

# Why *\*if or not* but *✓whether or not*\*

Danfeng Wu | MIT | dfwu@mit.edu

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## 1. The puzzle

This squib argues that several contrasts between the behavior of *whether* and *if* as introducers of embedded alternative questions can be explained if we assume that *whether* can pied-pipe, but there is no pied-piping in *if*-questions. Strikingly, once we eliminate the pied-piping parse for *whether*, it behaves like *if*.

Consider first the well-known fact that *or not* can immediately follow *whether* (3), but not *if* (4) (observed by Kayne (1991), a.o.).

(1) I don't know **whether** Pat will arrive this weekend or not.

✓Yes/No (Y/N) Reading: I don't know which of the following is true: (1) Pat will arrive this weekend, or (2) he won't arrive this weekend.

(2) I don't know **if** Pat will arrive this weekend or not. (✓Y/N)

(3) I don't know **whether** or not Pat will arrive this weekend. (✓Y/N)

(4) \*I don't know **if** or not Pat will arrive this weekend. (\*Y/N)

*Whether* and *if* contrast in another less well-known manner that will be significant here. Both (5) and (6) have the Alt(ernative) reading indicated below.<sup>1</sup> When the disjoined PP *on Saturday or on Sunday* immediately follows *whether*, this Alt reading remains (7).<sup>2,3</sup> But when the disjoined PP immediately follows *if*, the Alt reading is lost (8).

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<sup>1</sup> Examples (5) and (6) permit a Y/N reading, but that is not relevant to the current discussion. Section 2.3 will briefly discuss this Y/N reading of (5) and (6).

<sup>2</sup> Out of the 8 native speakers I interviewed, 6 shared this judgment and agreed that (8) is worse than (7), and 2 found (7) so awkward that it just sounds bad, and reported (8) to also be ungrammatical. Crucially, no one who accepted (7) also accepted (8). As I will argue later, the contrast between (3) and (4) and the contrast between (7) and (8) follow from *whether*'s ability to pied-pipe its sister. For those who rejected (7) and (8) and yet agreed with the contrast between (3) and (4), *whether* can pied-pipe certain elements (e.g. the polar DisjP *or not*), but not others (e.g. the temporal DisjP *on Saturday or on Sunday*). This is not surprising, as *wh*-phrases can't pied-pipe every type of element in English anyway. For example, a *wh*-object can pied-pipe a preposition but not a verb.

Furthermore, there is already dialectal variation in what material can be pied-piped by other *wh*-phrases. For example, the structure in (i), also known as 'massive pied-piping' in relative clauses, was reported to be ungrammatical by Heck (2009), but judged to be fine by Ross (1986):

(i) \*a man [<sub>DP</sub> a deck chair of whom]<sub>i</sub> you spilled coffee on t<sub>i</sub>

<sup>3</sup> The prosody associated with the Alt reading for (7) involves accentuation on the primarily stressed syllables of *Saturday* and *Sunday*. Pruitt and Roelofsen (2013) showed that in matrix contexts the final contour is a stronger cue than accentuation on disjuncts: matrix alternative questions require a final falling contour, whereas matrix Y/N questions don't. Unfortunately, embedded questions require a falling contour regardless of whether they are Alt or Y/N, so the final contour is not a cue in embedded contexts.

(5) I don't know **whether** Pat will arrive on Saturday or on Sunday.

✓Alt(ernative) Reading: I don't know which of the following is true: (1) Pat will arrive on Saturday, or (2) Pat will arrive on Sunday.

(6) I don't know **if** Pat will arrive on Saturday or on Sunday. (✓Alt)

(7) I don't know **whether** on Saturday or on Sunday Pat will arrive. (✓Alt)

(8) I don't know **if** on Saturday or on Sunday Pat will arrive. (\*Alt)

The facts in (1)-(8) can be given a unified explanation. First suppose that in (1)-(4) *or not* is a disjunction phrase (DisjP), disjoining the covert positive polarity (POS) and the negative polarity (NEG) *not* (9a). This DisjP supplies the polarity value to the rest of the clause. In (5)-(8), *on Saturday or on Sunday* is a DisjP coordinating two PPs (9b).<sup>4</sup>

(9) a. [DisjP (POS) or not]

b. [DisjP [on Saturday] or [on Sunday]]

There is a direct connection between the DisjP and the relevant reading. In the Y/N reading in (1)-(4), what is in question is the choice between the two alternatives *Pat will arrive this weekend* and *Pat won't arrive this weekend*. These two alternatives differ only in their polarity value. Notice that the DisjP *or not* provides the polarity values that they differ in. Therefore, I call the Y/N reading a reading where the alternatives presented in the DisjP (POS) *or not* are *put under question*.

