

‘WHETHER OR NOT ANYTHING’ BUT NOT ‘WHETHER ANYTHING OR NOT’*

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1 Introduction

Negative polarity items (such as *any* and *ever*), a.k.a. NPIs, are so-called because they seem to require a “negative” licenser. This is illustrated by the contrast in (1): there is no licenser for *ever* in the unacceptable (1a), but (1b) is acceptable because *not* (or *n’t*) licenses *ever*.

- (1) a. *I think that John has ever been happy.
b. I don’t think that John has ever been happy.

A long-standing puzzle concerns the fact that NPIs are acceptable in some interrogative clauses, such as the Y-N (Yes/No) question in (2), which does not contain overt negation, or any other adequate licenser.

- (2) Do you think that John has ever been happy?

We propose a novel theory of questions according to which (2) contains disjunction and negation in its underlying syntax (roughly: *whether* [[*you think John has (at least once) been happy*] or [*not* [*you think that John has ever been happy*]]]). The covert *not* in (2) licenses *ever*, just like the overt *not* licenses it in (1b). We correctly predict that not all types of questions license NPIs because, as we show, some types of questions do not contain negation in their underlying form, for independent reasons.

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Section 2 introduces the data. A sketch of the proposal is given in Section 3; a detailed version of the proposal is spelled out in Sections 4-6.

2 NPIs in Questions

Our goal in this paper is to account for three NPI-licensing contrasts, which we label (i) the ‘alternative’/Y-N contrast, (ii) the *whether or not CP / whether CP or not* contrast, and (iii) the weak/strong-*wh* contrast, and illustrate in turn in this section.

The ‘alternative’/Y-N contrast concerns the ambiguity of surface strings such as *Did John play chess or checkers* (Larson 1985, Higginbotham 1993, Han and Romero 2004). This string may be uttered with some phonetic prominence on *chess* and *checkers* or not. This is demonstrated in (3) (where capital letters indicate phonetic prominence; see Bartels (1997) and Romero (1998)).¹

- (3) a. Did John play CHESS or CHECkERS?
b. Did John play chess or checkers?

Noticeably, whereas (3b) can optionally host *either* between *play* and *chess* (as in *Did John play either chess or checkers?*), (3a) cannot. Likewise, when the same string is modified so as to contain an NPI, it is unacceptable when uttered with the (3a)-prosody, but acceptable when uttered with the (3b)-prosody (see Higginbotham 1993).

- (4) a. (i) *Did John ever play CHESS or CHECkERS?
(ii) *Did John play either CHESS or CHECkERS?
b. (i) Did John ever play chess or checkers?
(ii) Did John play either chess or checkers?

The contrast is independent of the syntactic position of the NPI in the question, as the following examples illustrate.

- (5) a. *Did (either) MArY or JOhn bring anything to the party?
b. Did (either) Mary or John meet any students last weekend?

(3a) is an ‘alternative’ question; (3b), (4b), and (5b) are Y-N questions.² Other Y-N questions – including those that do not contain *or* in their nucleus – admit NPIs, as illustrated by (6).

- (6) Did Mary read any book?

The contrasts in *either*-licensing and NPI-licensing between ‘alternative’ and Y-N questions correlate with a contrast in meaning. The ‘alternative’ question (3a) presupposes that John played one of the games. The asker also expects the answerer to know which game was played.

- (7) a. Expected answers to (3a):

¹The reader should be aware that the descriptive claims about intonation are intended to be suggestive of the relevant interpretation, rather than rigorous claims. A more precise semantic characterization of the distinction we are interested in is presented below in terms of answerhood conditions.

²We use the word *alternative* in two different ways. To disambiguate, one of the uses is designated by ‘ ’. Thus, ‘*alternative*’, with ‘ ’, refers to a question such as (3a). *Alternative*, without ‘ ’, designates the traditional use (John, Mary and Fred are alternative individuals; *and*, *but* and *or* are alternative coordinators; and so on).

- (i) He played chess.
- (ii) He played checkers.
- b. Unexpected answers to (3a):
 - (i) He played either chess or checkers, but I don't know which.
 - (ii) No, he didn't play either chess or checkers.
- c. Possible replies (presupposition corrections):
Oh/well, he didn't play either.

On the other hand, the Y-N question (3b), as well as the Y-N question in (4b), do not presuppose that John played anything (and the asker doesn't expect the answerer to know which game was played, even if one of the games was indeed played). In this they also resemble (6), which does not presuppose that Mary read anything.³

- (8) Expected answers to (3b)/(4b):
 - a. Yes(, but I don't know which).
(Yes), he played chess.
 - b. No (, he didn't play either chess or checkers).
- (9) Expected answers to (6):
 - a. Yes(, she did).
(Yes,) she read SS. (SS = Syntactic Structures)
 - b. No (, she didn't read anything).

The observations regarding prosody, interpretation, and NPIs remain the same when the questions are embedded, as shown in (10)-(11) (the presuppositions of the embedded questions, if there are any, are "inherited" by the subject of the main clause).

- (10) a. *Bill wondered whether Mary ever played (either) CHESS or CHECKers. **'Alternative'**
- b. *Bill wondered whether any professor played (either) CHESS or CHECKers **'Alternative'**
- c. *Bill wondered whether MArY or JOhn brought anything to the party. **'Alternative'**
- d. *Bill wondered whether MArY or JOhn ever brought something to a party. **'Alternative'**
- (11) a. Bill wondered whether Mary ever played (either) chess or checkers, (but he didn't care which). **Y-N**
- b. Bill wondered whether any professor played (either) chess or checkers (but he didn't care which). **Y-N**
- c. Bill wondered whether Mary or John brought anything to the party (but he didn't care who). **Y-N**
- d. Bill wondered whether Mary or John ever brought something to a party (but he didn't care who) **Y-N**

³There are, however, subtle meaning differences between the *ever* and *ever-less* variants: *ever* widens the temporal domain that the VP quantifies over. See Kadmon and Landman (1993) for discussion of the widening effect of NPIs.

A satisfactory account of the ‘alternative’/Y-N contrast specifies what property (1b), (4b) and (5b) have in common that makes them good environments for NPIs. Our proposal says all three of them have underlying sentential negation (while (1a), (4a) and (5a) do not).

Our observations above are at odds with Nicolae (2013a,b). Specifically, she claims that there is a contrast in acceptability between (4a) and (5a). After consulting numerous speakers, both linguists and non-linguists, we found no genuine discrepancy with the judgment above as all of them consistently found the examples both in (4a) and in (5a) unacceptable and the ones in (4b) and (5b) perfectly acceptable. However, it should be noted that it is sometimes hard to exclude a Y-N interpretation in the (a) cases, because a Y-N question with a disjunction can also be positively answered by mentioning one of the disjuncts, and this might create the illusion that an ‘alternative’ reading is available in all these cases, regardless of the relative position of disjunction and NPIs. Embedding helps control for this possibility, because we do not need to use acceptable answers to establish the presence or absence of an interpretation. Rather, it is sufficient to present scenarios where the subject of the sentence is taken to be informed about the answer to the Y-N question (e.g., in (10), Bill knew that Mary played one of the games but didn’t remember which, or he knew that one of Mary and John brought something to the party but didn’t remember who), to force an ‘alternative’ interpretation of the embedded interrogative containing an NPI. In all these cases our informants found these sentences unacceptable. In this paper we are interested in finding an explanation for this fact.

The *whether or not NPI / whether NPI or not* contrast concerns embedded Y-N questions. Questions such as the embedded question in *Mary wondered whether her student had read SS* may alternatively be expressed with *or not* following the nucleus (see (12a)), or with *or not* preceding the nucleus (see (12b)). These alternatives have the same meaning as *Mary wondered whether her student had read SS*, implying that Mary wants to be informed about the truth of ‘that Mary’s student read SS’.

- (12) a. Mary wondered whether her student had read *SS or not*.
 b. Mary wondered whether **or not** her student had read *SS*.

We observe that an NPI is acceptable when it follows *whether or not*, but not when it is “trapped” between *whether* and *or not*, as shown in (13). ^{*/R} indicates that most of our consultants find (13a) unacceptable, and even those who find it (marginally) acceptable report that *or not* “feels like” an afterthought in (13a) (though it does not “feel like” an afterthought in the *ever-less* (12a)). In these cases, we speculate that the final *or not* is interpreted as a right peripheral parenthetical, repairing ‘insufficiently explicit’ previous text (see Stowell 2005).

- (13) a. ^{*/R}Mary wondered **whether** her student had ever read *SS or not*.
 b. Mary wondered **whether or not** her student had ever read *SS*.

The contrast in (13) is reminiscent of the following contrast involving ellipsis and NPIs observed in Kayne (1994).

- (14) a. *Mary didn’t buy any books about linguistics but John bought any books about linguistics.
 b. *Mary bought any books about linguistics, but John didn’t.
 c. Mary didn’t buy any books about linguistics, but John did.

Ellipsis can rescue an ‘unlicensed NPI’ provided that the overt NPI is in the scope of negation.

A satisfactory account of the *whether or not NPI / whether NPI or not* contrast specifies what (13b), (1b) and (4b) have in common. Our proposal says that the overt NPI occurs in the surface scope of negation in them (while this is not the case in (13a), (4a) or (1a)).

The weak/strong-wh contrast concerns embedded constituent questions. As observed in Guerzoni and Sharvit (2007), while matrix constituent questions always admit NPIs, not all embedded constituent questions do. For example, they admit them if the embedder is *wonder*, but not if the embedder is *surprise*. This is shown in (15)-(16).

