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## **Cyclic Spell-Out Model and a Parametric Approach to Pied-Piping in English**

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### **0. Introduction**

This paper deals with pied-piping in English. In this paper, I will attempt to provide an analysis of pied-piping which can explain not only pied-piping in English but also cross-linguistic variation in pied-piping. For this, I will examine the properties of WH-questions in languages like Imbabura Quechua (IQ, henceforth) and Sinhala and show how they bear on the proper analysis of the pied-piping phenomenon in general.

Drawing on the idea that WH-words can be decomposed into the indefinite *wh* and the *wh-op* (Kuroda 1965; Nichigauchi 1991; Tsai 1994, etc.), I will show that WH-questions involve two separate steps of “WH-marking”(the step which corresponds to building up a WH-phrase syntactically out of the indefinite *wh* and the *wh-op*) and “WH-scoping”(the step which corresponds to what is known as “WH-movement”), and that the pied-piping phenomenon can be best understood in terms of the movement involved in these two separate steps. Since each step could involve either overt or covert movement, it is predicted that there can be four types of languages. We will see that the movement involved in both steps is overt in languages like IQ, while it is both covert in languages like Sinhala. Of the remaining two types, I will argue that English is a language where WH-marking movement is covert while WH-scoping movement is overt. What is also crucial in my analysis of pied-piping is the Cyclic Spell-Out model proposed in Chomsky (1998) where overt and covert movement are interspersed within narrow syntax. I will show how pied-piping in English can be given a coherent explanation under the Cyclic Spell-Out model.

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### 1. Basic Facts

Pied-piping in English shows the following properties.

First, the phrases of not all syntactic categories which contain a WH-element can be pied-piped. So, as we see below, phrases such as DPs, PPs, APs, or AdvPs in English can be pied-piped but not VPs or CPs.

- (1) a. [<sub>DP</sub> Whose book] did you buy?  
 b. [<sub>AP</sub> How smart] is he?  
 c. [<sub>AdvP</sub> How soon] can you finish it?  
 d. [<sub>PP</sub> With whom] did you travel?  
 e. \* [<sub>VP</sub> Meet whom ] will you?  
 f. \* [<sub>CP</sub> What he bought] do you believe?

Secondly, only the WH-element which stands in a certain structural configuration with the head can be a pied-piper. This is clearly illustrated by the contrast between a pair of sentences as in (2) below.

- (2) a. [Whose picture] did you see?  
 b. \* [The picture of whom] did you see?

As we can see, the WH-word in the specifier position of DP as in (2a) can pied-pipe the whole DP but the WH-word in the complement position as in (2b) cannot. Note, however, that we cannot generalize that complements in general are not pied-pipers given that WH-complements of PPs are pied-pipers, as we have seen in (1d).

The preceding facts show that the constituents which can be pied-piped in English do not form a uniform group in terms of their syntactic categories and that the WH-element which can be a pied-piper does not stand, at least on the surface, in any uniform structural relation with the head of the constituent which it pied-pipes. In order to provide an analysis of the observed facts, in the following sections, I will examine some cross-linguistic variation in pied-piping and propose an analysis of pied-piping which can capture the cross-linguistic variation as well as the various facts of pied-piping in English.

### 2. Some Cross-Linguistic Variation in Pied-Piping

Languages vary a great deal in terms of pied-piping possibilities. First, languages differ in terms of the syntactic categories which can be pied-piped. For example, although English does not allow pied-piping of clauses, i.e., CPs, there are languages such as IQ and Basque which allow clausal pied-piping (Cole 1982; Ortiz de Urbina 1993).

