acceptable in Basque precisely in those cases where there is no interrogative selection. In embedded indirect questions, pied-piping is as unacceptable in Basque as it is in English, suggesting that the unacceptability of (5b) derives from UG, rather than language particular characteristics like the one assumed by Webelhuth.

2. *Asymmetries in clausal pied-piping*

2.1 *Clausal pied-piping in Basque*

Basque wh-questions display a V2 phenomenon whereby the wh-operator must immediately precede the verb. This adjacency can receive different treatments (see for example Ortiz de Urbina 1989 and Laka & Uriagereka 1987, Uriagereka 1987), but for our present purposes it can be used as a descriptive statement describing a situation in which a wh-word in SPEC of CP must be adjacent to the left of the main verb and/or the inflected element. This situation is exemplified in (12):

- (12) a. *Nor ikusi du Mikelek kalean?*
 who seen has Mikel street-in
 "Who has Mikel seen in the street?"
 b. **Nor Mikelek ikusi du kalean?*
 Jon Mikelek ikusi du kalean
 c. "Mikel has seen Jon in the street"

(12b), and any permutation of constituents where the wh-word does not immediately precede the verbal element, is ungrammatical. Given the rather free word order found in Basque, the equivalent clause (12c), where a regular argument substitutes for the operator in (12b), is fully grammatical. Let us assume that the scrambled object argument has been adjoined to CP.

Wh-words from embedded clauses may be extracted, with the usual island effects in certain configurations. Thus, in (13) the interrogative word *nor* "who" has been extracted out of the complement clause and moved to the matrix SPEC, triggering V2 adjacency in the matrix clause:

- (13) *Nor uste duzu ikusi duela Peruk?*
 who think aux seen has-that Peter
 "Who do you think (that) Peter has seen?"

Again, the same structure would be unacceptable were any argument or adjunct to intervene between the operator and the verb.

As (14) shows, extraction out of an island yields an ungrammatical sentence, for the usual reasons:

- (14) **Nori irakurri duzu [Mikelek ti eman dion-ri] liburua?*
 who-D read have Mikel given aux-comp book
 * "To whom have you read the book that Mikel gave t?"

However, there is another alternative present in Basque for question formation of an element belonging to an embedded clause. This strategy is exemplified in (15):

- (15) a. [*Nor etorriko d-ela bihar*] *esan diozu Mireni?*
 who come aux-that tomorrow said aux Mary-D
 "That who will come tomorrow have you told Mary?"
 b. * [*Nor etorriko dela bihar*] *Mireni esan diozu?*

In (15a) the interrogative word has not been extracted from its clause, but remains adjacent to its own verb. On top of this familiar adjacency between wh-word and verb, there is a second adjacency which must be noted, holding

between the whole embedded clause and the matrix inflected verb. As (15b) shows, any intervening matrix argument causes ungrammaticality in this construction. In Ortiz de Urbina (1989), structures like (15a) are argued to represent clausal pied-piping strategies. The embedded wh-word moves to the embedded SPEC, triggering a V2 phenomenon. The wh-operator in SPEC of CP may proceed further to the matrix SPEC, generating well-known long-movement structures like (13), but, like other operators in specifier position, it may 'transmit' its operator feature to the whole embedded CP. In this case, it pipes the maximal projection it specifies (CP) to the matrix SPEC position, triggering the V2 phenomenon to appear in the matrix clause. Thus, (15b) is ruled out because an argument intervenes between the embedded clause in the matrix SPEC and the matrix verb *esan diozu*.

Since in these structures questioning of an element in the embedded clause does not involve extraction, contrary to the long movement case represented in (13), elements within extraction islands can be freely questioned. This is shown in (16), where the wh-word appears within a time adjunct:

- (16) a. [*Mikeli [zer esan ondoren]*] *joan zen etxetik?*
 Mikel-D what say after go aux home-from
 "After saying what to Mikel did he leave home?"
 b. * [*Zer Mikeli esan ondoren*] *joan zen etxetik?*
 c. * [*Mikeli [zer esan ondoren]*] *etxetik joan zen?*

In (16a) *Mikeli* "to Mikel" may be analyzed as a topic adjoined to the adjunct. (16b) is out due to the lack of V2 effects in the adjunct clause and, more importantly, (16c) is out due again to the lack of adjacency between the adjunct clause pied-piped to the matrix SPEC and the matrix verb.²

Yet another piece of evidence in favor of the clausal pied-piping analysis arises from the fact that, as one would expect, once the embedded clause moves to SPEC as a whole, it can move higher up, in much the same way as simple operators can undergo successive cyclic movement from SPEC to SPEC. This is shown in (17):

- (17) [*Nor etorriko d-ela*] *esan du Mirenek tuste du-ela Peruk?*
 who come aux-that said has Miren think aux-that P.
 "That who will come has Mary said (that) Peter thinks?"