- (15) Who has (ever) read *SS*?
 (16) a. John wonders who (ever) read *SS*.
 b. It surprised John who (*ever) read *SS*.

The contrast in NPI-licensing between *wonder* and *surprise* correlates with the fact that *wonder* can embed a Y-N question while *surprise* cannot, as illustrated in (17).

- (17) a. John wonders whether Mary read *SS*.
 b. *It surprised John whether Mary read *SS*.

Moreover, the predicates participating in the contrast have been observed to fall under the more general semantic distinction between weak and strong exhaustivity. We call “strong” predicates those that support strongly exhaustive inferences, as shown in (18) for *wonder*, and “weak” predicates those that do not, as shown in (19) for *surprise*.

- (18) John wonders who read *SS*.
 ⇒ John wants that:
 If Bill read *SS*, John knows that Bill read *SS*;
 If Bill didn’t read *SS*, John knows that Bill didn’t read *SS*.
 (19) It surprised John who read *SS*.
 Bill didn’t read *SS*.
 ⇏ It surprised John that Bill didn’t read *SS*.

John wonders who read SS implies that John would be satisfied only if he knew the “strongly exhaustive” answer to *Who read SS*, namely, the answer that provides an exhaustive list that includes the *SS*-readers as well as the non-*SS*-readers (among the individuals he considers potential *SS*-readers). *Surprise* is “weak” because *It surprised John who read SS* implies that John is surprised by the “weakly exhaustive” answer to *Who read SS* – namely, the answer that provides an exhaustive list of only the *SS*-readers – and that John expected at least one of the actual *SS*-readers to be a non-*SS*-reader. The sentence crucially does not imply that John expected one of the actual non-*SS*-readers – if there are any – to be a *SS*-reader. These judgments are confirmed by the oddity of (20) (assuming John is acquainted with all the students in his class), and the oddity of (21) (based on a similar example from Heim (1994)).⁴

⁴These claims are not uncontroversial. For an approach that argues against the weak/strong distinction, see George (2013). For alternative attempts to derive this distinction, see Guerzoni (2007) and Spector and Égré (2014).

- (20) #Although John wonders which students in his class read *SS*, he does not want to know which of them did not read *SS*.
- (21) #Although John had expected Mary and Sue – the people who actually read *SS* – to have read *SS*, it still surprised him who read *SS*, because he also expected Jill, who didn't read *SS*, to have read *SS*.

Guerzoni & Sharvit further observe the contrast in (22).

- (22) a. John knows who has read *SS* but he does not know who hasn't read *SS*.
 b. #John knows who has ever read *SS* but he does not know who hasn't.

They offer the following explanation for this contrast. While *know*, unlike *wonder* and *surprise*, may be either “weak” or “strong”, in both conjuncts of (22b) *know* must be “strong”, or it wouldn't license *ever*. This results in a contradiction: the “strongly exhaustive” answer to *Who read SS* is identical to the “strongly exhaustive” answer to *Who didn't read SS*, so John cannot simultaneously know and not know that answer. No such problem arises with (22a), where *know* may be “weak”: the first conjunct says that John knows about all the actual *SS*-readers that they are *SS*-readers, the second conjunct says that regarding the non-*SS*-readers, John doesn't know that they are non-*SS*-readers (at least not about all of them). As expected, *John knows whether Mary read SS* is acceptable (cf. (17)).

A satisfactory account of the weak/strong-*wh* contrast specifies what “strong” constituent questions have in common with Y-N questions (and with (1b)), that makes them good licensors of NPIs, and what “weak” constituent questions have in common with ‘alternative’ questions. Our proposal says that the NPI is in the scope of negation in (16a), (1b) and (4b) (while it is not in the scope of negation in (16b), (1a) and (4a)). On this view, the *which*-phrase is not the direct licensor of the NPI in (16a), nor is the embedding predicate; rather, some questions – “strong” questions in particular – contain inherent negation (and negation is an NPI-licensor).

More generally, given that ‘alternative’ questions and “weak” constituent questions do not license NPIs, but Y-N questions and “strong” constituent questions do, no question operator (*who*, *which-NP* or *whether*) can be directly “blamed” for NPI-licensing in the question-nucleus. We propose that in the absence of an independent licensor (such as *doubt* in *Does John doubt that Mary has any FRIENDS or any ENemies?*), NPIs are licensed only in questions whose LF contains (possibly covert) inherent sentential negation, and only if the NPI is in the scope of said negation. ‘Alternative’ questions and “weak” constituent questions do not contain inherent negation, but “strong” constituent questions and all Y-N questions do. A theory that accounts for the facts in this way has the advantage of satisfying all theoretical contenders: any theory of NPIs – those that say that the licensor must be downward entailing (Fauconnier 1975, Ladusaw 1979), as well as those that do not (e.g. Crnič 2011) – must predict a syntactically present negation to be an adequate licensor of NPIs.⁵

We only discuss non-minimizing NPIs (such as *any* and *ever*) in the nucleus of information-seeking questions. For a theory of NPIs in the *wh*-restrictor (e.g., *Which students who have ever*

⁵It is worth stressing, in this connection, that we do not claim that negation is the only licensor of NPIs in general. We only claim that, if our analysis of questions is correct, what effectively licenses NPIs in question happens to be negation, unless these questions contain an independent overt licensor (whether that independent overt licensor is *not* or some other item with the right semantic properties).

been to Paris appreciate fine cuisine?) see van Rooij (2003) and Guerzoni and Sharvit (2007) among others. For a theory of minimizers (such as *lift a finger*, as in *Did John lift a finger to help?*) and their licensing in “rhetorical” negatively biased questions, see Guerzoni (2003, 2004) among others. Guerzoni & Sharvit’s theory of NPIs in *wh*-restrictors and Guerzoni’s theory of minimizers are fully compatible with the current proposal.

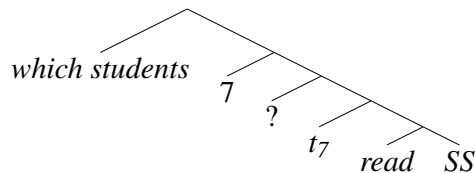
3 A Unified Analysis of Questions

3.1 Semantic Background

Questions are often analyzed as denoting sets of alternatives, the alternatives themselves being propositions that count as possible or true answers. For example, according to one influential theory of questions (Karttunen (1977); partly following Hamblin (1973)), the constituent question *Which students read SS?* denotes a subset of { ‘that x read SS’ | x is a student }, and the Y-N question *Did John read SS?* denotes a subset of { ‘that John read SS’, ‘that John didn’t read SS’ }.⁶ While Karttunen (1977) proposes a unified analysis of constituent and Y-N questions, it is not clear how that proposal may be extended to cover ‘alternative’ questions and Y-N questions with an overt *or not*, and it is far from clear how the contrasts from Section 2 can be captured. Like Karttunen, we adopt the view that questions denote sets of alternative propositions, but we propose – unlike Karttunen – that (syntactic) disjunction in the question-nucleus is one of the basic ways to generate those alternatives. This affords a unified (ellipsis-based) account of ‘alternative’, Y-N and constituent questions, and of the three contrasts from Section 2.

Since we borrow some important insights from Karttunen, let us begin with a brief overview of his analysis and its shortcomings. The Karttunen-style denotation of the constituent question *Which students read SS* is obtained as in (23), with Karttunen’s question-operator ‘?’ and an ‘existential’ treatment of *wh*-phrases (the technical details in Karttunen 1977 are somewhat different, but not in any way relevant to the current discussion). We assume that movement and binding are done in the style of Heim and Kratzer (1998), according to which movement triggers insertion of a binding index in the syntactic tree. The binding index binds the trace of the moved phrase, giving rise to the following interpretation: $\llbracket \text{QP} [n [\dots t_n \dots]] \rrbracket^{g,w} = \llbracket \text{QP} \rrbracket^{g,w} (\lambda x. \llbracket [\dots t_n \dots] \rrbracket^{g[n \rightarrow x],w})$, where *g* is a variable assignment and *w* the evaluation world.

(23) a. LF of *Which student read SS*, Karttunen-style



- b. $\llbracket t_7 \text{ read } SS \rrbracket^{g,w} = 1$ iff *g*(7) read *SS* in *w*
- c. $\llbracket ? \rrbracket^{g,w} = \lambda q_{st}. \lambda p_{st}. p = q$
- d. $\llbracket 7 [? [t_7 \text{ read } SS]] \rrbracket^{g,w} = \lambda x_e. \lambda p_{st}. p = \text{‘that } x \text{ read } SS\text{’}$
- e. $\llbracket \text{which students} \rrbracket^{g,w} = \lambda Q_{\langle e, \langle st, t \rangle \rangle}. \lambda p_{st}. \text{there is an } x \text{ such that: } \llbracket \text{student} \rrbracket^{g,w}(x) = 1 \wedge Q(x)(p) = 1 \wedge p(w) = 1$

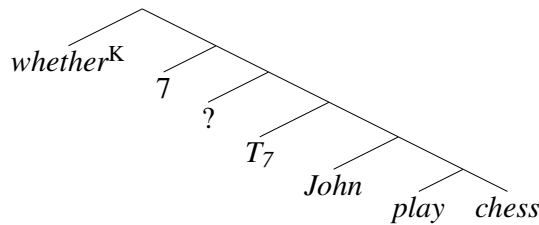
⁶We use ‘that a Verb *b*’ as an informal notation, intended to represent the function $[\lambda w. \llbracket \text{Verb} \rrbracket^{g,w}(\mathbf{b})(\mathbf{a})]$.