Likewise, in the Alt reading in (5)-(8), what is put under question is the choice between the two alternatives *Pat will arrive on Saturday* and *Pat will arrive on Sunday*. These two alternatives differ only in their PP, which is supplied by the temporal DisjP *on Saturday or on Sunday*. Therefore, I say that in this reading, it is the alternatives presented in the DisjP *on Saturday or on Sunday* that are *put under question*.

The puzzle can then be described as a correlation between the position of the DisjP and the relevant readings we observe. This unified puzzle can be summarized as follows:

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<sup>4</sup> A reviewer asked whether (1)-(8) could be analyzed differently, which would involve clausal disjunction (TP- or VP-disjunction) plus ellipsis, as Han and Romero (2004) argued for disjunction in general. While this analysis may be possible for (1), (2), (5) & (6), it is not possible for (3), (4), (7) & (8). Since this squib aims to capture the contrasts between (3) & (4) and (7) & (8), I won't discuss the ellipsis approach in the squib. Here is the reason why the ellipsis approach is not available. Suppose first that (5) & (6) can be analyzed as TP-disjunction plus ellipsis:

(i) I don't know whether/if [DisjP [TP Pat will arrive on Saturday] or [TP ~~Pat will arrive~~ on Sunday]].

If (7) & (8) involve clausal coordination, I can think of two potential analyses to derive the correct word order. One is topicalization of the PP in each TP, plus backward ellipsis of T' (*Pat will arrive*). The other is right-node-raising of T':

(ii) I don't know whether/if [DisjP [TopP on Saturday ~~Pat will arrive~~] or [TopP on Sunday Pat will arrive]]. *Backward ellipsis*  
(iii) I don't know whether/if [DisjP [TP t<sub>i</sub> on Saturday] or [TP t<sub>i</sub> on Sunday]] [Pat will arrive]<sub>i</sub>. *Right-node-raising*

Both analyses are ruled out by independent constraints. Backward ellipsis in coordination structures is banned by the Backward Anaphora Constraint (see Langacker 1969; Ross 1967, 1969). If we posit right-node-raising of T', the movement of the first T' has to cross a TP (the second disjunct), which was shown by Schwarz (1999) to be impossible.

- (10) Unified puzzle
- a. The alternatives presented in a DisjP can be put under question when that DisjP immediately follows *whether*.
  - b. The alternatives presented in a DisjP cannot be put under question when that DisjP immediately follows *if*.

## 2. The solution

First, I assume the following structure for *whether*- and *if*-questions, following Larson (1985) and Han and Romero (2004). In a *whether*-question, *whether* originates as the sister of the DisjP (assuming it is Spec, DisjP, following Kayne (1994) a.o.), and subsequently moves to Spec, CP:<sup>5</sup>

- (11) a. I don't know [<sub>CP</sub> *whether*<sub>i</sub> [<sub>C'</sub> C<sup>0</sup> [<sub>TP</sub> Pat will arrive this weekend [<sub>DisjP</sub> *t*<sub>i</sub> [<sub>Disj'</sub> (POS) or not]]]]].
- b. I don't know [<sub>CP</sub> *whether*<sub>i</sub> [<sub>C'</sub> C<sup>0</sup> [<sub>TP</sub> [<sub>T'</sub> Pat will arrive] [<sub>DisjP</sub> *t*<sub>i</sub> [<sub>Disj'</sub> on Saturday or on Sunday]]]]].

In an *if*-question, there is a covert counterpart of *whether* with the same derivational history, i.e. origination in Spec, DisjP and movement to Spec, CP. In addition, *if* is C<sup>0</sup>. Let us call this covert counterpart of *whether* *Op*(erator):

- (12) a. I don't know [<sub>CP</sub> *Op*<sub>i</sub> [<sub>C'</sub> *if* [<sub>TP</sub> Pat will arrive this weekend [<sub>DisjP</sub> *t*<sub>i</sub> [<sub>Disj'</sub> (POS) or not]]]]].
- b. I don't know [<sub>CP</sub> *Op*<sub>i</sub> [<sub>C'</sub> *if* [<sub>TP</sub> Pat will arrive [<sub>DisjP</sub> *t*<sub>i</sub> [<sub>Disj'</sub> on Saturday or on Sunday]]].