*Imbabura Quechua*

- (3) [ima-ta Juan randi-shka]-ta-taj pro ya-ngui ?  
 what-ACC Juan buy-NML-ACC-Q (you) think-2  
 'What do you think that Juan bought?' (Cole 1982:21)

*Basque*

- (4) [Nor etorriko e-el bihar] esan diozu Mireni?  
 who come aux-that tomorrow said aux Mary-D  
 'Who have you told Mary will come tomorrow?' (Ortiz de Urbina 1993:197)

Secondly, languages also vary with respect to the position the WH-word can occupy in the pied-piped constituent. As an example, in many languages, the WH-word must be in the initial position of a constituent to be pied-piped, while in English the WH-word in the complement position of a certain category, i.e., preposition, can also be a pied-piper. As an example, in Tzotzil, in order for a WH-complement of a preposition to pied-pipe the whole PP, it must first move to the beginning of the PP, which is analyzed to be the Spec of P (Aissen 1996). The contrast between the following pair of sentences in Tzotzil shows this.<sup>1</sup>

- (5) a. [Buch'u ta s-na] ch-a-bat?  
 who P A3-house ICP-B2-go  
 'To whose house are you going?  
 b. \*[Ta s-na buch'u] ch-a-bat?  
 P A3-house who ICP-B2-go  
 'To whose house are you going?' (Aissen 1996: 470)

In the next section, I will examine the pied-piping phenomenon involved in WH-questions in IQ and Sinhala, which I will argue to be an overt and covert clausal pied-piping language, respectively, and propose an analysis which can capture the cross-linguistic variation in pied-piping.<sup>2</sup>

### 3. Towards an Explanation: Decomposing WH-Questions

#### 3.1. Overt Clausal Pied-Piping in Imbabura Quechua

There are two ways to form WH-questions in IQ. First, the questioned element is marked with an interrogative suffix, *taj*, and fronted to the beginning of the sentence as in (6a), and secondly, the whole constituent containing the questioned element is fronted, i.e., pied-piped, to the beginning of the sentence. This is illustrated in (6b).

<sup>1</sup> The following abbreviations were used: A3: Set A affixes, 3rd person, ICP: incompletive aspect, CP: completive aspect, ENC: enclitic

<sup>2</sup> Weibelhuth (1989) proposes to explain the possibilities of pied-piping in English and other Germanic languages in terms of the general feature percolation mechanism and various syntactic principles such as the Theta Theory and the Bijection Principle. His analysis, however, fails to explain the cross-linguistic variation in pied-piping observed in this section, since in his analysis, the possibility of pied-piping is determined by some deep syntactic principles like the Theta Criterion and the Bijection Principle and thus there is not much room for cross-linguistic variation. See Yoon (1999a) for more discussion on this.

- (6) a. *ima-ta-taj*<sub>i</sub> (pro) ya-ngui [Juan t<sub>i</sub> randi-shka]-ta.  
 what-ACC-Q you think-2 Juan buy-NML-ACC  
 'What do you think that Juan bought?'
- b. [*ima-ta* Juan randi-shka]-ta-taj pro ya-ngui ?  
 what-ACC Juan buy-NML-ACC-Q (you) think-2  
 'What do you think that Juan bought?' (Cole 1982:21)

Two things are crucial in pied-piping in IQ. First, as we see in (6b), the so-called interrogative suffix, *taj*, must appear at the end of the pied-piped constituent, apart from the WH-word like *ima*, and secondly, the WH-word must move to the initial position of the pied-piped constituent (Cole 1982).

Given the proposal that WH-expressions can be decomposed into an indefinite wh-variable and a wh-op<sup>3</sup> (Kuroda 1965, etc.), one way to explain the preceding facts is to analyze the WH-word like *ima* in IQ as the indefinite wh-variable and *taj* as the overt realization of the wh-op, which determines the quantificational force of the indefinite wh that it comes to be associated with.<sup>4</sup> Given this, what pied-piping in IQ shows is that the indefinite wh and the wh-op can be non-adjacent and form a syntactic WH-phrase, which undergoes the usual WH-movement to the Spec of C. Specifically, I propose the following as the mechanism underlying the pied-piping movement.