- f. $\llbracket \text{which students } [7 [? [t_7 \text{ read } SS]]] \rrbracket^{g,w} =$
 $\lambda p_{st}. \text{ there is an } x \text{ such that: } \llbracket \text{student} \rrbracket^{g,w}(x) = 1 \wedge p = \text{'that } x \text{ read } SS' \wedge p(w) = 1$

The question-operator ‘?’ takes as its argument the intension of the question nucleus $[t_7 \text{ read } SS]$, where t_7 – the *wh*-trace – denotes an individual; and returns, for any g , the singleton set of propositions {‘that $g(t_7)$ read SS ’}.⁷ The set of alternative answers is provided by the *which*-phrase, which quantifies over the “open” position – i.e., the free index – in $[? [t_7 \text{ read } SS]]$ and returns the set of true members of {‘that x read SS ’ | x is a student}.

Here is a Karttunen-style variant of the denotation of the Y-N question *Did John play chess?* (*Whether John played chess*) as proposed and independently motivated in Guerzoni (2003). This denotation is obtained in a way similar to (23) as shown in (24) with Karttunen’s ‘?’ and *whether*^K. *Whether*^K is the Y-N counterpart of *which-NP*: both are existential quantificational determiners but, while the quantification domain of *which-NP* is restricted by NP (e.g., *students*), the quantification domain of *whether*^K is inherently restricted by $\{\lambda p.p, \lambda p.\sim p\}$ (compare (23e) with (24e)).⁸

- (24) a. LF of *Did John play chess*, Karttunen-style



- b. $\llbracket \text{John played chess} \rrbracket^{g,w} = 1$ iff John played chess in w
c. $\llbracket T_7 \text{ John played chess} \rrbracket^{g,w} = g(7)(\text{'that John played chess'})$
d. $\llbracket 7 [? [T_7 \text{ John played chess}]] \rrbracket^{g,w} = \lambda f_{\langle st,st \rangle}. \lambda p_{st}. p = f(\text{'that John played chess'})$
e. $\llbracket \text{whether}^K \rrbracket^{g,w} =$
 $\lambda Q_{\langle \langle st,st \rangle, \langle st,t \rangle \rangle}. \lambda p_{st}. \text{ there is an } h \text{ such that: } (h = [\lambda q_{st}. \lambda w'. q(w') = 1] \vee h =$
 $[\lambda q_{st}. \lambda w'. q(w') = 0]) \wedge Q(h)(p) = 1 \wedge p(w) = 1$
f. $\llbracket \text{whether}^K [7 [? [T_7 \text{ John played chess}]]] \rrbracket^{g,w} =$
 $\lambda p_{st}. (p = \text{'that John played chess'} \vee p = \text{'that John didn't play chess'}) \wedge p(w) = 1$

T_7 – the *whether*^K-trace – denotes an $\langle st,st \rangle$ -function that takes the intension of $[\text{John played chess}]$ as its argument returning, for any g , $g(7)(\text{'that John played chess'})$. The question-operator ‘?’ (see (23c)) takes as its argument $\llbracket T_7 \text{ John played chess} \rrbracket^{g,w}$, and returns the singleton set $\{g(7)(\text{'that John played chess'})\}$. The set of alternative answers is provided by *whether*^K, which quantifies over the “open” position – i.e., the free index – in $[? [T_7 \text{ John played chess}]]$, and returns the singleton set containing the true member of {‘that John played chess’, ‘that John didn’t play chess’}. Thus, constituent and Y-N questions receive a unified analysis. There are however two concerns about this analysis, which we now discuss.

⁷We use set-talk and function-talk interchangeably (accordingly, $[\lambda p_{st}. p = q] \approx \{q\}$).

⁸In Karttunen (1977), the analysis is not parallel to *wh* cases in that he assumes a *whether or not* operator, which is base-generated above ‘?’ and whose semantics introduces among the alternatives the negation of the nucleus. However, the above rendition of Guerzoni (2003) adopts from Karttunen the requirement that the answers in the denotation be true in the evaluation world, hence the notation *whether*^K.

Consider the ‘alternative’ question *Did John play CHESS or CHECKers*. Intuitively, it denotes the true member of {‘that John played chess’, ‘that John played checkers’}. On Karttunen’s/Guerzoni’s approach, the only LF we can generate for this string is *whether*^K [7 [? [T₇ *John played chess or checkers*]]], where *whether*^K “binds” T₇ (as it does in (24)), yielding the true member of {‘that John played either chess or checkers’, ‘that John played neither chess nor checkers’}. This is the Y-N reading of the surface string *Did John play chess or checkers*, not its ‘alternative’ reading, and the ‘alternative’ reading is not accounted for.⁹

Consider also *Mary wonders whether John read SS or not*. Intuitively, it means that Mary wants to know which member of {‘that John read SS’, ‘that John didn’t read SS’} is true (just like *Mary wonders whether John read SS*). If we assume that the underlying form is [... *whether*^K [7 ? [T₇ [*John read SS or not* [*John read SS*]]]]], for any world *w* the question denotes the member of {‘that John read or didn’t read SS’, ‘that John read and didn’t read SS’} that is true in *w*. One of these members is trivially true and the other trivially false, so Mary cannot be ignorant about which one is true. The result is that Y-N questions with an overt *or not* are not accounted for.

Still faithful to the spirit of Karttunen (1977) and Guerzoni (2003), our proposal below aims to address these two concerns by providing a unified analysis of ‘alternative’ questions, Y-N questions (with and without *or not*), and constituent questions (“weak” and “strong”), and to predict the contrasts from Section 2. The proposal consists of the following (for the formal details, see Sections 4-6): (i) the LF of the question-nucleus of both ‘alternative’ and Y-N questions is of the form [? [*CP or*₇ *CP*]]; (ii) *whether* quantifies over the free index of *or*, providing a subset of the set of alternative answers [*CP*], [*CP*]. We thus depart from Karttunen and Guerzoni regarding the formation of the alternatives, the distribution of *whether* and its exact semantics. Inspired by an idea in Larson (1985), we adopt a different but unified *whether* – *whether*^L – whose role is to quantify over the free index of *or* in the question-nucleus (unlike *whether*^K, whose semantics encodes disjunction).¹⁰ More concretely, both ‘alternative’ and Y-N questions have an ‘alternative’ LF, with *whether*^L, as follows.

- (25) a. ‘Alternative’: *Did John play CHESS or CHECKers?*
whether^L 7 [? [[*John played chess*] *or*₇ [*John play checkers*]]]
 (cf. Han and Romero 2004)
 {‘that John played chess’, ‘that John played checkers’}
- b. Y-N: *Did John play chess (or not)?*
whether^L 7 [? [[*John played chess*] *or*₇ [*not* [*John play chess*]]]]
 {‘that John played chess’, ‘that John didn’t play chess’}

One more aim of our proposal is to have an account for strongly exhaustive inferences and their limited occurrences. Groenendijk & Stokhof’s (1984) often-cited criticisms of Karttunen’s theory of constituent questions is that it fails to capture those inferences. Given (23), *John knows which students read SS* only implies that John knows the propositions that comprise the “weakly exhaustive” answer (i.e., he can provide an exhaustive list of the actual *SS*-readers). Following Heim (1994), Guerzoni and Sharvit (2007), as we saw above, have argued that both “weak”

⁹The reading would be accounted for, under the assumption of a second *whether* designated to ‘alternative’ questions. There seems to be no cross-linguistic evidence for such a specialized ‘alternative’ *whether*.

¹⁰Additional supporting evidence against an unanalyzed disjunctive operator *whether or not* is found in languages different from English where the sequence *if or not* is always discontinuous.

and “strong” readings exist in principle, but different embedding verbs may impose different restrictions (see Section 2; Beck and Rullmann (1999), and Sharvit (2002)). In order to address this concern within the current proposal we adopt and modify a solution in (Guerzoni 2003), and suggest that “strong” constituent questions, but not “weak” constituent questions, are collections of Y-N questions in the following sense.

A constituent question may contain *whether*^L (cf. Guerzoni 2003) in which case, according to our proposal, it must have an ‘alternative’ LF (where the alternatives are p and not-p). Thus, when *whether*^L is present in the LF of a constituent question it yields the “strong” reading by quantifying over the index of *or* (see (26a)). When *whether*^L is absent, we get the “weak” reading (see (26b)).

(26) *Which students read SS?*

- a. “Strong” *wh*: [*which students*] 2 *whether*^L 7 [? [*t*₂ *read SS or*₇ *not t*₂ *read SS*]]
 { ‘that x read SS’ | x is a student } ∪
 { ‘that x didn’t read SS’ | x is a student } (cf. (25b))
- b. “Weak” *wh*: [*which students*] 2 [? [*t*₂ *played chess*]]
 { ‘that x read SS’ | x is a student } (cf. (23))

3.2 Syntax: Ellipsis, Pragmatic Omission and NPI Licensing

Given the structure we are proposing for ‘alternative’ and Y/N questions, we assume that the surface appearance of these questions is the result of ellipsis, in the former, and ellipsis and optional pragmatically triggered omission of *or not*, in the latter. Ellipsis applies under identity. In Y-N questions, ellipsis-under-identity can apply either in the first or the second disjunct. This accounts for all surface patterns described in Section 2, as illustrated in (27). (We distinguish between ellipsis, which applies under identity, and optional pronunciation – e.g., *or not* in (27b), which for some reason must be omitted in (27c)).