This structure can derive the meaning with existing theories of question semantics. For example, assume that the DisjP denotes a choice-functional trace applying to a set, and the landing site of *whether*/*Op* existentially quantifies over this trace: “I don't know [ $\lambda p$ :  $\exists f$ .  $p = \text{Pat will arrive } f(\{\text{on Saturday, on Sunday}\})$ ]]” for (12b). The question operator can be an identity function in the sense of Hamblin (1973) and Karttunen (1977).

The reading where the alternatives presented in a DisjP are put under question arises in the following way: (1) base-generate *whether* / *Op* as the sister of the DisjP; and (2) move *whether* / *Op* to Spec, CP. If either step fails to take place, the alternatives in the DisjP cannot be put under question and hence the relevant reading will be lost.

### 2.1. Why DisjP cannot be put under question when immediately following *if*

The alternatives in the DisjP that immediately follows *if* cannot be put under question because *Op* fails to move to Spec, CP from the position it would have to move from.

<sup>5</sup> As a reviewer pointed out, Larson actually claimed that *whether* / *Op* originates as the sister of *or* and subsequently moves to Spec, CP, stopping in the edge of DisjP. Han and Romero simplified Larson's proposal, and assumed that *whether* is base-generated adjacent to DisjP. I adopt the assumption by Han and Romero.

When the DisjP follows *if*, I assume that the DisjP occupies a derived  $\bar{A}$ -position as a result of what I will assume to be topicalization.<sup>6</sup>

- (13) a. \*I don't know [CP Op<sub>i</sub> if [TopP [DisjP t<sub>i</sub> [Disj' (POS) or not]]<sub>j</sub> Top<sup>0</sup> [TP Pat will arrive this weekend t<sub>j</sub>]]]. *Derivation for (4)*  
 b. \*I don't know [CP Op<sub>i</sub> if [TopP [DisjP t<sub>i</sub> [Disj' on Saturday or on Sunday]]<sub>j</sub> Top<sup>0</sup> [TP Pat will arrive t<sub>j</sub>]]]. *Derivation for (8)*

Structures in (13) are excluded because a topicalized phrase may not contain a *wh*-trace:

- (14) \*[CP wh<sub>i</sub> C<sup>0</sup> [TopP [... t<sub>i</sub> ...]<sub>j</sub> Top<sup>0</sup> ... t<sub>j</sub> ]]]

The following examples show that this ban is true for English in general.<sup>7</sup>

- (15) a. \*I wonder whom<sub>j</sub> [to t<sub>j</sub>]<sub>i</sub> you talked t<sub>i</sub>.  
 b. \*I wonder [what day]<sub>j</sub> Pat thinks that [on t<sub>j</sub>]<sub>i</sub> you left t<sub>i</sub>.  
 c. \*I wonder [whose book]<sub>j</sub> Kim claims that [about t<sub>j</sub>]<sub>i</sub> you talked t<sub>i</sub>.

This restriction may form a part of a broader generalization that bans an A'-moved element that contains another A'-trace (Lasnik and Saito (1992), Takahashi (1994), Müller (1998) & (2010), Corver (2014), Bošković (2018), a.o.), but for the purposes of this squib, the restriction alone suffices. Because the topicalized DisjP cannot contain the *wh*-trace of Op in (13a-b), the alternatives in the DisjP cannot be put under question.

## 2.2. Why DisjP can be put under question when immediately following *whether*

We may wonder why the alternatives in the DisjP that immediately follows *whether* can be put under question, as the same empirical generalization should rule out extraction of *whether* from the topicalized DisjP as well.

I argue that this is because *whether* as a *wh*-phrase can pied-pipe. Consequently, there is another way to parse (3) and (7), where the DisjP following *whether* is pied-piped by *whether* rather than topicalized:

- (16) a. I don't know [CP [DisjP whether [Disj' (POS) or not]]<sub>i</sub> C<sup>0</sup> [TP Pat will arrive this weekend t<sub>i</sub>]]. *Derivation for (3)*  
 b. I don't know [CP [DisjP whether [Disj' on Saturday or on Sunday]]<sub>i</sub> C<sup>0</sup> [TP Pat will arrive t<sub>i</sub>.]] *Derivation for (7)*

<sup>6</sup> While the disjoined PP can be topicalized (13b), it may be difficult to imagine topicalizing a polar disjunction (13a), which may be the reason why (13a) is bad. In any case, this point of view does not conflict with the goal of this subsection, which is to rule out (13a,b).

<sup>7</sup> Lasnik and Saito (1992) claimed that a topicalized DP containing a type-e trace is not completely unacceptable. This does not weaken the claim made here because the topicalized DisjP examined in this squib is not nominal. In addition, *whether* and Op are likely not type e.