Let us assume that the wh-op is a head which selects a constituent with [wh]-feature. Assuming that feature percolation is possible only from the head and the Spec to the dominating XP, a constituent XP can have [wh]-feature only in two ways. First, XP can have [wh]-feature if its head has [wh]-feature. Secondly, XP can have [wh]-feature if its Spec has a wh-element through the feature percolation mechanism.<sup>5</sup> Sentences like (6b) where the indefinite wh is not adjacent to the wh-op belong to this case. In (6b), the indefinite wh, *ima*, moves to the Spec of the constituent marked with the wh-op, i.e., to the Spec of CP, and percolates its [wh]-feature up to the mother node, i.e., CP. By virtue of this movement and the subsequent percolation of the [wh]-feature, the CP can "combine" with the wh-op and the whole constituent can undergo "pied-piping" WH-movement.<sup>6</sup>

<sup>3</sup> This is often called Q (-marker) in the literature on this topic and wh-op's like *taj* were glossed as Q in the paper. To avoid the confusion, I am using the small letter 'wh' for the indefinite wh and the capital 'WH' for the Wh-op Phrase built up from the indefinite wh and the wh-op

<sup>4</sup> Given that IQ is a head-final (SOV) language, analyzing *taj* as C seems not very plausible.

<sup>5</sup> Alternatively, we might say that wh-op has the [wh]-feature to check and that feature checking is possible between the head and the Spec of the complement phrase as well as the head and its Spec. This is in line with the Phase Impenetrability Condition of Chomsky (1998).

<sup>6</sup> Basically the same proposal was made by Ortiz de Urbina (1993) for the overt-clausal-pied-piping movement in Basque and by Horvath (1997) for partial WH-movement in Hungarian. See also Nichigauchi (1991) for the same analysis for covert pied-piping movement in Japanese. For a somewhat different proposal which does not adopt the feature percolation mechanism, see Tanaka (1999). See also footnote 9.

The preceding analysis is supported by cases where only the pied-piping strategy can be used to form a WH-question. These are the sentences like (7) below where an element in syntactic islands like complex NP is questioned.<sup>7</sup>

- (7) a. \*[*ima-ta-taj*]<sub>i</sub> pro riku-rka-ngui [[ t<sub>i</sub> randi-shka] runa]-ta.  
 what-ACC-Q you see-PAST-2 buy-NML man-ACC  
 '\*What did you see the man who bought (it)?'
- b. [[ *ima-ta randi-shka*] runa ]-ta-taj<sub>i</sub> pro riku-rka-ngui t<sub>i</sub>?  
 what-ACC buy-NML man-ACC-Q (you) see-PAST-2  
 '\*What did you see the man who bought (it)?' (Cole 1982:24)

Given the analysis, the contrast in grammaticality between sentence (7a) and (7b) can be explained in the following way: sentence (7a) is ungrammatical since the wh-op *taj* is next to the indefinite wh and consequently, movement of this WH-phrase, *ima-ta-taj*, to the Spec of C over the island boundary violates Subjacency. Sentence (7b), in contrast, is grammatical since the wh-op *taj* appears at the edge of the island and the whole island attached with it moves to the Spec of C.

As for the indefinite wh *ima*, it moves only to the beginning of the pied-piped constituent and percolates its [wh]-feature. To be more specific, I will adopt Nichigauchi's (1991) proposal about the position of relative clauses in Japanese and assume that relative clauses are in the Spec of NP in IQ.<sup>8</sup> Given this, the indefinite wh in (7b) will move up only to the Spec of the relative clause and its [wh]-feature will percolate first to the CP node and then to the NP node dominating the CP. In short, the preceding proposal about the association between the indefinite wh and the wh-op based on movement and the subsequent feature percolation enables us to explain the grammaticality of sentences like (7b) which involves island boundaries between the indefinite wh and the wh-op.<sup>9</sup>

To summarize, what IQ data clearly shows is that the indefinite wh and the wh-op can be generated non-adjacent and form a WH-phrase through some syntactic mechanism, i.e., movement and feature percolation, and that this syntactically built WH-phrase can undergo WH-movement to the Spec of interrogative C.

<sup>7</sup> According to Cole (1982:22), unlike other Quechua languages like Ancash Quechua, WH-movement in IQ does not show adjunct island effects, i.e., constituents of adverbial clauses may be questioned either by direct extraction from the adverbial clause or by pied-piping the adverbial clause.