- (27) a. ‘Alternative’ questions: WHETHER ... XP OR XP’ ... (XP’ ≠ not XP)
whether^L 7 [? [[_{CP} *John played chess*] *or*₇ [_{CP} *John play* [_{NP} *checkers*]]]]
- b. Y-N questions: WHETHER ... CP OR CP’ (CP’ = not CP)
 (i) WHETHER (OR NOT) CP
whether^L 7 [? [[_{CP} *John played chess*] (*or*₇ [_{CP} *not*] [_{CP} *John play chess*]]]]
- (ii) WHETHER CP (OR NOT)
whether^L 7 [? [[_{CP} *John played chess*] (*or*₇ [_{CP} *not*] [_{CP} *John play chess*]]]]
- c. “Strong” constituent questions: WH WHETHER CP OR CP’ (CP’ = not CP)
 (i) WHICH NP ((WHETHER) (OR NOT) CP
which students 2 (*whether*^L) 7 ? [[_{CP} *t*₂ *play chess*] (*or*₇ [_{CP} *not*] [_{CP} *t*₂ *play chess*]]]]
- (ii) WHICH NP (WHETHER) CP (OR NOT)
which students 2 (*whether*^L) 7 ? [[_{CP} *t*₂ *play chess*] (*or*₇ [_{CP} *not*] [_{CP} *t*₂ *play chess*]]]]
- d. “Weak” constituent questions: WH CP
which students 2 ? [*t*₂ *played chess*]

Since the LFs of Y-N questions and “strong” constituent questions inherently contain *not* (overtly or covertly), they may host NPIs in the scope of *not*, but only if the licensed NPI is in a non-elided phrase. Since the LFs of “weak” constituent questions do not contain inherent negation, NPIs are ruled out in them (unless there is an independent licenser in the nucleus, such as *doubt*). Since the LFs of ‘alternative’ questions do not contain inherent negation either, NPIs are ruled out in them as well (unless there is an independent licenser).

- (28) a. \checkmark WHETHER [CP ... NPI ...] = [*whether* $\overline{\text{CP}}$ (*or not*) [CP ... NPI ...]] (6)
 \checkmark WHETHER OR NOT [CP ... NPI ...] = [*whether* $\overline{\text{CP}}$ *or not* [CP ... NPI ...]] (13b)
 * WHETHER [CP ... NPI ...] OR NOT = [*whether* [CP ... NPI ...] *or not* $\overline{\text{CP}}$] (13a)
- b. WHETHER ... [[XP ... NPI ...] OR XP']
 * ‘Alternative’ = [*whether* [CP ... NPI ...] *or* CP'] (4a)
 \checkmark Y-N = [*whether* $\overline{\text{CP}}$ *or* $\overline{\text{CP}}$ ' (*or not*) [[CP ... NPI ...] *or* CP'] (4b)
- c. WH [CP ... NPI ...]
 \checkmark “Strong” = [*wh*₁ (*whether*) [$\overline{\text{CP}}$... *t*₁ ...] (*or* [CP' *not*] [CP ... NPI ...]]] (16a)
 * “Weak” = [*wh*₁ [CP ... *t*₁ [... NPI ...]]] (16b)

We now present a detailed version of the analysis, beginning with the kind of questions that contain an overt or but no negation, namely, ‘alternative’ questions such as (3a).

4 The Proposal, Part I: ‘Alternative’ Questions

Larson (1985) proposes that in an ‘alternative’ question such as *Did John play CHESS or CHEckers*, the domain restriction of *whether* is supplied by its complement, which denotes {‘that John played chess’, ‘that John played checkers’}. In fact, says Larson, “... historically, *whether* developed as the *wh*-counterpart of *either*, with the original meaning of ‘which of either A or B [...]’ ...” (Larson 1985, p. 225).¹¹ The following is an explicit compositional proposal of how to achieve this.

Whether^K, whose disjunctive restriction is part of its lexical meaning, is obviously not a good candidate for the Larsonian *whether*, whose domain restriction must be supplied syntactically. We therefore propose *whether*^L in (29) instead.

$$(29) \quad \llbracket \textit{whether}^L \rrbracket^{g,w} = \lambda Q_{\langle st, \langle st, t \rangle \rangle} . \lambda q_{st} . \text{there is a } r_{st} \text{ such that } Q(r)(q) = 1 \wedge q(w) = 1$$

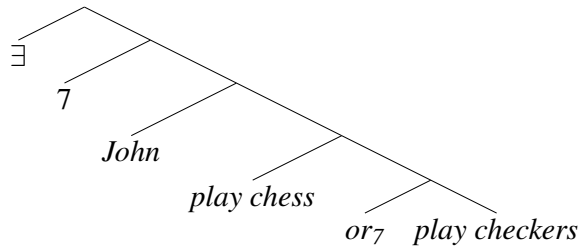
Whether^L is the Y-N counterpart of *which*: the restrictor of *which* is supplied syntactically by its nominal complement (see (23)); similarly, the restrictor of *whether*^L is supplied syntactically by its question-nucleus complement which, at least in ‘alternative’ questions, contains a disjunctive clause. We therefore need a syntax and semantics for *or* that renders the disjunctive question-nucleus an appropriate semantic argument of *whether*^L – i.e., roughly a set of two alternative propositions. Following Rooth and Partee (1982), we assume that *or* is a cross-categorial Heimian indefinite, i.e., a restricted variable that gets bound by a “higher” operator (Heim 1982). Its lexical entry is given in (30).

$$(30) \quad \llbracket \textit{or} \rrbracket^{g,w} = \lambda P_{\langle \sigma, t \rangle} . \lambda Q_{\langle \sigma, t \rangle} . \lambda z_{\sigma} . (g(7) = P \vee g(7) = Q) \wedge g(7)(z) = 1$$

¹¹To support this claim, Larson provides examples such as “Whether is greater, the gold or the temple?” from Matthew 21.17 (cited in Jespersen 1909-1949, II).

Accordingly, the interpretation of *John played chess or checkers* proceeds as in (31) (where quantification and binding, like movement and binding, are done in the Heim & Kratzer fashion, see (23)-(24)). [*play chess or play checkers*] forms a disjunctive predicate of individuals restricting an open variable (the index of *or*) which in turn applies to the individual denoted by the subject, the index of *or* is bound by a binding index or a default existential operator.¹²

(31) a. LF of *John played chess or checkers*

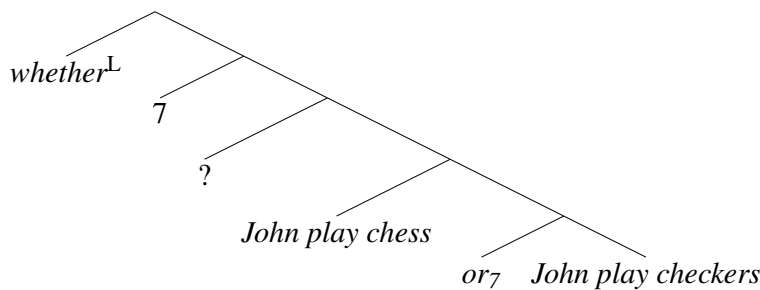


- b. $\llbracket [play\ chess] [or_7 [play\ checkers]] \rrbracket^{g,w} = \lambda z_e. (g(7) = \llbracket play\ chess \rrbracket^{g,w} \vee g(7) = \llbracket play\ checkers \rrbracket^{g,w}) \wedge g(7)(z) = 1$
- c. $\llbracket [7 [John [\llbracket play\ chess \rrbracket [or_7 play\ checkers]]]] \rrbracket^{g,w} = \lambda P. (P = \llbracket play\ chess \rrbracket^{g,w} \vee P = \llbracket play\ checkers \rrbracket^{g,w}) \wedge P(John) = 1$
- d. $\llbracket [\exists [7 [John [\llbracket play\ chess \rrbracket [or_7 play\ checkers]]]]] \rrbracket^{g,w} = 1$ iff:
 $\llbracket play\ chess \rrbracket^{g,w}(John) = 1 \vee \llbracket play\ checkers \rrbracket^{g,w}(John) = 1$

Eliding *played*, under identity, from the second disjunct yields the surface structure $[\exists 7 John [played\ chess] [or_7 [played\ checkers]]]$, phonetically realized as *John played chess or checkers*.

As for the denotation of ‘alternative’ questions, we predict that it is the set of true alternatives among the disjuncts. By combining *whether*^L with this cross-categorical Heimian *or*, we get the LF in (32), where *whether*^L – instead of ‘ \exists ’ – “binds” *or*. Disjunction occurs here at the clausal level, instead of the VP-level, and *John played chess or John played checkers* forms a disjunctive open predicate of possible worlds.

(32) a. LF of *Did John play CHESS or CHEckers*, current proposal



- b. $\llbracket [John\ played\ chess] [or_7 [John\ played\ checkers]] \rrbracket^{g,w} = \lambda w'. (g(7) = \text{'that John played chess'} \vee g(7) = \text{'that John played checkers'}) \wedge g(7)(w') = 1$
- c. $\llbracket [7 [? [\llbracket John\ played\ chess \rrbracket or_7 \llbracket John\ played\ checkers \rrbracket]]] \rrbracket^{g,w} = \lambda q_{st}. \lambda p_{st}. p = \lambda w'. (q = \text{'that John played chess'} \vee q = \text{'that John played checkers'}) \wedge q(w') = 1$

¹²An LF more faithful to Rooth and Partee (1982) would be $[\exists_7 [John\ play\ chess\ or_7\ play\ checkers]]$.