Recall that in order to put the alternatives in the DisjP under question, all we need is to move *whether* to Spec, CP. We do not care if *whether* pied-pipes other material. (16) satisfies this requirement because the final position for *whether* is in Spec, CP. Thus, the alternatives in the DisjP that is pied-piped by *whether* can be put under question.

Two pieces of evidence support the claim that *whether* can pied-pipe the DisjP. The first comes from sluicing. Assuming that sluicing deletes TP or C', the only element that can survive sluicing is Spec, CP. Material pied-piped by the *wh*-phrase survives sluicing:

- (17) a. Pat talked to someone, but I don't know to whom ~~he talked~~.  
b. Pat left on some day, but I don't know on which day ~~he left~~.

Strikingly, *whether* plus a DisjP may remain after sluicing, indicating that the DisjP must have been pied-piped by *whether*:<sup>8</sup>

- (18) I know that Pat will arrive sometime on the weekend. I'm just not sure whether on Saturday or on Sunday.

The second evidence for *whether*'s ability to pied-pipe comes from variants of English that allow overt *whether* and auxiliary inversion to cooccur, where in a matrix clause, *whether* may appear to the left of the auxiliary in C<sup>0</sup> (e.g. of the form 'Whether will Pat arrive?'). Assuming that the constituent immediately to the left of C<sup>0</sup> occupies Spec, CP, then if *whether* and the DisjP can appear together before C<sup>0</sup>, this can be taken as evidence that *whether* and the DisjP are one constituent, and *whether* pied-pipes the DisjP.

Such sentences are attested in legal documents from the 19th ((19)-(20)) and 20th centuries (21). Even more strikingly, *whether* and the pied-piped DisjP together can be coordinated with other *wh*-elements that occupy Spec, CP, including material pied-piped by other *wh*-phrases like *for what purpose* and *by whom* (19b). The coordination fact again suggests that DisjP, like other pied-piped material, occupies Spec, CP.

- (19) a. Whether or not did you prepare a lease, pursuant and conformable to such instructions?  
b. And if yea, for what purpose, and when and by whom and whether or not was such counterpart, left with the said complainant?<sup>9</sup>  
(20) a. Whether or not did such action come on to be tried?  
b. Whether or not were the judge desirous to find a special verdict; ...<sup>10</sup>

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<sup>8</sup> All my 6 informants accepted (18), which is striking because *whether* on its own resists sluicing:

(i) \*I know that Pat will arrive on either Saturday or Sunday, I just don't know whether.

The acceptability of (18) suggests that *whether*-sluicing is actually possible, but only possible when *whether* pied-pipes. I leave it to future research why this is the case.

<sup>9</sup> (19a&b) come from: <https://books.google.com/books?id=v2VjAAAAcAAJ>

<sup>10</sup> (20a&b) come from: <https://books.google.com/books?id=rQDAAAQAAJ>

- (21) I will ask you whether or not did the defendant make any voluntary statement to you after he was placed under arrest?<sup>11</sup>

Also, suppose *whether* is a *wh*-word, as it shares *wh*- morphology with other *wh*-words (Emonds (1976) a.o.). Since *wh*-words can pied-pipe in general in English, *whether* being a *wh*-word should also be able to pied-pipe.

If (3) and (7) have the relevant readings because the DisjP is pied-piped by *whether* rather than topicalized, then this analysis makes a prediction. If we prevent the structure from being parsed as involving pied-piping, then *whether*-sentences without pied-piping should behave like *if*-sentences, and the relevant reading should disappear.

One way to rule out the pied-piping parse is by interpolating an adverb or a parenthetical between *whether* and DisjP, adapting a test first developed by Rudin (1988) for Bulgarian. For instance, regular *wh*-sentences with pied-piping become ungrammatical once the *wh*-word and the pied-piped material are interpolated:

- (22) \*I wonder to, {according to Kim/actually/fortunately}, whom you talked.

Interpolation between *whether* and the DisjP makes the *whether*-sentences *if*-like, as the relevant readings are no longer available:

- (23) \*I don't know whether, {according to Kim/actually/fortunately}, or not Pat will arrive this weekend.  
(24) I don't know whether, {according to Kim/actually/fortunately}, on Saturday or on Sunday Pat will arrive. (\*Alt)

The interpolation test shows that pied-piping is the reason why the alternatives in the DisjP that follows *whether* can be put under question. Once we rule out the pied-piping parse by interpolation, the relevant readings also disappear.

If *whether*-sentences allow the relevant readings because of a parse in which *whether* pied-pipes DisjP, we may wonder whether Op can pied-pipe DisjP as well.