<sup>8</sup> See Kayne (1994) for a similar proposal for N-final relative clauses.

<sup>9</sup> Tanaka (1999) assumes that the indefinite wh moves to the Spec of wP, which corresponds to the Wh-op Phrase in my analysis. I have not opted for this analysis, due to the problem of island constraint violations involved in the derivation of sentences like (7b). This problem, however, can be solved if we assume that feature checking is possible between the head and the Spec of complement, as I have suggested in footnote 6. Sentences like (7b) are also the reason I have proposed the non-adjacent generation of the indefinite wh and the wh-op unlike Hagstrom (1998). Dealing with similar data in Sinhala, Hagstrom assumes that the wh-op *taj* in Sinhala is generated right next to the indefinite wh and moves out of the island by means of a special type of movement which he calls "migration." Note, however, that this movement is different from other kinds of movement in that it disobeys the typical movement characteristics such as Subjacency and that its only motivation is to move the wh-op out of the island.

### 3.2. Covert Clausal Pied-Piping in Sinhala

The existence of covert clausal-pied-piping is best illustrated by Sinhala. Although there is no overt WH-movement in Sinhala, the following facts provide evidence that there is large-scale pied-piping in Sinhala which is comparable to that in IQ.

Except for the fact that there is no overt WH-movement in Sinhala, WH-questions in Sinhala show quite parallel behavior to those in IQ. Just as in IQ, WH-expressions in Sinhala are composed of two words and there is a way to question an element in syntactic islands such as complex NPs and adjunct clauses, i.e., to put the second part of the WH-expression, i.e., the so-called Q-marker, *d*, to the edge of the island, not next to the WH-word such as *kau*, as we see in (8) below.

- (8) a. oyaa [kauru liyp u] pot-d k i euwe?  
           you who wrote book-Q read-E<sup>10</sup>  
           \*\*Who did you read the book that (he) wrote? (Kishimoto 1992:56)
- b. [kauru en kot]-d R a njit paadam krami n hitie?  
           Who came time Q Ranjit study doing was-E  
           \*\*Who was Ranji studying when (he) came? (Kishimoto 1992:58)

The grammaticality of (8) is contrasted with the ungrammaticality of sentences in (9), which are minimally different from (8) in that *d* is adjacent to the WH-in-situ inside the island.

- (9) a. \*oyaa [kau-d liyp u] pot kieuwe?  
           you who-Q wrote book read-E  
           \*\*Who did you read the book that (he) wrote? (Kishimoto 1992:56)
- b. \*[kau-d en kot] Ranjit paadam krami n hitie?  
           Who-Q came time Ranjit study doing was-E  
           \*\*Who was Ranji studying when (he) came? (Kishimoto 1992:58)

The preceding facts can also be explained if we analyze WH-words like *kau* in Sinhala as the indefinite *wh* and *d* as the *wh-op*. If this is the case, what undergoes WH-movement to the Spec of C in (8) is the whole complex NP or the adjunct clause attached with *d*, not *kau*, and consequently (8a) and (8b) do not violate Subjacency. Sentences (9a-b), in contrast, are ungrammatical since *d* appears inside the island and thus movement of the *d*-marked element, i.e., WH-phrase, to the Spec of C across the island boundary will violate Subjacency.<sup>11</sup>

In short, the preceding discussion shows that sentences like (8) in Sinhala can be readily explained if we assume that they involve covert pied-piping movement. The only

<sup>10</sup> E-ending marks the scope of WH-expressions and contrasts with *a*-ending which appears in declarative clauses. Given this, we can analyze it as the interrogative C.

<sup>11</sup> See Yoon (1999b) for more detailed discussion on Sinhala. See also Kishimoto (1992) for the same claim that sentences like (8) in Sinhala involve LF pied-piping.

difference between Sinhala and IQ is that the movement involved in pied-piping is covert in Sinhala, while it is overt in IQ.