- d. $\llbracket \text{whether}^L [7 ? \llbracket [\text{John played chess}] \text{or}_7 [\text{John played checkers}]] \rrbracket^{\text{g},w} = \lambda p_{\text{st}}$. there is an r_{st} such that $p = [\lambda w'. (r = \text{'that John played chess'} \vee r = \text{'that John played checkers'}) \wedge r(w') = 1] \wedge p(w) = 1$
- e. (i) For $p = \text{'that John played chess'}$, there is an r_{st} and a world w such that: $r = p = [\lambda w'. r = \text{'that John played chess'} \wedge r(w') = 1] \wedge p(w) = 1$
- (ii) For $p = \text{'that John played checkers'}$, there is an r_{st} and a world w such that: $r = p = [\lambda w'. r = \text{'that John played checkers'} \wedge r(w') = 1] \wedge p(w) = 1$
- (iii) For all other p_{st} , there is no $\langle r_{\text{st}}, w \rangle$ such that $p = [\lambda w'. (r = \text{'that John played chess'} \vee r = \text{'that John played checkers'}) \wedge r(w') = 1] \wedge p(w) = 1$
- f. By d.-e., $\llbracket \text{whether}^L [7 ? \llbracket [\text{John played chess}] \text{or}_7 [\text{John played checkers}]] \rrbracket^{\text{g},w} = \lambda p_{\text{st}}$. ($p = \text{'that John played chess'} \vee p = \text{'that John played checkers'}$) $\wedge p(w) = 1$

Or takes the intensions of *John played chess* and *John played checkers* as its arguments. '?' returns, for any g , the singleton {'that ($g(7)$ is 'that John played chess' or $g(7)$ is 'that John played checkers') and $g(7)$ is true'}. The alternative answers are provided by whether^L , which quantifies over the free index in $\llbracket [\text{John played chess}] \text{or}_7 [\text{John played checkers}] \rrbracket$, and returns the true member(s) of {'that John played chess', 'that John played checkers'}.¹³ With ellipsis-under-identity, we get the surface structure $\llbracket \text{whether}^L 7 ? \llbracket [\text{John played chess}] \text{or}_7 [\text{John played checkers}] \rrbracket \rrbracket$, phonetically realized as *Did John play CHESS or CHECKers?*

The predictions regarding NPI-licensing are straightforward. On the assumption that neither whether^L nor '?' are NPI-licensors, NPIs are not admitted in 'alternative' questions without an independent licensor, as shown in (33) (*smtm* is a non-NPI semantically equivalent counterpart of *ever*, which means 'at least once', see Ladusaw (1979)).

- (33) a. *Did John ever play CHESS or CHECKers?
 b. No licensor for the NPI:
 $\text{whether}^L 7 [? \llbracket [\text{John ever played chess}] \text{or}_7 [\text{John smtm/ever played checkers}]] \rrbracket$

Some discussion is in order, regarding how the presuppositions of *Did John play CHESS or CHECKers* come about. One such presupposition is that the answerer is not ignorant about which of the two John played (the 'informed answerer' presupposition, henceforth). In other words, *John played one of them, but I don't remember which* is not a complete adequate answer to the 'alternative' question. In addition the question presupposes that John played exactly one of the two games; that is, it carries a uniqueness presupposition similar to that observed in singular *wh*-questions, as well as an existence presupposition. This must be so, as neither of the following assertions is a felicitous semantically congruent answer to it: *John didn't play either chess or checkers* ('existence' presupposition failure) and *John played both chess and checkers* ('uniqueness' presupposition failure).

The 'informed answerer' presupposition, we argue, follows straightforwardly from the congruence principle in (34), which is defined in terms of Heim's notion of (weak) answerhood:

- (34) For any interrogative LF α and declarative LF β :
 β is an adequate answer to α only if:

¹³Notice that *or* is not just cross-categorical; there should also be no upper limit on the number of $\langle \sigma, \tau \rangle$ -arguments that *or* takes, in order to account for examples such as *Did John play CHESS, CHECKers, or MoNOpoly*.

$$\exists w \text{ s.t. } \text{ANS}_{\text{weak}}(\llbracket \alpha \rrbracket^{g,w}) = \lambda w'. \llbracket \beta \rrbracket^{g,w}$$

(where $\text{ANS}_{\text{weak}}(\llbracket \alpha \rrbracket^{g,w}) = \cap \llbracket \alpha \rrbracket^{g,w}$, cf. Heim (1994))

Given (32) above, there are only four options for the denotation of *Did John play CHESS or CHECKers*: (i) ϕ , (ii) {‘that John played chess’}, (iii) {‘that John played checkers’}, (iv) {‘that John played chess’, ‘that John played checkers’}. By (34), *John played chess* and *John played checkers* may each be an adequate answer to *Did John play CHESS or CHECKers*, but *John played chess or checkers* cannot.

A slight change of the semantics for *whether*, as formalized in (35), is sufficient to account for the uniqueness presupposition of ‘alternative’ questions (and, as we will discuss below, it does not affect the semantics of Y-N interrogatives). We propose that in all its occurrences the denotation of *whether* is as shown in (35).

$$(35) \quad \llbracket \text{whether}^L \rrbracket^{g,w} = \lambda Q_{\langle st, \langle st, t \rangle \rangle}. \lambda q_{st}. \exists! r_{st} \text{ such that } Q(r)(q) = 1 \wedge q(w) = 1$$

This denotation together with the above mentioned notion of congruent answer rules out *John played chess and John played checkers* as a felicitous reply to the question, since the denotation of the question can no longer contain both propositions ‘that John played chess’ and ‘that John played checkers’, as the reader can readily verify.

Finally, adapting Dayal’s (1996) proposal for singular *which*-questions to the case at hand, we take the infelicity of *John didn’t play either* as an adequate reply to the ‘alternative’ question *Did John play CHESS or CHECKers* to follow from an existence presupposition introduced by the answerhood operator, as indicated in (36):¹⁴

$$(36) \quad \text{For any interrogative LF } \alpha \text{ and world } w, \text{ANS}_{\text{weak}}(\llbracket \alpha \rrbracket^{g,w}) \text{ is defined only if } \exists p_{\langle s, t \rangle} \text{ s.t.}$$

$$\llbracket \alpha \rrbracket^{g,w}(p) = 1 \text{ (iff } \llbracket \alpha \rrbracket^{g,w} \neq \phi \text{ in set-talk).}$$

$$\text{If defined, } \text{ANS}_{\text{weak}}(\llbracket \alpha \rrbracket^{g,w}) = \cap \llbracket \alpha \rrbracket^{g,w}$$

This accounts for ‘alternative’ questions.

5 The Proposal, Part II: Y-N Questions

We propose that all Y-N questions have an ‘alternative’ LF, regardless of whether disjunction and negation appear on the surface. This results in three possible Y-N surface forms, as shown in (37).

$$(37) \quad \begin{array}{ll} \text{LF:} & \dots \text{ whether } ? \text{ [CP or}_7 \text{ [not CP]]} \\ \text{Surface forms:} & \dots \text{ whether CP or not} \\ & \dots \text{ whether or not CP} \\ & \dots \text{ whether CP} \end{array}$$

The surface forms in (37) are obtained as follows. CP undergoes ellipsis-under-identity, with two possible ellipsis sites – the first or second disjunct – yielding two surface forms. In addition, *or not* can be subsequently omitted for pragmatic reasons (the full nature of which has yet to be understood; cf. Larson (1985)). When *or not* is omitted, a single surface form comes about, regardless of the site of ellipsis.

¹⁴In 6.1 we discuss how assuming the operator in (36) affects our predictions regarding singular and plural *wh*-questions.

- (38) a. Ellipsis, Option 1:... WHETHER CP OR NOT \mathcal{CP}
 Example: Mary wonders whether John played chess or not
 b. Ellipsis, Option 2: WHETHER \mathcal{CP} OR NOT CP
 Example: Mary wonders whether or not John played chess
- (39) a. Ellipsis, Option 1, with (or not):... WHETHER CP (OR NOT) \mathcal{CP}
 b. Ellipsis, Option 2, with (or not):... .. WHETHER \mathcal{CP} (OR NOT) CP
 Example: Mary wonders whether John played chess

The semantic computation is derived in a way parallel to (32) yielding (40b) for the LF in (40a).¹⁵

- (40) a. $whether^L \ 7 \ [? \ [[John \ played \ chess] \ or_7 \ [not \ John \ played \ chess]]]$
 b. $\lambda p_{st}. (p = \text{'that John played chess'} \vee p = \text{'that John didn't play chess'}) \wedge p(w) = 1$

Thus, Y-N and 'alternative' questions receive a fully unified syntactic and semantic analysis.

As mentioned in Section 2, also questions of the surface form *whether ... XP or XP' ...* such as *Did John play chess or checkers* receive a Y-N interpretation under the (3b)-prosody, in addition to the 'alternative' interpretation discussed in the previous section. On our view, this second reading is accounted for as follows: under the (3b) prosody the question has a Y-N LF. This LF comes with two disjunction levels: one disjunction occurs at the matrix level and is $whether^L$ -bound, and two disjunctions occur at the embedded level and are \exists -bound. This is where the Y-N-reading (namely, $\lambda p. (p = \text{'that John played chess or checkers'} \vee p = \text{'that John didn't play either chess or checkers'}) \wedge p(w) = 1$) comes from.