² Since the adjunct phrase is headed by a postposition, (16) would be equivalent to a case of pied-piping where the wh-element specifies the complement of a preposition.

Here the complement of *uste* "think" has moved first to the embedded SPEC, triggering V2 (and apparent 'inversion' of the subject *Peruk*), and moving further to the matrix SPEC, producing there a V2 pattern (and thus apparent 'inversion' of *Mirenek*) with the matrix verb *esan*.

Further evidence for the pied-piping analysis can be derived from the syntactic behavior of focal operators in Basque. In this language, foci share many of the syntactic properties of interrogative operators, triggering, in particular, adjacency to the left of the verb. This V2 phenomenon is illustrated here in (18), which closely parallels the V2 data shown in (12) above for wh-operators:

- (18) a. *MIKELEK ikusi du Jon kalean*
 Mikel seen has Jon street-in
 "It is Mikel that has seen Jon in the street"
 b. **MIKELEK Jon ikusi du kalean*

In Ortiz de Urbina (1989), foci are assumed to move to SPEC at S-structure just like wh-words, a syntactic similarity arising from their shared nature as operators. If foci move to SPEC of CP and this position is indeed a pied-piper, one would expect the whole embedded structure to be able to move to the matrix SPEC, pied-piped by the operator in the relevant position. This expectation is actually met by the data, as shown in (19), parallel to (15a):

- (19) a. [*JON etorriko d-ela bihar*] *esan diot Mireni*
 come aux-that tomorrow said aux Mary-D
 "That it is Jon that will come tomorrow have I told Mary"
 b. ?*JON etorriko d-ela bihar Mireni esan diot*

JON in SPEC pied-pipes the embedded clause to the matrix SPEC, triggering V2 effects in both clauses. (19a) is uttered with a peculiar intonational pattern peaking in the focus and falling steadily till the end of the embedded clause and on to the main verb, without intervening pauses. This pattern is not acceptable in a sentence like (19b), where an intervening matrix argument disrupts the adjacency between pied-piped clause and main verb.

2.2 [+wh] verbs and clausal pied-piping

In the preceding section I have tried to show that interrogative clausal pied-piping in finite clauses does exist in natural languages, providing empirical support to consider SPEC of CP a pied-piper, just like other non θ -marked specifier positions. Returning now to Webelhuth's (1989) analysis, it is claimed there that the impossibility of pied-piping from that position in a

structure like (5b), repeated here, is due to the blocking of operator feature percolation from SPEC to CP. Such blocking effect is attributed to the hypothesized [-wh] character of null complementizers of indirect questions in Germanic languages:

- (5b) **[What [e] John said] do you know?*

However, there is an interesting asymmetry in the Basque phenomenon which shows this analysis to be on the wrong track. As the paradigm in (20) and (21) shows, clausal pied-piping is possible with complements of [-wh] verbs like *esan* "say", but not with indirect questions.³ (21), the counterpart to (5b) is also ungrammatical in Basque:

- (20) a. [*Nor etorriko d-ela bihar*] *esan diozu Mireni?*
 who come aux-that tomorrow said aux Mary-D
 "That who will come tomorrow have you told Mary?"
 b. **Nor etorriko d-ela bihar Mireni esan diozu*

- (21) a. **[Nor etorriko d-en] galdezu duzu?*
 who come aux-comp asked aux
 "Who will come have you asked?"
 b. [*Nor etorriko d-en*] *galdezu duzu*
 "You have asked who has come"

As usual, where the scope of the interrogative element is the embedded clause, the sentence is acceptable with verbs selecting interrogative complements (21b), but unacceptable with verbs that don't (as in (20b) where the embedded clause has not been pied-piped). The reverse is true in the structures under question (20a) and (21a). Here we find a seemingly baffling pattern where clausal pied-piping, resulting in the formation of a 'matrix' question (in the sense that the embedded wh-argument takes scope over the whole structure), is possible with verbs selecting a [-wh] complement (20), but not with those selecting interrogative complements (21). By itself, this already indicates that the ungrammaticality of a sentence like (5b) cannot be due to the presence of a [-wh] complementizer blocking percolation of the operator feature in SPEC to CP, since Basque (20) with the overt [-wh] complementizer *-(e)la*, complement of a verb like *esan* "say", is grammatical. In Webelhuth's account of (5b), percolation (or its blockage) is part of UG, while the [-wh] nature of null complementizers is a language particular characteristic of Germanic languages.