Even if it can, the *if*-sentences (13a,b) that were under analysis in section 2.1 cannot be analyzed as Op pied-piping because of the incorrect word order. If Op can pied-pipe DisjP, we should be able to see the following word order, which is also ungrammatical:

- (25) a. \*I don't know [DisjP Op [Disj' (POS) or not]]<sub>i</sub> if Pat will arrive this weekend t<sub>i</sub>.  
b. \*I don't know [DisjP Op [Disj' on Saturday or on Sunday]]<sub>i</sub> if Pat will arrive t<sub>i</sub>.

There are two possible reasons why (25a,b) are bad. First, they violate the Doubly-Filled Comp Filter, which prohibits overt occurrence of both the head (*if*) and its specifier (DisjP). Second, it is possible that phonologically null elements cannot pied-pipe overt material, so Op cannot pied-pipe the DisjP, unlike *whether*. I do not commit to a particular reason here, noting only that (25a,b) can be ruled out by one of them.

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<sup>11</sup> <https://law.justia.com/cases/texas/court-of-criminal-appeals/1962/34019-3.html>

Because the pied-piping parse is unavailable for *if*-sentences, we predict the *if*-counterpart of (18) to be ungrammatical, which is the case:

- (26) \*I know that Pat will arrive sometime on the weekend. I'm just not sure if on Saturday or on Sunday.

### 2.3. An additional reading of (5)-(8)

In addition to the Alt reading, (5)-(8) also have a Y/N reading, i.e. 'I don't know which of the following is true: (1) Pat will arrive on a weekend day (either Saturday or Sunday), or (2) he won't arrive on either of those days.'

The discussion so far has only concerned the presence or absence of Alt reading of (5)-(8). Why is the Y/N reading always available for them?

Following Hamblin (1973), Karttunen (1977) and Biezma (2009), I assume that there are two types of questions with different question operators:  $Q_{Alt}$  and  $Q_{yes/no}$ .  $Q_{Alt}$  is an identity function that scopes over the set denoted by an overt disjunction:  $\llbracket Q_{Alt} \rrbracket = \lambda p. \lambda q. p = q$ .<sup>12</sup> It is present in (1)-(4), and in the Alt-reading parse of (5)-(8).

$Q_{yes/no}$  takes a simple proposition and induces a partition of the set of possible worlds into disjunctive polar sets:  $\llbracket Q_{yes/no} \rrbracket = \lambda p. \lambda q. [q = p \vee q = \neg p]$ . The additional Y/N reading in (5)-(8) results from the presence of  $Q_{yes/no}$ , which simply converts any proposition into a Y/N question. (7)-(8) involves topicalization of the temporal DisjP inside this simple proposition, which should not affect its semantic composition with  $Q_{yes/no}$ , and thus does not affect the Y/N reading.

## 3. Cross-linguistic analyses: Polish and Bengali

This section shows that Polish has *whether* but not *if*, and Bengali has *if* but not *whether*, so together they complete the paradigm in English. In addition, they offer something that English *whether* does not have: they have multiple lexical items for 'or'. In particular, Polish 'or' is identical in form to the initial coordinator ('either', 'whether', 'neither') it is local to. Taking this morphological identity as an indication of an agreement relation between them, I offer an analysis of how pied-piping occurs in Polish, which in turn can be applied to English as well.

### 3.1. Polish has *whether*

Example (27) shows the neutral word order for an embedded alternative question in Polish.<sup>13</sup> I will argue that the first *czy* should be analyzed as *whether*. Note that it is identical in form to the disjunction coordinator, glossed as 'or1' (in contrast to 'or2', to be discussed in section 3.3). Section 3.3 will also discuss why it lacks the Y/N reading.

<sup>12</sup> I have not included the complete details of the denotations for clarity.

<sup>13</sup> I am grateful to Barbara Citko, Barbara Tomaszewicz, and Bartosz Wiland for the Polish judgments in this section.

- (27) Nie wiem czy Jan przyjedzie w sobotę czy w niedzielę.  
 Not know.1sg whether Jan arrive.perf.3sg in Saturday or1 in Sunday  
 Literal Meaning: ‘I don’t know whether Jan will arrive on Saturday or on Sunday.’  
 ✓Alt Reading: I don’t know which of the following is true: (1) Jan will arrive on Saturday, or (2) Jan will arrive on Sunday.  
 \*Y/N Reading: Which of the following is true: (1) Jan will arrive on a weekend day, or (2) Jan won’t arrive on a weekend day?