- (41) Underlying structure:
 $[whether^L \ 7 \ ? \ [\exists \ 2 \ [[John \ played \ chess] \ or_2 \ [John \ played \ checkers]]]$
 $or_7 \ not \ [\exists \ 3 \ [[John \ played \ chess] \ or_3 \ [John \ played \ checkers]]]$
 Ellipsis, Option 1 (cf. (39a))
 $[whether^L \ 7 \ ? \ [\exists \ 2 \ [[John \ played \ chess] \ or_2 \ [~~John \ played \ checkers~~]]]$
 $(or_7 \ not) \ [\exists \ 3 \ [[~~John \ played \ chess~~] \ or_3 \ [~~John \ played \ checkers~~]]]$
 Ellipsis, Option 2 (cf. (39b))
 $[whether^L \ 7 \ ? \ [\exists \ 2 \ [[~~John \ played \ chess~~] \ or_2 \ [~~John \ played \ checkers~~]]]$
 $(or_7 \ not) \ [\exists \ 3 \ [[~~John \ played \ chess~~] \ or_3 \ [~~John \ played \ checkers~~]]]$

By (34), 'Yes, John played either chess or checkers' and 'No, John didn't play either chess or checkers' are the adequate answers to *Did John play (either) chess or checkers*.

The predictions regarding NPI-licensing are based on two additional principles: (i) the overt NPI must be in the *surface* scope of its licenser; (ii) the licenser need not be pronounced. The first principle receives independent support from the well-known contrast in (42).

- (42) a. Jane didn't see anyone.
 b. *Anyone didn't see Jane.

¹⁵Given that 'that John played chess' and 'that John didn't play chess' are incompatible with each other, the denotation of (40a) relative to a world w comes out as in (40b) regardless of whether we use (29) or (35) as the semantics of $whether^L$.

Thus, NPIs are acceptable when the surface form is ... **WHETHER (OR NOT) CP**, as shown in (43)-(45); but not when the surface form is ... **WHETHER CP (OR NOT)**, as shown in (46).

- (43) a. Has Mary ever read SS?
 b. The NPI is in the surface scope of *not*:
whether^L 7 ? [~~[[Mary smtm read SS]]~~ (or₇ [**not**] [Mary ever read SS]]]
- (44) a. Has John ever played chess or checkers?
 b. The NPI is in the surface scope of *not*:
whether^L 7 ? [∃ 2 [~~[[John smtm played chess]]~~ or₂ [~~[[John smtm played checkers]]~~]]
 (or₇ [**not**] [∃ 3 [~~[[John ever played chess]]~~ or₃ [~~[[John smtm played checkers]]~~]])]
- (45) a. Mary wondered whether or not her student had ever read SS.
 b. The NPI is in the surface scope of *not*:
 ... *whether*^L 7 ? [~~[[Mary's student smtm read SS]]~~ or₇ [**not**] [Mary's student ever read SS]]]
- (46) a. ^{*/R} Mary wondered whether her student had ever read SS or not.
 b. The overt NPI is not in the surface scope of *not*:
 ... *whether*^L 7 [? [[Mary's student ever read SS] or₇ [**not**] [~~[[Mary's student ever read SS]]~~]]]

Given this, the analysis explains what the contrast above and Kayne (1994)'s contrast mentioned in section 2 and repeated below have in common: in (43)-(45) the overt NPI is in the scope of negation like in (47a), in (46) it is not, just like in (47b).

- (47) a. Mary didn't buy any books about linguistics but John did.
 b. ^{*/R}Mary bought any books about linguistics but John didn't.

To sum up, the assumption that both 'alternative' and Y-N questions have an 'alternative' LF accounts for the 'alternative'/Y-N contrast and the *whether or not NPI* / *whether NPI or not* contrast. As a corollary, the well-formedness of NPIs in a ***whether CP*** surface form also follows.

Some additional consequences are worth mentioning. While English has surface ***if CP*** questions, with and without NPIs, and ***if CP or not*** questions, it lacks ***if or not CP*** questions altogether. Assuming that *if* and *whether* have the same meaning, the fact that NPIs are not admitted in ***if CP or not*** is expected.

- (48) a. Mary wondered if her students (ever) read SS.
 b. ^{*/R}Mary wondered if or not her student (ever) read SS.
 c. Mary wondered if her students (^{*/R}ever) read SS or not.

English also has the surface form ***whether/if XP AUX or AUX+n't VP***, whose LF is presumably (50).

- (49) Dan wondered whether/if Mira had or hadn't been in France
 (50) ... *whether*^L 7 ? [Mira AUX [_{VP} *be in France*]] or₇ **not** [Mira AUX [_{VP} *be in France*]]

As expected, an NPI is acceptable only if it follows *hadn't*, but not when it precedes *hadn't*.

- (51) Dan wondered whether/if Mira had or hadn’t ever been in France.
 (52) *Dan wondered whether/if Mira had ever or hadn’t been in France.¹⁶

If the current proposal is on the right track, we expect not to find an NPI outside the surface scope of negation in languages other than English either. This is confirmed at least for Italian, whose *or not* patterns differ slightly from the English *or not* patterns. Specifically, Italian does not have a *wh*-word analogous to surface *whether* at all; embedded Y-N as well as ‘alternative’ questions are introduced by *se* which is the Italian counterpart of *if*.¹⁷ Italian *se*, like English *if*, cannot be immediately followed by *or not*. Given this restriction, the pattern in Italian is predicted to be just like the English pattern in (47). As (53)-(55) show, the Italian NPI *mai* (‘ever’) is acceptable in *if CP* questions, just like *ever* in English (see (48)), but unacceptable in an *if CP or not* question.

- (53) Dan si chiedeva se Mira fosse (mai) stata in Francia.
 Dan wonder-past if Mira be-past-subj ever be-participle in-France
 ‘Dan wondered whether Mira had ever been in France’
 (54) *Dan si chiedeva se o no Mira fosse (mai) stata in Francia
 Dan wonder-past if or not Mira be-past-subj ever be-participle in France
 (55) Dan si chiedeva se Mira fosse (*mai) stata in Francia o no.
 Dan wonder-past if Mira be-past-subj ever be-prt in France or not

However, Italian – unlike English – also has the surface form *if XP AUX or not VP*. The underlying form of (56) is presumably (57) (cf. (50)).

- (56) Dan si chiedeva se Mira fosse o no stata in Francia.
 Dan wonder-pst if Mira be-pst-sbj or not be-participle in-France
 ‘Dan wondered whether Mira had or hadn’t been in France’
 (57) ... *whether*^L ? [Mira AUX [_{VP} ~~be in France~~]] *or*₇ *not* [~~Mira-AUX~~ [_{VP} *be in France*]]

As expected, *mai* (‘ever’) can follow *o no* (‘or not’) but cannot precede it.

- (58) Dan si chiedeva se Mira fosse o no mai stata in Francia.
 Dan wonder-pst if Mira be-pst-sbj or not ever be-prt. in-France
 (59) *Dan si chiedeva se Mira fosse mai o no stata in Francia.
 Dan wonder-pst if Mira be-pst-sbj ever or not be-prt. in-France

6 The Proposal, Part III: Constituent Questions

6.1 Deriving “Weak” and “Strong” Constituent Questions

As we saw in Section 2, based on evidence from embedded questions, Heim (1994) and Guerzoni & Sharvit (2007) have argued that both “weak” and “strong” readings of constituent questions are

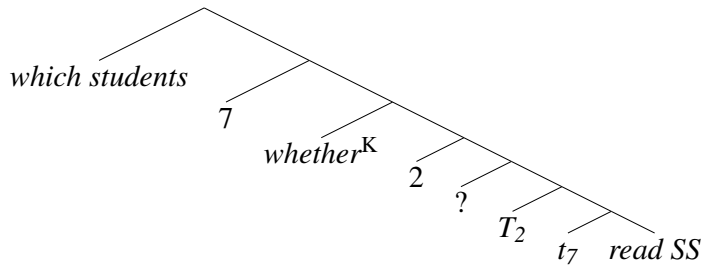
¹⁶A few speakers we have consulted found *Mary had ever or hadn’t ever been in France* acceptable, a fact we currently have no explanation for.

¹⁷*Se* is the complementizer introducing conditionals as well as embedded interrogatives.

attested. Here we focus on how these readings are derived in root questions; in 6.2 we discuss how these question meanings interact with embedding predicates.

Guerzoni (2003, 2004) proposes that the “strong” reading of *Which students read SS* is obtained when a Karttunen-style *whether* is part of the LF. The *which*-phrase quantifies over the “open” position in $[\textit{whether}^K [2 ? [T_2 t_7 \textit{read SS}]]]$, as illustrated in (60), yielding the true members of $\{\textit{‘that } x \textit{ read SS’} \mid x \textit{ is a student}\} \cup \{\textit{‘that } x \textit{ didn’t read SS’} \mid x \textit{ is a student}\}$.