### 3.3. Summary: A Two-Step Model for WH-movement

Following is the summary of the proposal made in this section, based on the preceding discussion on pied-piping in IQ and Sinhala and the earlier analyses (Kuroda 1965; Nichigauchi 1986, 1991; Tsai 1994, etc.).

(i) WH-expressions can be decomposed into an indefinite wh-variable and a wh-op and the quantificational force of a wh-variable is determined by the wh-op (or Q) with which it comes to be associated. The indefinite wh and the wh-op can be generated separately.

(ii) WH-question formation can accordingly be broken down into two steps. First, the indefinite wh-variable must be associated with the wh-op, thereby forming a WH-phrase (WH-marking step) and secondly, the WH-phrase thus formed must be "associated" with an interrogative C (WH-scoping step). The former step corresponds to building up a WH-phrase syntactically, while the latter corresponds to what is known as "WH-movement."

(iii) The formation of a WH-phrase from the non-adjacent indefinite wh and wh-op involves "movement" and the subsequent feature percolation. Specifically, I will assume that wh-op is a head which selects a constituent with {wh}-feature. Assuming that percolation of a feature is possible only from the head and the specifier, the indefinite wh which is not the head of XP must move to the Spec of XP and percolate its [wh]-feature up to the mother node. By virtue of this movement and the subsequent percolation of [wh]-feature, XP will combine with the wh-op and form a WH-phrase (Wh-op Phrase, to be precise). The WH-phrase thus formed will undergo "pied-piping" WH-(scoping) movement to the Spec of C.

## 4. Explaining Pied-Piping in English

Turning finally to the pied-piping phenomenon in English, I propose the following explanation. Note that according to the proposal presented in section 3, two separate steps of movement can be involved in WH-questions and the movement involved in each step can be either overt or covert. This means that there can be four different types of languages depending on whether the movement involved in each step is overt or covert.

### (10) *Four Types of Languages*

	WH-marking movement	WH-scoping movement
Imbabura Quechua, Basque	Overt	Overt
Sinhala ( Korean, Japanese)	Covert	Covert
?	Overt	covert
?	Covert	overt



We have already seen that the movement involved in both WH-marking and WH-scoping step is overt in IQ, while it is both covert in Sinhala.<sup>12</sup> What has not been discussed yet is the languages where WH-marking movement is overt and WH-scoping movement covert and the languages where the opposite holds. Of these two remaining types, I propose that English fits the last type.<sup>13</sup> If this is the case, various facts of pied-piping in English can be explained in the following way.

First, the proposal can explain why WH-specifiers in English (as illustrated in (1a)-(1c)) are pied-pipers. Since feature percolation is possible from the Spec position, the indefinite *wh* element in Spec, either base-generated or moved into it, can percolate its [wh]-feature to the mother node, thereby forming a WH-phrase with the *wh*-op.<sup>14</sup>

Secondly, the fact that the complements of PPs are pied-pipers unlike complements of other phrases can be explained in the following way ((1d)). According to the Cyclic Spell-Out model of Chomsky (1998), overt and covert movement are interspersed within narrow syntax. This means that it is in principle possible for covert movement to precede overt movement, as long as the covert movement occurs in the cycle preceding the one where the overt movement takes place. This means that if PP is a cycle, then the *wh*-element in the complement position of P can overtly pied-pipe the PP: in the PP cycle, the indefinite *wh* will covertly move to the Spec of PP and percolate its [wh]-feature to the PP. The WH-phrase formed by this covert WH-marking movement and the subsequent feature percolation will undergo overt WH-scoping movement to the Spec of C.

Since it is crucial for PP to form a cycle in this explanation,<sup>15</sup> let us consider whether it is a reasonable assumption that PP constitutes a cycle. Although the precise definition of cycle remains to be worked out,<sup>16</sup> I take the following as evidence that PP constitutes a cycle/phase. According to Chomsky (1998), all derivations are cyclic and this is succinctly expressed in his "Phase-Impenetrability Condition," which basically states that the cycle is so strict that only the head and its Spec are visible for outside operations (Chomsky 1998:22). Chomsky further suggests that the Phase-Impenetrability Condition induces a strong form of Subjacency by requiring that A'-movement target the

<sup>12</sup> We can assume that the indefinite *wh* in Sinhala also moves to the beginning of the pied-piped constituent by analogy to IQ.