³ Of course, *esan* "say", just like its English correlate, may also be used as a [+wh] verb when reporting questions.

While this remains controversial for Germanic languages, the fact that an un-contrastively [-wh] complement (and complementizer, see below) in a language like Basque does not block percolation clearly indicates that this particular percolation theory cannot be correct. Basque possesses two distinct complementizers for non interrogative and interrogative complements, *-(e)la* and *-(e)n*, respectively, as illustrated in (22):

- (22) a. *Jon bihar etorriko d-ela esan du (*-en)*
 Jon tomorrow come aux-comp said has
 "He has said that Jon will come tomorrow"
- b. *Bihar nor etorriko d-en galdetu du (*-ela)*
 tomorrow who come aux-comp asked has
 "He has asked who will come tomorrow"

The COMP head in (20) is therefore uncontroversially [-wh], and still percolation seems possible. Conversely, clausal pied-piping is not possible in (21), where the complementizer is clearly [+wh]. The explanation for the paradigm in (20) and (21) must lie, therefore, elsewhere. In the following sections, I review some alternatives.

2.3 Selectional mismatches

The selectional difference between verbs that require interrogative complements (like *galdetu* in (22b)) and verbs that require non-interrogative ones (as in (22a)) has usually been expressed, with different details since Baker (1970), as a head to head relation between the lexical specification of the verb and a [+wh] feature in the complementizer head. For concreteness, I give Lasnik & Saito's (1992) formulation:

- (23) a. [+wh] COMP must have a [+wh] head
 b. [-wh] COMP must not have a [+wh] head
 c. Traces are [-wh]

(23c) is required to account for extraction, via COMP, of wh-words from embedded contexts, as in (24):

- (24) *Who_i do you think [t_i [Bill saw t_i]*

One possibility to analyze the paradigm in (20)-(21) would make use of assumption (23c) to account for the ungrammaticality of (21). Recall that clausal pied-piping is possible with complements of [-wh] verbs, but not with complements of [+wh] verbs. This might be related to the fact that after the wh-

word in SPEC drags the embedded clause to the matrix SPEC position, a trace is left behind in the complement position. If the selectional restrictions of the matrix verb are checked against the trace left in the position of its complement, the presence of a trace will only match the selectional restrictions of [-wh] verbs like *esan* "say", but not of [+wh] verbs like *galdetu* "ask", explaining in this way the ungrammaticality of (21a) as opposed to (20a).

One problem with this hypothesis is that other applications of Move- α leave traces, presumably [-wh] as well, but do not induce ungrammaticality. Thus, Basque is a rather free word order language, with scrambling possibilities, like those of Japanese.⁴ If, following Saito (1985) and Hoji (1985), free word order phenomena in these languages result from the S-structure application of Move- α a sentence like that in (25a) will have the structure shown in (25b):⁵

- (25) a. *Mikelek galdetu du nor etorri d-en*
 Mikel asked has who come has-comp
 "Michael has asked who has come"
- b. *Mikelek t_i galdetu du [nor etorri den]_i*

The object argument of *galdetu* "ask" appears removed from its canonical position to the left of the verb, perhaps adjoined to CP (see Laka 1989). The presence of a trace in the argument position does not clash with the selectional requirements of the matrix verb, in contrast to what this analysis of (21) would seem to predict. As in other cases, scrambling does not affect the basic relationships between the verb and its complement. Of course, one could claim that at LF some sort of reconstruction substitutes the object clause into its canonical position, but, crucially, the level where the conditions in (23) are assumed to apply is the level where syntactic movement takes place: S-structure, in Basque, hence the structure in (25b), rather than any reconstructed version. This suggests that this is not an adequate analysis of the paradigm in (20) and (21).⁶

⁴ Even more, since, unlike Japanese, Basque allows verbs to permute with their arguments and adjuncts.