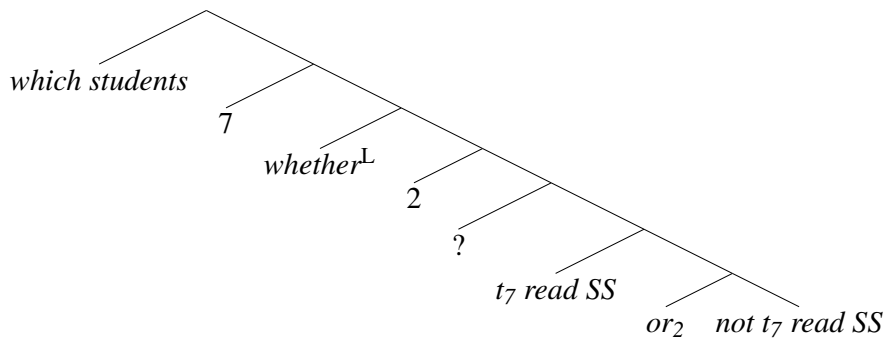
(60) a. “Strong” LF of *Which students read SS*, Guerzoni-style



- b. $\llbracket \textit{whether}^K [2 ? [T_2 t_7 \textit{read SS}]] \rrbracket^{g,w} =$
 $\lambda q_{st}. (q = \textit{‘that } g(7) \textit{ read SS’} \vee q = \textit{‘that } g(7) \textit{ didn’t read SS’}) \wedge q(w) = 1$ (cf. (24))
- c. $\llbracket [\textit{which students}] [7 [\textit{whether}^K [2 ? [T_2 t_7 \textit{read SS}]]]] \rrbracket^{g,w} =$
 $\lambda p_{st}. \textit{there is an } x \textit{ such that: } \llbracket \textit{student} \rrbracket^{g,w}(x) = 1 \wedge (p = \textit{‘that } x \textit{ read SS’} \vee p = \textit{‘that } x \textit{ didn’t read SS’}) \wedge p(w) = 1$

We borrow from Guerzoni the idea that *whether* can be part of a *which*-question LF, but in our system it is our unified *whether*^L, which takes a disjunction as its argument. The *which*-phrase quantifies over the “open” position in $[\textit{whether}^L 2 [? [t_7 \textit{read SS} \textit{or}_2 \textit{not } t_7 \textit{read SS}]]]$.¹⁸

(61) a. “Strong” LF of *Which students read SS*, current proposal



¹⁸Guerzoni is concerned with the negative bias of questions with minimizers (e.g., *Who (even) lifted a finger to help?*), which she derives as a result of scope interaction between *even* and the *whether*^K-trace (see (i); see Guerzoni (2003, 2004) for details). The readers are invited to verify that in the current proposal, the same negative bias is obtained with scope interaction between *even* and *not* (see (ii)).

- (i) $T_2 \gg \textit{even}: \textit{who } 7 [\textit{whether}^K 2 ? [T_2 \textit{even } t_7 \textit{lifted a finger to help}]]$
 $\textit{even} \gg T_2: \textit{who } 7 [\textit{whether}^K 2 ? [\textit{even } T_2 t_7 \textit{lifted a finger to help}]]$
- (ii) $\textit{not} \gg \textit{even}: \textit{who } 7 [\textit{whether}^L 2 ? [\textit{even } t_7 \textit{did very little to help } \textit{or}_2 [\textit{not } [\textit{even } t_7 \textit{lifted a finger to help}]]]]]$
 $\textit{even} \gg \textit{not}: \textit{who } 7 [\textit{whether}^L 2 ? [\textit{even } t_7 \textit{did very little to help } \textit{or}_2 \textit{even} [\textit{not } [t_7 \textit{lifted a finger to help}]]]]]$

- Ellipsis, Option 1: [*which students*] 7 (*whether*^L) 2 ? [*t*₇ *read SS* (*or*₂ *not*) ~~*t*₇ *read SS*~~]
- Ellipsis, Option 2: [*which students*] 7 (*whether*^L) 2 ? [~~*t*₇ *read SS*~~ (*or*₂ *not*) *t*₇ *read SS*]
- b. $\llbracket \textit{whether}^L 2 ? [t_7 \textit{read SS or}_2 \textit{not } t_7 \textit{read SS}] \rrbracket^{g,w} =$
 $\lambda q_{st}. (q = \text{'that } g(7) \textit{ read SS'} \vee q = \text{'that } g(7) \textit{ didn't read SS'}) \wedge q(w) = 1$ (cf. (40))
- c. $\llbracket \textit{which students} [7 [\textit{whether}^L 2 ? [t_7 \textit{read SS or}_2 \textit{not } t_7 \textit{read SS}]]] \rrbracket^{g,w} =$
 $\lambda p_{st}. \text{there is an } x \text{ such that: } \llbracket \textit{student} \rrbracket^{g,w}(x) = 1 \wedge (p = \text{'that } x \textit{ reads SS'} \vee p = \text{'that } x \textit{ didn't read SS'}) \wedge p(w) = 1$

Notice that (for reasons that have yet to be understood) *whether*^L is not pronounced in “strong” constituent questions, and the pronunciation of *or not* is not optional – it cannot be pronounced either. The assumption that neither *or* nor *not* may be pronounced is needed in order to account for the unacceptability of *Which students read SS or not*.

The “weak” reading of *Which students read SS?* is obtained from an LF that does not contain either *whether*^L or disjunction. This is essentially the Karttunen-style LF in (23), repeated in (62) (yielding the true members of {‘that x read SS’ | x is a student}).

- (62) $\llbracket [\textit{which students}] [7 [? [t_7 \textit{read SS}]]] \rrbracket^{g,w} =$
 $\lambda p_{st}. \text{there is an } x \text{ such that: } \llbracket \textit{student} \rrbracket^{g,w}(x) = 1 \wedge p = \text{'that } x \textit{ read SS'} \wedge p(w) = 1$

Notice that the answerhood operator in (36) above yields the correct presuppositions for plural *wh*-questions like (60)/(61). Specifically for (61), the presupposition of existence we predict is very weak, as both positive and negative answers are part of the denotation; as a consequence the question does not come with the presupposition that any student read SS, which is, in our view a desired result. In weak *wh*-questions we, instead, predict such a presupposition of existence.¹⁹ As for the well known existence and uniqueness presuppositions of singular *which*-questions, such as *which student read SS*, we assume that they come from a definite semantics of *which* as proposed in Rullmann and Beck (1998).

If the current proposal is on the right track, we expect there to be languages where *or not* appears in constituent questions on the surface. Indeed, Italian has two kinds of disjunction+negation in constituent questions – *o no* (‘or not’) and *o meno* (‘or less’).

- (63) Mario si domanda [chi sia venuto (o no/o meno)]
 Mario wonders who is-Subj come or not/or less
 ‘Mario wonders who came’
- (64) Mario si domanda [chi sia (o meno/o no) venuto]
 Mario wonders who is-Subj or not/or less came
 ‘Mario wonders who came’

Moreover, Guerzoni (2003) offers the following evidence from Bulgarian of the optional presence of a Y-N question inside a constituent question. Both matrix and embedded Y-N questions in Bulgarian obligatorily contain the ‘question clitic’ *li* (or its non clitic variant *dali*):

- (65) a. Iska *(li) kafe?
 want-3sg *li* coffee
 ‘Does he/she want coffee?’

¹⁹Whether this prediction is indeed correct is beyond the scope of this paper.

- b. Čudja se/ ne znam iska *(li) kafe
 wonder-1sg refl/not know-1sg want-3sg *li* coffee
 'I wonder/ I don't know whether he/she wants coffee'

Interestingly, *li* can, though doesn't have to, co-occur with *wh*-words in both matrix constituent questions and in constituent questions embedded under *wonder*.²⁰

- (66) a. S kogo (li) se e sreštnal včera?
 With whom *li* refl is met-participle yesterday?
 'Who did you meet yesterday?'
 b. S koi (li) studenti se e sreštnal včera?
 With which *li* student refl is met-participle yesterday?
 'Which student did you meet yesterday?'
 c. Čudja se kakvo (li) iska
 wonder-1sg refl what *li* want-3sg
 'I wonder what he wants'

Finally, notice that the assumption that Y-N questions and 'alternative' questions both have *whether*^L 7 ? [[CP ...] *or*₇ [CP' ...]] as their underlying form, and the assumption that constituent questions have two possible LFs as in (61) and (62), make two predictions. They correctly predict (67) not to have a "weak"/non-'alternative' reading. This is because *or* is overt, so the "weak" (68a) is not a possible LF for (67). (A *whether*^L-less LF with unbound disjunction is ruled out independently.) But these assumptions also incorrectly predict (67) to have a "strong"/'alternative' reading, stemming from (68b).

- (67) *Which students played CHESS or CHECKers?
 (68) a. [*which students*] [7 [7 [7 *played chess*]]]
 b. [*which students*] [7 *whether*^L 2 [7 [7 *played chess or*₂ *t*₇ *played checkers*]]]

Since (67) is unacceptable, (68b) must be ruled out somehow. One way to rule it out would be to say that this is a side effect of the obligatory non-pronunciation of *or not*, and that *or* cannot be pronounced in constituent questions, even if there is no *not* there. However, as we saw in (63)-(64), there are languages where *or not* is admitted in constituent questions. Suppose, alternatively, that a "strong" constituent question is subject to the constraint in (69).

- (69) A "strong" LF α (of the form *wh* [7 *whether*^L 2 [7 [[CP ... *t*₇ ...] *or*₂ [CP' ... *t*₇ ...]]]]) can be paired with a surface string S only if there is an LF β such that: (i) β is the "weak"/non-'alternative' counterpart of α (i.e., β is formed by removing *whether*^L, 2, *or*₂ and CP' from α , yielding the "weak" *wh* [7 [7 [CP ... *t*₇ ...]]]), and (ii) β is a possible LF of S.

By (69), (68b) is ruled out as an LF of (67) because its "weak" counterpart – (68a) – is not a possible LF of (67).

²⁰The fact that *li* splits the *wh*-phrase *which student* is merely due to its clitic nature.

6.2 Question strength and NPI-licensing

As observed in Guerzoni and Sharvit (2007), while all root constituent questions allow NPIs in their nucleus, not all embedded questions do.

- (70) Which students have (ever) read *SS*?
- (71) a. John wonders which students (ever) read *SS*.
 b. John knows which students (?ever) read *SS*.
 c. It surprised John which students (*ever) read *SS*.