In parallel to (7), when the temporal DisjP immediately follows *czy* ‘whether’, the Alt reading remains:

- (28) Nie wiem czy w sobotę czy w niedzielę Jan przyjedzie.  
 Not know.1sg whether in Saturday or1 in Sunday Jan arrive.perf.3sg  
 Literal Meaning: ‘I don’t know whether on Saturday or on Sunday Jan will arrive.’  
 (✓Alt)

This fact can be explained if we analyze *czy* as the Polish counterpart to *whether*, and propose that *czy* can pied-pipe the DisjP. Then in (28), *czy* pied-pipes the DisjP, generating the Alt reading.

The argument from sluicing that we saw for English applies to Polish, as *czy w sobotę czy w niedzielę* ‘whether on Saturday or on Sunday’ can survive sluicing. Furthermore, Wiland (2017) observed that *czy* ‘whether’ has *wh*-morphology. Since Polish *wh*-phrases can pied-pipe in general, *czy* should also be able to pied-pipe.

### 3.2. Bengali does not have *whether*

Following is the neutral word order for a matrix alternative question in Bengali.<sup>14</sup> Notice it only has the Alt reading, and *na* is glossed as ‘or1’ (parallel to Polish (28)). See footnote 18 for an analysis of its two ‘or’s, and why the absence of Y/N reading.

- (29) Rubai ki sonibar na robibar rôwna hoeche?  
 Rubai PRT Saturday or1 Sunday depart happen.PRES  
 Literal Meaning: ‘Did Rubai depart on Saturday or on Sunday?’  
 ✓Alt Reading: Which of the following is true: (1) Rubai left on Saturday, or (2) Rubai left on Sunday?  
 \*Y/N Reading: Which of the following is true: (1) Rubai left on a weekend day, or (2) Rubai didn’t leave on a weekend day?

When the temporal DisjP precedes *ki*, the sentence becomes ungrammatical:

- (30) \*sonibar na robibar ki Rubai rôwna hoeche?  
 Saturday or1 Sunday PRT Rubai depart happen.PRES

<sup>14</sup> I am grateful to Neil Banerjee for providing Bengali judgments in this section.



The behavior of *ki* is almost identical to what Bhatt and Dayal (2020) call “polar *kya*.” in Hindi-Urdu. I adopt their analysis and analyze *ki* here as a particle in ForceP, and the DisjP to have moved (scrambled, to be precise) before *ki* in (30).<sup>15</sup> In addition, following Larson’s (1985) analysis for English, I assume that Bengali has a null question operator equivalent to English Op (originating as the sister of DisjP and moving to Spec, CP). Crucially, as a null element, it cannot pied-pipe the DisjP, which is overt. Then the movement of the DisjP traps this null operator and causes ungrammaticality.<sup>16</sup>

### 3.3. Two ‘or’s in Polish, Bengali and English

This subsection discusses the additional fact that Polish, Bengali, (and English, actually, as we will see) have two ‘or’s, which prompted the gloss ‘or1’ on *czy* in (27) and *na* in (29). My analysis of the multiple ‘or’s provides an account of how pied-piping occurs in English and Polish. Recall the absence of Y/N reading for (27). To get this reading, the disjunction coordinator in (27) must be replaced by *albo*, glossed as ‘or2’ below:

- (31) Nie wiem czy Jan przyjedzie w sobotę **albo** w niedzielę.  
 Not know.1sg whether Jan arrive.perf.3sg in Saturday or2 in Sunday  
 (\*Alt; ✓Y/N)

When ‘or1’ surfaces, we can only get the Alt reading (27); when ‘or2’ surfaces, we can only get the Y/N reading (31). I argue that the reason for the complementary distribution of the two ‘or’s is that their presence indicates different syntactic structures.

Note the identical form of *czy* ‘whether’ and *czy* ‘or’. Notice also that the Polish word for ‘either’ (the [-WH] counterpart to ‘whether’) is identical in form to *albo* ‘or2’ (‘neither’ and ‘nor’ are identical too, see footnote 19).<sup>17</sup>

- (32) **Albo** Jan przyjedzie w sobotę **albo** przyjedzie w niedzielę.  
 Either Jan will.arrive on Saturday or2 will.arrive on Sunday  
 ‘Either Jan will arrive on Saturday or he will arrive on Sunday.’

<sup>15</sup> Bengali allows many different elements to appear before *ki*, but not idiomatic objects, which resist movement in general. This suggests that elements before *ki* get there through movement. Also, elements before *ki* are presupposed and backgrounded. These are identical to the patterns in Hindi, as was discussed by Bhatt and Dayal (2020). For the sake of space I do not include the actual examples here.