⁵ There is another structure corresponding to a similar clause where *Mikelek* is focalized. Then the focus would occupy the SPEC position and the adjacency with the verb would be a V2 phenomenon, probably resulting from the movement of V to COMP.

⁶ Saito (1986) shows that scrambling in Japanese, although an S-structure A-bar movement, can be freely undone in the LF component. This claim may be true of Basque too, but, as indicated in the text, it is not relevant for the question under consideration, since (23) are S-structure conditions in a language with syntactic wh-movement like Basque.

There is a second piece of evidence which points at the same conclusion. As mentioned in Section 2, foci in Basque basically share the same distribution as wh-words. Consequently, focalized constituents within indirect questions should also move to the embedded SPEC, producing the typical clausal pied-piping scenario, as in the fully grammatical (26):

- (26) [JON etorri den] galdetu dit
 come has-comp asked have
 "I have asked whether it is Jon that has come"

(26) is fully acceptable with the same steadily falling intonation discussed with respect to (18a) and associated there with clausal pied-piping.⁷ If so, then the embedded complement of the [+wh] verb has moved to SPEC, leaving a [-wh] trace which, contrary to the prediction of this analysis, does not yield a violation of the selectional restrictions of the matrix verb.

An even clearer example of the same argument is provided by northern dialects, where the V2 phenomenon may affect either the whole verbal form (participle plus auxiliary), as in Spanish, or only the auxiliary, as in English:

- (27) a. *Jonek liburua irakurri du*
 Jon book read has
 "Jon has read the book"
 b. *JONEK irakurri du liburua*
 "It is Jon that has read the book"
 c. *JONEK du liburua irakurri*
 "It is Jon that has read the book"

⁷ The embedded clause in (26) could in principle occupy its D-position as the object of *galdetu*. However, the intonation seems to indicate a structure like (26) contains a pied-piped complement. Actually, nothing can intervene between the embedded clause and the verb:

- (a) *?? [JON etorri den] Mikel-i galdetu diot
 On top of the pattern in (26), (ii) is also possible:
 (b) *t_i galdetu dit [JON etorri d-en]_i*
 asked have come has-comp

"I have asked whether it is Jon that has come"

Here the focus occurs in the scrambled clause adjoined to the right of CP. A possible way of accounting for (b) could rely on the fact that there exists an end-focus type of construction in Basque, different from the one I have been describing up to now, and exemplified by (c): (c) *Eitorri da AITA*
 come has father

"It is our father that has arrived"

(b) could correspond to this focusing strategy; the focus in SPEC may have turned the whole embedded CP into a focus, which follows the same pattern as in (c). Otherwise, as in (26), it follows the regular pattern described above.

These dialects present clausal pied-piping with foci within indirect questions as in (28):

- (28) a. [JON d-enentz jin] galdetu dit
 has-comp come asked have
 "I have asked whether it is Jon that has come"
 b. */? [JON d-enentz jin] Mikel-i galdetu diot
 Mikel-D
 "I have asked Mikel whether it is Jon that has come"

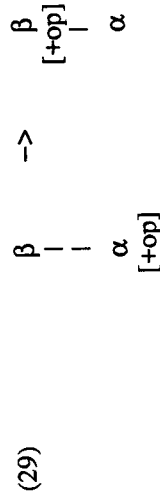
The inverted pattern within the embedded clause clearly indicates JON has moved to SPEC, triggering the same V2 pattern observed in (27c) within the embedded clause, and turning the whole CP into a focus. The latter is then moved to the matrix SPEC, where it triggers the regular V2 pattern with respect to the matrix verb. Again, the trace left by the embedded clause moved to SPEC does not clash with the presence of a [+wh] verb, providing a direct counterargument against the analysis sketched above.

3. Analysis

Sentences like (27) and (28) in the previous section show that clausal pied-piping is not altogether excluded from complements of [+wh] verbs, but only in those cases where the pied-piper is a wh-word. Therefore, what induces the ungrammaticality of (21) is not a 'mismatch' between the [+wh] requirement of the verb and the presence of clausal pied-piping itself, as suggested in the previous analysis, but between the selectional requirement and the wh-word which meets it in the structures in question. In this section, I will develop an analysis to account for this mismatch.