<sup>13</sup> Due to the limitations of this paper, I will not discuss the third type in this paper.

<sup>14</sup> I am analyzing WH-words like *who* or *what* in English as the amalgamated form of the indefinite *wh*-variable (*who*, *what*) and the *wh*-op, which is phonologically null. This analysis is supported by words like *whoever* and *whatever*, where *who* and *what* are bound by '-ever' (Tsai 1994). Given this, the difference between WH-words in English and those in IQ or Sinhala simply is that the indefinite *wh* and the *wh*-op are lexicalized as a single word in English, while they are lexicalized as two separate words in languages like IQ and Sinhala. See Aoun & Li (1993) for a similar idea.

<sup>15</sup> At least for sentences like (1d), we can explain the pied-piping of PP even if PP is not a cycle itself. It is because PP as in (1d) is generated below the *vP* cycle and thus, covert movement of indefinite *wh* to the Spec of PP can precede the overt pied-piping movement of the WH-phrase formed by the covert WH-marking movement to the Spec of C in the next cycle.

<sup>16</sup> Chomsky (1998:20) suggests that cycle/phase is the closest syntactic counterpart to a proposition and that CP or *vP* is a phrase but not TP or a verbal phrase headed by H lacking  $\phi$ -features and therefore not entering into Case/agreement checking. See Uriagereka (1999) for different ideas.

edge of every phase. This means that if PP indeed is a phase, movement out of PP must proceed through its Spec.

We have already seen some overt evidence for this, i.e., pied-piping of PP in Tzotzil. As already discussed, in Tzotzil, WH-movement of the complement of P out of PP must proceed through the Spec, suggesting that PP is a phase. Although not as obvious as in Tzotzil, there is also evidence in English which suggests that PP is a phase. Van Riemsdijk (1982) argues that "PPs behave like syntactic island in many constructions," based on the fact that it is easier to extract elements from a PP if the PP is closely connected with the verb. The contrast between the following two sentences shows this.

- (11) a. Whom<sub>i</sub> did you talk [<sub>PP</sub> to t<sub>i</sub> ]?  
 b. \*[Which room]<sub>i</sub> did you sleep [<sub>PP</sub> in t<sub>i</sub> ]?

In order to explain this, van Riemsdijk claims that licit movement from PP proceeds through an escape hatch within PP, which will be Spec of P under the current theory. We can interpret this as evidence that PP is a phase in English.

If the preceding analysis is on the right track, what has to be explained is not why the WH-element in the complement position of PP can be pied-pipers but why the WH-complements of phrases other than PP, as in (12) below, cannot be pied-pipers. Although the details of the analysis hinge on the precise definition of cycle, I propose that the impossibility of pied-piping can be explained in the following way.

- (12) a. \*[Afraid of whom] are you?  
 b. \*[ The picture/ A picture/ Pictures of whom] did you see?  
 c. \*[ That John bought what] do you think?  
 d. \*[ Meet whom] will you?

First of all, the ungrammaticality of sentences like (12a) can be explained if we assume, following Chomsky (1998), that AP does not constitute a cycle. If this is the case, there is only a single cycle, i.e., the whole CP, in sentences like (12a) and overt movement must precede covert movement in that cycle. Given that WH-marking movement is covert whereas WH-scoping movement is overt in English, derivation of sentences like (12a) is predicted to be impossible in English.<sup>17</sup>

Secondly, the ungrammaticality of (12b) can be explained if we assume, following Lyons (1999), that articles like *a* and *the* are not heads themselves but are the Specs of phonologically null heads like D, Card(inality)P or Num(ber). If this is the case, movement of indefinite wh to the Specs of these phrases will be impossible since they are already occupied and consequently, the WH-phrase which will undergo overt pied-piping movement to the Spec of C will not be formed.