<sup>16</sup> Bhatt and Dayal (2017) observed nearly identical patterns to Bengali for Hindi-Urdu, with a major difference being that Hindi-Urdu only has one ‘or’. My analysis also applies to Hindi-Urdu, whose null question operator can’t pied-pipe. However, I do not present the analysis of it in detail due to limited space.

<sup>17</sup> Example (30) is a counterexample to an alternative analysis that claims that *czy* ‘or1’ only coordinates clauses, and *albo* ‘or2’ only coordinates phrases that are smaller than clauses. Likewise, Bengali *ba* ‘or2’ can also coordinate clauses, again suggesting that this alternative analysis is incorrect for Bengali as well:

- (i) Rubai sonibare rōwna hoeche, **ba** Raj robibare poucheche  
 Rubai on.Saturday depart happen.PRES, or2 Raj on.Sunday arrive.PRF.AUX  
 ‘Rubai left on Saturday, or Raj arrived on Sunday.’

I propose that the appearance of the coordinator ‘or’ depends on the initial coordinator it has been local to. ‘Or’ appears as *czy* ‘or1’ if and only if it has been local to *czy* ‘whether’, and as *albo* ‘or2’ if and only if it has been local to *albo* ‘either’. What this means is that in (27), *czy* ‘whether’ must have been the sister of the temporal DisjP formed by *czy* ‘or1’, so it has the Alt reading.<sup>18,19</sup> (31) lacks the Alt reading because ‘whether’ cannot have originated as the sister of the temporal DisjP.

Furthermore, I propose that the morphological identity between ‘whether’ and ‘or’ is a reflex of an agreement relation between them. When ‘whether’ originates as the sister of a DisjP, it agrees with ‘or’, and copies its morphological feature to ‘or’ under agreement.

In the same way that ‘whether’ agrees with ‘or’, ‘either’ also agrees with ‘or’ it is local to, and copies its morphological features to ‘or’ under agreement. The surface form of ‘or’ can thus be taken as an indication of the origination site of ‘either’/‘whether’. ‘Or’ surfaces as *czy* under locality to ‘whether’, and as *albo* under locality to ‘either’.

In fact, this sharing of morphological feature exists in English as well. There are two morphologically related ‘or’s in English: *nor* appears when it has been local to *neither*, and *or* appears when it has not been local to *neither*. *Neither* has been analyzed as the [+NEG] counterpart of *either* (e.g. Hendriks 2004; den Dikken 2006). Den Dikken argues that similar to *whether*, *neither* originates as the sister of a DisjP and may move up later, triggering auxiliary inversion. Then the negative morphology on *nor* can be taken as a reflex of agreement between *neither* and *nor* when *neither* is local to *nor*.

I will now show that English *or* and *nor* have complementary distribution, in the same way that Polish ‘or’s do. First, note that *neither* can generate two readings. In one reading, *neither* is associated with a disjunction coordinated by *nor* (33). In the other reading, *neither* is used in a continuation to a previous negative statement about an individual, and says the same negative statement applies to another individual (34).

- (33) There will be terrible weather all this weekend, therefore...  
... neither will Pat arrive on Saturday nor on Sunday.

<sup>18</sup> The same analysis applies to Bengali. Recall the absence of the Y/N reading in (29). To get the Y/N reading, *na* ‘or1’ must be replaced by *ba* ‘or2’:

- (i) Rubai      ki      sonibar      **ba** robibar      rōwna      hoeche?  
Rubai      PRT      Saturday      or2 Sunday depart      happen.PRES      (✓Y/N; \*Alt)

‘Or’ takes the form of *na* ‘or1’ if and only if it has been local to the null question operator, otherwise it appears as *ba*.

In parallel to (8), scrambling of the temporal DisjP coordinated by *ba* ‘or2’ in (i) does not affect the Y/N reading because scrambling within the simple proposition that composes with *Q<sub>yes/no</sub>* does not affect the composed meaning:

- (ii) sonibar      **ba** robibar      ki      Rubai      rōwna      hoeche?  
Saturday      or2 Sunday PRT      Rubai      depart      happen.PRES      (✓Y/N)

<sup>19</sup> As a reviewer suggested, the reason why (27) lacks the Y/N reading may be that the structure involving *whether*’s movement is the wrong type to combine with *Q<sub>yes/no</sub>*. In support of this idea, *czy* ‘or1’ is limited to questions. For example, *czy* ‘or1’ may not be used in ‘neither ... nor ...’ constructions, which use the form of *ani ... ani ...* instead. The same applies to Bengali, whose *na* ‘or1’ is limited to questions and cannot be used in ‘neither ... nor ...’.