3.1 Feature percolation and loss

At an intuitive level, we find in pied-piping structures expressions containing an operator which behave as operators themselves. This operator-like behavior is syntactic (they undergo Move- α in the same way operators do), and sometimes assumed to be undone at LF by a reconstruction process (see Chomsky 1977) which cancels out the effects of syntactic movement for the non-operator portion of the expression. Regardless of the status of reconstruction, some sort of mechanism should account for the operator-like behavior of the maximal projection undergoing syntactic movement. Weibelhuth considers this mechanism to be an instance of percolation, whereby the operator feature of α (usually [+wh]), but also [neg], as seen in Section 1) is transmitted up to the category β dominating it:



In the present context, α is the category in (SPEC, XP), β=XP. Webelhuth also assumes that once α passes its operator feature on to β, the former loses its operator status.

Under these assumptions, consider the paradigm in (20), reproduced here for convenience:

- (20) a. [*Nor etorriko d-ela bihar esan diozu Mireni?*
 who come aux-that tomorrow said aux Mary-D
 "That who will come tomorrow have you told Mary?"
 b. **Nor etorriko d-ela bihar Mireni esan diozu ?*

As (23c) states, a selected [-wh] COMP may not be occupied by a [+wh] operator. Therefore, if a wh-word occupies the (SPEC, CP) position of the complement of a [-wh] verb like *esan* "say", a violation will result, as in (20b). However, the element in the embedded SPEC may percolate its operator feature up to CP. If it does, the embedded clause turns into an operator and must move to the matrix SPEC. No selectional violation emerges because the original operator in the embedded SPEC loses its status after percolation. A sentence like (20a) is therefore grammatical.

This analysis accounts for an apparent counterexample to the provisions in (23). Thus, notice that a clausal pied-piping structure like the one in (20a) seems to provide an example where a [-wh] complementizer *-(e)la* co-occurs with a wh-word in SPEC, an impossible configuration if the statement in (23b) corresponds to UG. But (23b) must hold of Basque too, since it is required to rule (20b) out. The apparent contradiction is solved if we assume that percolation from α to β removes from the former the feature it passes on to the latter. Then, the wh-word in (20a) would no longer count as an operator, and there would be no mismatch between the non-interrogative complementizer and the presence of *nor* "who" in SPEC. (23b) would then be fully operative in Basque too.

We are assuming that once an operator feature percolates up to the maximal projection, the original operator discharges that feature and can no longer behave as a syntactic operator. Further evidence for this assumption derives from the interaction of long-movement and pied-piping. As (17) above shows, once

the operator feature has been discharged onto the CP, the latter will move to SPEC, from where it can proceed further up provided the usual locality conditions are met. However, given a three-level structure, several other possibilities arise which prove relevant to the study of discharge. Let us concentrate on such structure, where an interrogative operator is base generated at the most deeply embedded cycle, roughly as in (30):

- (30) *Mirenek esan du Jonek iste du-ela nor etorri d-ela*
 Mary said aux John think aux-that who come aux-that
 "Mary said that John thinks that who has come"

Nor "who" will first move to the lowest SPEC, CP and once there two alternatives are open: it may undergo long-movement or it may discharge its operator feature onto CP. If the latter is the case, the embedded clause will move to the specifier position of the middle cycle, giving an intermediate structure roughly as follows:

- (31) *Mirenek esan du* [*nor etorri d-ela*] *iste du-ela Jonek*
 "Mary has said that who has come does John think"

The middle cycle in (31) includes a complex derived operator in SPEC position, and several alternatives have to be checked. First, if the operator-clause itself undergoes long-movement, we would get a sentence like (17) above. A second derivation would involve discharging the operator feature again: the CP in SPEC position can pass on the operator feature it has acquired by percolation (discharge) to the mid-cycle CP, so that now everything included within the outer parentheses in (31) works as an operator. The result seems acceptable:

- (32) [*Nor etorri dela iste duela Jonek*] *esan du Mirenek?*
 "That who has come does John think has Mary said?"

Yet a third alternative should be considered, namely, whether *nor* in (31) can undergo long-movement. As shown in (33), such derivation is not possible:⁸

- (33) ??*Nor esan du Mirenek etorri dela iste duela Jonek?*
 "Who has Mary said that has come does John think?"