<sup>17</sup> The grammaticality of sentences like (1b), in contrast to (12a), is not a problem to this explanation, since the wh-element *how* is base-generated in Spec of AP or in some functional projection above AP (e.g., DegP), not moved into it.

Third, the impossibility of clausal pied-piping as in (12c) can be attributed to the Doubly Filled Comp Filter (DFCF). Although the nature of the DFCF in the current theory is not very clear, the descriptive generalization expressed by it is that both the Spec and the head of CP cannot be occupied by lexical material.<sup>18</sup> This means that if the indefinite *wh* covertly moves to the Spec of CP in (12c) to form a WH-phrase, the resulting structure will violate the DFCF and thus is ruled out.<sup>19</sup> Deletion of *that* will not yield the grammatical output, either, since the null C must be governed by the verbal head selecting it (Stowell 1981).

Finally, I propose to attribute the impossibility of pied-piping VP (or *vP*) as in (12d) to a kind of selectional restriction between the *wh*-op and the phrases it subcategorizes for.<sup>20</sup> If we assume that *wh*-op does not subcategorize for VP (or [+V] categories), then the impossibility of pied-piping as in (12d) can be explained. To speculate, that *wh*-op does not subcategorize for VP might be related to the fact that [+WH]-C has two strong features to check, i.e., the strong N-feature which is checked by an overt WH-phrase in the Spec and the strong V-feature which is checked by the Infl overtly raised to C. If the VP itself is pied-piped, the strong V-feature of [+WH]-C will not be checked and thus will cause the derivation to crash.

To summarize, the discussion in this section shows that various facts of pied-piping in English can be explained, (i) if we decompose WH-questions into two separate steps, i.e., WH-marking and WH-scoping, each of which involves movement; (ii) if we assume that English is a language where WH-marking movement is covert while WH-scoping movement is overt; and finally, (iii) if we assume the Cyclic Spell-Out model where overt and covert movement are interspersed within narrow syntax.

## 6. Conclusion

This paper dealt with pied-piping in English. Based on cross-linguistic variation involved in pied-piping, I have proposed an analysis of pied-piping which can explain not only pied-piping in English but also cross-linguistic variation in pied-piping. In short, my claim is that WH-questions involve two separate steps of movement and that pied-piping phenomenon can be best understood in terms of the movement involved in these two separate steps. Specifically, the cross-linguistic variation, in this approach to pied-piping, is the result of the overt/covert nature of movement involved in each step of WH-question formation. According to this proposal, there can be four different types of languages, i.e.,

<sup>18</sup> The same analysis was proposed by Ortiz de Urbina (1993). According to him, languages which allow clausal pied-piping do not show the DFCF effects. An alternative explanation for the ungrammaticality of (12c) is to attribute the ungrammaticality to the feature clash between *th*- and *wh*-. That the declarative C *that* in English has the [+definite] feature is suggested by the fact that it has the same form as the demonstrative *that*. See Tsai (1994) for the idea that *th*- contrasts with *wh*- with respect to definiteness in English.

<sup>19</sup> In order for this explanation to work, I have to assume that a covertly moved element in Spec, although not pronounced, also counts for the DFCF.

<sup>20</sup> Tanaka (1999) makes a similar proposal that *w*, i.e., *wh*-op in my analysis, selects only a certain categories of phrases. However, he differs from me in that he assumes that CP cannot be selected by *w*, i.e., CP cannot be pied-piped.

(i) languages where movement involved in both steps is overt; (ii) languages where it is both covert; (iii) languages where movement involved in WH-marking is overt, while that in WH-scoping is covert; and finally (iv) languages where movement involved in WH-marking is covert and that involved in WH-scoping is overt. Of these four possible types, I have proposed that English belongs to the fourth type and shown how various facts of pied-piping in English can be explained if this is the case.

What is also crucial in my explanation of various facts of pied-piping in English is the Cyclic Spell-Out model where it is possible for covert movement to precede overt movement. However, given that much of the explanations for the possibility of pied-piping in English given in this paper hinges on what constitutes a cycle, what is necessary seems to be a more clear understanding of cycle. I leave this for future research.

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