- (34) Chris won't arrive on Saturday...  
 ... neither will Pat arrive on Saturday.

These two readings differ syntactically. In the first reading, *neither* originates as the sister of the DisjP coordinated by *nor*, while in the second reading, there is no overt *nor* (we might assume for now that there is a covert *nor*-phrase that *neither* originates from, so the underlying structure for (34) is *Neither will Pat (nor Chris) arrive on Saturday*). Following the generalization drawn from Polish, we'd expect the coordinator to appear as *nor* in the disjunction that *neither* originates in, and thus *nor* and *or* are in complementary distribution. Since in the first reading, *neither* starts from the disjunction, that DisjP must be coordinated by *nor*, not *or* (35).<sup>20</sup> In the second reading, *neither* does not originate from any overt disjunction, so any overt disjunction cannot be coordinated by *nor* (36):

- (35) There will be terrible weather all this weekend, therefore...  
 ... neither will Pat arrive on Saturday \*or/nor on Sunday.

- (36) Chris won't arrive on Saturday or on Sunday...  
 ... neither will Pat arrive on Saturday or/\*nor on Sunday.

If we generalize beyond *neither*, and claim that English *whether* also agrees with *or* (despite no overt shared morphology), this provides an answer to how pied-piping occurs in English and Polish. As I have argued, 'whether'/'neither'/'either' agrees with 'or'. For example, as Polish *czy* 'whether' agrees with 'or', it spreads its [+WH] feature to 'or', which then projects the [+WH] feature to the entire DisjP. As the interrogative C probes for the [+WH] feature, the entire DisjP and its specifier 'whether' are both eligible goals and equidistant to the C probe because of the [+WH] feature on them (Pesetsky and Torrego 2001). If C agrees with the DisjP, the entire DisjP moves to Spec, CP, creating pied-piping effects. If C agrees with 'whether' alone, 'whether' moves by itself.

By pooling 'neither' and 'whether' together, this analysis makes a prediction: *neither* should also be able to pied-pipe. As the entire DisjP inherits the [+NEG] feature through agreement between *neither* and *nor*, the entire DisjP and *neither* are equidistant to the probe for [+NEG]. This prediction is borne out.

- (37) There will be terrible weather all this weekend, therefore...  
 a. ... [neither]<sub>i</sub> will Pat arrive <sub>t<sub>i</sub></sub> on Saturday nor on Sunday.      *No pied-piping*  
 b. ... [neither on Saturday nor on Sunday]<sub>i</sub> will Pat arrive <sub>t<sub>i</sub></sub>.      *Pied-piping*

In (37b), *neither* and the DisjP appear to the left of C<sup>0</sup>, an indication that they occupy Spec, CP, and the DisjP is pied-piped by *neither*.

<sup>20</sup> Some speakers allow the coordinator to appear as *or* when it is local to *neither* (possibly because *neither ... nor ...* is a somewhat archaic construction, and is lost in some speakers' grammar), so they will accept both *nor* and *or* for (35). But for speakers who require *neither ... nor/\*or ...*, they only accept *nor* for (35).

## 4. Conclusion

In addition to the observation that polar DisjP cannot immediately follow *if*, this squib has made the novel observation that temporal DisjP can't immediately follow *if* either to derive the relevant Alt reading. This puzzle can be subsumed under the generalization that topicalized phrases may not contain a *wh*-trace. *Whether*-questions are different because they have another parse in which *whether* pied-pipes the DisjP, putting its alternatives under question. Then I showed that Polish has 'whether', which has the ability to pied-pipe, whereas Bengali does not. Also, English *neither* can pied-pipe, too.<sup>21</sup>

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<sup>21</sup> Guerzoni and Sharvit (2014) observed that the NPI *ever* is acceptable when following *whether or not*, but not when appearing between *whether* and *or not*:

(i) \*Mary wondered whether her student had ever read SS or not.

(ii) Mary wondered whether or not her student had ever read SS.

(Guerzoni and Sharvit 2004:202)

According to the proposal in this squib, *or not* is stranded in its base position in (i) and pied-piped in (ii). Assume also that *or not* disjoins the positive and negative polarities, and is base-generated somewhere between v and T. Suppose that an NPI is licensed when c-commanded by a negative element, and that *or not* is such a negative element by inheriting the negative feature of its disjunct, then the badness of (i) is puzzling because *or not* in its base position should c-command and thus license the NPI. This issue can be resolved if we adopt Ladusaw's (1980) Left-Right Order Restriction on NPI licensing, i.e. an NPI must be preceded by its licenser. In (i) the NPI precedes negation.

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