⁸ The sentence would be acceptable in another interpretation in which the most deeply embedded sentence appears to the left of the intermediate verb not because of occupying any SPEC position, but as an OVS word order. The relevant structure is better perceived when more constituents are present in the lowest cycle.

The unacceptability of (33) might be related to subadjacency and to the movement of an element (*nor*) which, after having discharged its feature, is no longer syntactically an operator. That is, after percolation, the semantic operator is syntactically inactive.

Let us consider yet another set of possible derivations, namely, those in which *nor* retains its operator feature without transferring it to the most deeply embedded CP. The operator must proceed on, since the verb *think* selects a [-wh] operator which must agree with its specifier. It undergoes long wh-movement to the mid SPEC, CP position, an intermediate structure roughly as in (34):

- (34) *Mirenek esan du* [[*nor* *uste duela Jonek*] *etorri dela*]
 Mary said has who think aux-that Jon come has-that
 "Mary has said who does John think has come"

At this stage, two possibilities are available again: operator feature retention or discharge. In the former case, we would obtain a familiar long movement structure like (35):

- (35) *Nor esan du Mirenek uste duela Jonek etorri dela?*
 "Who has Mary said John thinks will come?"

If, on the other hand, the feature is percolated, a sentence like (36) will be generated:

- (36) [*Nor uste duela Jonek etorri dela*] *esan du Mirenek?*
 "That who does John think that has come has Mary said?"

Nor has transferred its operator status to the intermediate CP which includes the object complement where the interrogative element originated. Therefore, the two embedded clauses have moved to the matrix SPEC. The availability of clausal pied-piping makes possible a range of structures which can be understood if, as assumed here, the operator feature is discharged to the specified CP, thereby turning the latter into a syntactic operator. At the same time, the original operator becomes syntactically inactive.

3.2 Interrogative selection in a CP analysis

Let us now turn to an analysis of the absence of clausal pied-piping with selected interrogative complements. The basic data in (21) are repeated here again:

- (21) a. **[Nor etorriko d-en] galdetu duzu?*
 who come aux-comp asked aux
 "Who will come have you asked?"
 b. *[Nor etorriko d-en] galdetu duzu*
 "You have asked who will come"

The analysis in the preceding section can be extended to paradigm (21). A verb like *galdetu* "ask" must take a complement with an operator SPEC, as stated by (23a). If the wh-word does not percolate its feature up, it will match the selection of the verb and a sentence like (21b) will be grammatical. If, on the other hand, percolation takes place, with subsequent loss of the [+wh] character of the embedded SPEC, a violation will arise, and the unacceptable (21a) will be ruled out. In order to articulate this analysis, I will provide a more detailed account of the complementizer system in Basque, to which I turn presently.

In a way similar to Japanese *-ka*, Basque *-(e)n* marks all indirect questions, both wh- and yes/no questions.⁹ If the indirect question marker *-(e)n* appears by itself, the embedded sentence is interpreted as a yes/no question, as in (37a). On the other hand, when *-(e)n* cooccurs with a wh-word in the same CP, the embedded structure is interpreted as a partial question, as in (37b):

- (37) a. *Ez dakit [Peru etorriko d-en]*
 neg know Peru come aux-comp
 "I don't know whether Peru will come"
 b. *Ez dakit [nor etorriko d-en]*
 who
 "I don't know who will come"

In the pre-CP framework where the matching requirements in (23) were originally stated, both the complementizer and the wh-word occupied the same COMP position. A wh-word moving to COMP would be its 'head' in that analysis, and a filter (as in Chomsky & Lasnik 1977) would rule out 'doubly filled' COMP positions, where the two elements in COMP could be two wh-words or a wh-word and an overt complementizer. On the other hand, in a CP analysis developed in Chomsky (1986), two independent positions are posited: a head COMP position corresponding to the complementizer itself, and a specifier position (SPEC, CP), which acts as a landing site for operators like wh-

⁹ *-(e)n* differs from *-ka* in that the former never occurs in matrix contexts. Eastern varieties of Basque possess a rich interrogative COMP system with independent forms for yes/no complementizers: *-a* in matrix and *-(e)netz* in embedded questions. The latter would correspond to Japanese *-ka-dooka* (English *whether*).

words. In this analysis, the interrogative complementizer *-(e)n* occupies the head COMP position in (37i,b), while the *wh*-word in (37b) occupies SPEC, CP.

I will follow standard assumptions in assuming that SPEC, CP in indirect *yes/no* questions like (37a) is occupied by a null *yes/no* operator, a counterpart to the overt *wh*-words found in embedded *wh*-questions. This assumption results in a symmetric pattern for both question types.¹⁰ Since the general SPEC-head agreement relationship also holds within CP, C and its specifier must agree as to their [\pm wh] feature.¹¹ Thus, the unacceptability of (20b) would derive from the lack of agreement after percolation of the operator feature, and the same analysis can be proposed for (21b).

The same set of assumptions can also account for the lack of clausal pied-piping with embedded *yes/no* questions, along the same lines as the analysis of (21) in the preceding section. Thus, an embedded question like (38a) cannot be pied-piped as in (38c):

- (38) a. [*Garaiz helduko gar-en*] *galdezu dit*
 on time arrive aux-comp ask he-has-to me
 ‘‘He has asked me whether we will arrive on time’’
 b. *Galdezu dit [garaiz helduko gar-en]*
 c. **Garaiz helduko garen galdezu ditzu?*
 ‘‘Whether we will arrive on time has he asked you?’’

The indirect question occupies the complement position in (38a) and has been extraposed in (38b). If a null operator occupied the SPEC position, it could percolate its feature up to the embedded CP, turning the whole embedded clause into a syntactic operator which would then move to the matrix SPEC position, as in (38c). However, once percolation takes place, the [\pm wh] feature

¹⁰ By attributing the *yes/no* interpretation to the empty operator, we can explain the appearance of the complementizer *-n* in other embedded clauses characterized by the presence of operators: relative clauses, negative complements (see Laka 1989), time adverbials, etc.
¹¹ Perhaps, as Nishigauchi (1986) claims, because *wh*-words are unselectively bound by the [\pm wh] complementizer, which determines their quantificational force. Japanese *wh*-words like *nani* ‘‘what’’ receive an interrogative interpretation when governed by the interrogative complementizer *ka*, but they can also receive a quantificational meaning as universal quantifiers when governed by the complementizer particle *mo* ‘‘also, even if’’. Basque patterns with English in this respect, since a special, derived form is used for universal quantification: *nor* ‘‘who?’/ *edonor* ‘‘whoever’’. The restrictions are similar in the three languages, however, since forms like **edozergatik* ‘‘*‘‘whyever’’ don’t exist, while *naze* ‘‘why’’ is incompatible with *mo*. Nonetheless, some *wh*-words do have non-interrogative quantificational uses in Basque, as *nor* in (a):
 (a) *Nor bere bizitzaz arduratu behar di*
 who his life-about care must aux
 ‘‘Each (one) must worry about his own life’’

of this null operator is lost, and an agreement mismatch will arise between the [\pm wh] COMP head and its specifier, explaining in this way the ungrammaticality of (38c) in this reading; this sentence is acceptable only as a *yes/no* question about the matrix verb. A possible answer to it is ‘‘Yes, he has asked me’’, but not ‘‘Yes, we have arrived on time’’. (38c) is acceptable only as equivalent to (39), where the embedded clause clearly is not in SPEC:

- (39) *Galdezu ditzu [garaiz helduko garen]?*
 ‘‘Has he asked you whether we will arrive on time?’’

These data would fall in place with the paradigm in (21) under the null operator and the agreement assumptions.

One potential problem for this approach might arise in the analysis of sentences like (26) above, where a mismatch between SPEC, CP and COMP seems to exist without any resulting unacceptability. In structures such as (26), repeated here, the embedded indirect question contains a focalized element which I have assumed moves to SPEC, from where it percolates its feature up to CP, triggering clausal pied-piping:

- (26) [*JON etorri der]* *galdezu dit*
 come has-comp asked have
 ‘‘I have asked whether it is Jon that has come’’

Although an operator, the focalized constituent *JON* is not [\pm wh], and does not match with the [\pm wh] complementizer. But if SPEC, CP is occupied by a null *yes/no* complementizer, it is not clear where the focalized element might be located, unless CP recursion is assumed to be available. However, even then, it is not clear why such recursion is not available with *wh*-words, since foci cannot cooccur with overt *wh*-operators. I will merely note this problem here, assuming that, if clausal pied-piping with focalization is to be assimilated to the analysis presented here, one must assume that foci and null operators can co-occur in SPEC, CP.¹²

A related case is that presented by focalized *wh*-words. *Wh*-words can be contrastively set opposite to other *wh*-words, resulting in interrogative opera-

¹² This is the syntactic side of a familiar semantic problem: ‘absorption’ as in Higginbotham & May (1981) is possible between different *wh*-operators, but not between *wh* and *yes/no* operators. Similarly, foci and *yes/no* operators are compatible, but not foci and *wh*-operators (at least if not left *in situ*).

tors which also work as contrastive foci. An example is provided by sentences like (40a):¹³

- (40) a. [NOR *etorri d-en*] *galdetu diot Mikeli*
 who come has-aux asked aux Mikel-D
 "I asked Mikel WHO had come"
 b. *NOR *etorri den galdetu diot Mikeli?*
 c. *NOR *etorri den Mikeli galdetu diot*

Here NOR "who" is both a [+wh] and a focal operator, but, as expected, only the focal operator feature can percolate to CP, as in (40a). (40b) shows no direct question can be formed, that is, the [+wh] feature cannot percolate since otherwise the SPEC, head agreement with this feature would be lost. (40c) again indicates the embedded question occupies the SPEC, CP position, making adjacency with the verbal element obligatory.

The SPEC-head agreement hypothesis used in this analysis can help explain other facts related to extraction from embedded questions. Some varieties of Basque allow extraction from wh-islands, so that on top of the usual embedded question pattern (41), (42) is also acceptable:

- (41) *Nor etorriko d-en galdetu du*
 who come aux-comp asked has
 "He has asked who will come"
 (42) *Nor galdetu duzu etorriko d-en?*
 who asked have come aux-comp
 "Who have you asked whether will come?"

Notice that, in spite of the structural similarity, there is an important difference between the two sentences: unlike in (41), in (42) the embedded clause is not interpreted as a wh-question, but as a yes/no question. It is the equivalent of English (43):

- (43) ??*What do you wonder whether John saw?*

Since the *-(e)n* complementizer signals the presence of an operator in SPEC, as discussed in fn. 9, an interrogative interpretation for the embedded clause can only be achieved if the embedded SPEC is occupied by a [+wh] operator. In (41) the wh-word *nor* "who" provides one. If (42) had been generated by moving this operator further to the matrix SPEC, a [-wh] trace would have been

¹³ I am grateful to Patxi Goenaga for bringing this sentence to my attention.

left behind, a structure ruled out due to the lack of agreement between the trace and the complementizer. Thus, it is impossible to extract from a wh-island retaining the partial wh-question interpretation in the embedded structure. However, there is another possibility available: the complementizer may agree with the null yes-no operator, giving us the structure in (44):

- (44) *Nor galdetu duzu* [Op [t *etorriko d- en*]
 who asked have come aux comp
 "Who have you asked whether will come?"

SPEC, CP is occupied by the null operator, accounting for the yes/no question interpretation necessarily associated with the embedded clause in (42). The wh-word must move to its matrix position directly, a possibility permitted by the 'Romancelike' parameter setting which takes CP, rather than IP as a bounding node. In fact, 'direct' extraction from wh-islands clearly takes place in structures where the lower SPEC is occupied by a wh-word, subject to familiar ECP conditions, as shown in (45) and (46):

- (45) *Zein liburu ez dakizu zergatik debekatu dute-n?*
 what book neg know why forbid aux-comp
 "Which book don't you know why they have forbidden?"
 (46) **Zergatik_i ez dakizu zein liburu debekatu duten t_i?*
 "Why don't you know which book they have forbidden?"

Where an adjunct like *zergatik* "why" is extracted over another wh-word, as in (46), an unacceptable sentence is generated.

With verbs that select partial questions, but which do not accept yes/no questions easily, such as *irakatsi* "teach" or *erakutsi* "show", extractions are far less acceptable:

- (47) a. [*Horrelakoetan zer egin behar d-en*] *irakatsi diot*
 in such cases what do need aux-c teach aux
 "I have taught him what to do in such situations"
 b. ??*Zer irakatsi diozu egin behar den horrelakoetan?*
 "What have you taught to him whether to do in such situations?"

Following the analysis above, the embedded SPEC must be occupied by a null yes/no operator, which is not compatible with the matrix verb, accounting for the status of (47b).