In Section 2 we called this the weak/strong-*wh* contrast. Specifically *wonder*, which is ‘strong’, admits NPIs in its complement, while *surprise*, which is ‘weak’ does not. The ?-status of (71b) is probably due to the ambiguity of *know*; it has a *wonder*-like incarnation and a *surprise*-like incarnation (see Section 2 for examples and discussion). Under the current proposal, the (un-)acceptability of NPIs in embedded questions correlates with the (un-)acceptability of Y-N questions in them.

- (72) a. John wonders whether Mary read *SS*.
 b. John knows whether Mary read *SS*.
 c. *It surprised John whether Mary read *SS*.

Based on (70)-(72), Guerzoni and Sharvit (2007) propose (73) and the licensing condition in (74).

- (73) a. Y-N questions are inherently ‘strong’.
 b. Matrix constituent questions can always receive a strong interpretation.
 c. *Wonder* is ‘strong’, *surprise* is ‘weak’, and *know* is ambiguous between a ‘strong’ and a ‘weak’ reading.
- (74) NPI licensing condition: NPIs are licensed either in the scope of a downward entailing operator (that is not upward-entailing), or in complements of “strong” predicates.

Given (73), the disjunctive condition in (74) correctly predicts NPIs to be licensed in any of the following environments: a Y-N question (matrix or embedded), a matrix constituent question, and a constituent question embedded under a “strong” question-embedding verb.

But (74) fails to meet explanatory or even descriptive adequacy. For one thing, ‘alternative’ questions (which do not license NPIs) should, on this view, be considered “weak”. But this seems wrong: *surprise*, which does not embed Y-N questions (presumably because they are “strong”; see (72)), does not embed ‘alternative’ questions either, as (75) shows.

- (75) *It surprised John whether Mary played CHESS or CHECKers.

Secondly, without a theory of questions that says what non-trivial semantic property downward-entailing operators and “strong” exhaustivity share, (74) is completely ad-hoc. Guerzoni & Sharvit’s theory fails to provide such a property. They assume that question “strength” stems from the application of the answerhood operator ANS_{strong} (cf. Heim 1994).

- (76) For any question α , and question-intension Q such that $Q = \lambda w. \llbracket \alpha \rrbracket^{g:w}$:
 $ANS_{strong}(Q) = \lambda w. \lambda w'. \{q: Q(w')(q) = 1\} = \{q: Q(w)(q) = 1\}$

A “strong” embedder such as *wonder* takes $\text{ANS}_{\text{strong}}(\text{Q})$ as its argument, on Guerzoni & Sharvit’s view. But $\text{ANS}_{\text{strong}}$ doesn’t seem to share any significant semantic property with *not*, *every*, *doubt*, *tallest* and other NPI-licensors.

On the other hand, the view advocated here makes the right predictions. We assume that every question is marked for the feature $[\pm\text{WHETH}]$. ‘+’ means that *whether*^L is present in the question’s LF: e.g., the ‘alternative’ (32), the Y-N (40a) and the “strong” (61). ‘-’ means that *whether*^L is absent from the question’s LF: e.g., the “weak” (62). All question-embedding verbs take a question-intension (type: $\langle s, \langle \langle s, t \rangle, t \rangle \rangle$) as their internal argument, and express an attitude relation between the subject and the weak answer to the that question (ANS_{weak} in (36)), but some verbs (e.g., *wonder*) select for a question that comes with a $[\text{+WHETH}]$ feature, some verbs (e.g., *surprise*) select for a question that comes with a $[\text{-WHETH}]$ feature, and some verbs (e.g., *know*) may select for either.²¹ The prediction is that only Y-N questions and “strong” constituent questions license NPIs, because only they have negation at LF. Crucially, since one of the ellipsis options in (61) is such that ellipsis applies to the first disjunct, an NPI is licensed in the second.

- (77) a. “Strong” constituent question, NPI in the surface scope of *not*:
 [which students] \uparrow [(*whether*^L) \uparrow ? [[t_7 *smtm read SS*] (*or*₂ [*not*] [t_7 *ever read SS*]])] (cf. (43)-(45), Y-N)
- b. “Weak” constituent question, NPI not in the scope of any licensor:
 [which students] \uparrow [\uparrow [t_7 *ever read SS*]] (cf. (33), ‘alternative’)

This accounts for the weak/strong-*wh* contrast, in a manner that meets descriptive adequacy. On the assumption that there is an independent theory that explains why negation licenses NPIs – whatever that theory might be – the current proposal also meets explanatory adequacy.

If the current proposal is on the right track, we expect that in languages like Italian where *or not* may appear in constituent questions on the surface (see (64)), a constituent question with *or not* shouldn’t be embeddable under *surprise*-like predicates, just like a Y-N question. This prediction is correct.

- (78) a. *Mario fu sorpreso (di) se Gianni venne alla festa.
 Mario was surprised about whether Gianni came to the party.
- b. Mario fu sorpreso di chi venne (*o no) alla festa (*o no).
 Mario was surprised about who came to the party
 ‘It surprised Mario who was at the party’

It is important to note that the current theory is at odds with Han and Siegel’s 1997 constraint that requires the trace of the *wh*-phrase to c-command the NPI. Han & Siegel’s constraint is based on examples such as *Who has Sam ever agreed with?* which, according to them, has only a rhetorical reading, as opposed to *Who has ever agreed with Sam?* which has a genuine information-seeking reading. (77a) (the LF of *Which students ever read SS?*) indeed obeys Han &

²¹Sharvit (2002, 2007) argues that ‘de dicto’ readings (in the sense of Groenendijk and Stokhof (1984) of embedded questions come about only in “strong” questions (as predicted by Heim (1994)). This is not predicted by the current system (or by Guerzoni (2003)): even if we stipulate that *wonder* takes a question-intension and *surprise* a question-extension, we still cannot exclude the possibility of there being a “weak” embedder that takes a question-intension, or a “strong” embedder that takes a question-extension.

Siegel’s constraint, but (79) (the LF of *Who has Sam ever agreed with?*) is well-formed by current assumptions, but does not obey Han & Siegel’s constraint.

(79) *who* ₇ [(*whether*^L) ₂ ? [[~~*Sam smtm agreed with t*~~₇] (*or*₂ [*not*] [*Sam ever agreed with t*₇]]]]

So if we wanted to incorporate Han & Siegel’s constraint we would have to stipulate it, as our theory, as it stands, does not derive it. But should we incorporate this constraint at all?

The facts are far from clear. On the one hand, it is observed in Tieu (2010) that (80a,b), which violate Han & Siegel’s constraint, do have genuine information-seeking readings (and that given the right context, even *Who has Sam ever agreed with*, which also violates Han & Siegel’s constraint, has such a reading).

- (80) a. Which magazines have you ever read?
b. Who has Penny ever starred in a movie with?

Based on this, we could conclude that ‘rhetorical’ effects are completely independent of the structural relation between the NPI and the *wh*-trace. On the other hand, in Tieu (2013) an experiment is reported that shows a clear preference for “strong” questions that obey Han & Siegel’s constraint, over both “strong” questions that disobey Han & Siegel’s constraint and “weak” questions that obey Han & Siegel’s constraint. Given this, while the overall evidence is inconclusive, it seems that Han & Siegel’s constraint does play an important role.

And indeed, Nicolae (2013a,b) proposes a theory of questions that derives Han & Siegel’s constraint (as well as a subject-object asymmetry she observes in the licensing of NPIs in ‘alternative’ questions; see Section 2). According to that proposal, strongly exhaustive questions contain a silent *only* (a downward-entailing operator which forms a dependency with the *wh*-trace). An NPI can appear in the scope of *only*, provided that two additional requirements are met: (i) a semantic requirement of the NPI to form a dependency with the exhaustifying operator *exh*, which must appear above the downward-entailing operator (cf. Chierchia 2006, 2013); and (ii) a syntactic ban on crossing dependencies. In (81)-(82) below, only (81b) obeys both.

- (81) Who ate anything?
a. [*who*₁... *only*^F *exh*^D [*t*₁^F ate anything^D]]
b. [*who*₁... *exh*^D *only*^F [*t*₁^F ate anything^D]]

- (82) *What did anyone eat?
a. [*what*₁... *only*^F *exh*^D [*anyone*^D eat *t*₁^F]]
b. [*what*₁... *exh*^D *only*^F [*anyone*^D eat *t*₁^F]]

Yet another finding reported in Tieu (2013), namely, that questions that failed to meet either requirement were “judged to be more acceptable than the control unlicensed NPI in a positive declarative sentence” (p. 13), suggests that the status of Han & Siegel’s constraint is still not fully understood.

Finally, notice that “strict” NPIs such as *in years* are not licensed in questions at all, as shown in (83).

- (83) a. *Mary wonders whether John has played CHESS or CHECKers in years.
b. *Mary wonders whether her student has read SS in years.

- c. *Mary wonders whether John has played (either) chess or checkers in years.
- d. *Mary wonders which students have read *SS* in years.

Indeed, these NPIs are known to be licensed in a proper subset of the set of environments that license “weak” NPIs such as *any* and *ever*, as illustrated by (84)-(85) (see Zwarts 1996, Gajewski 2005, among others).

- (84) a. *Every student who has read *SS* in years appreciates Generative Grammar.
- b. Every student who has ever read *SS* appreciates Generative Grammar.
- (85) a. Mary doesn’t think that she has had a real friend in years.
- b. Mary doesn’t think that she has ever had a real friend.

That *in years* is not licensed in (83a) is not surprising, given that other NPIs are banned from ‘alternative’ questions. But the fact that it is banned from (83b-d) requires an explanation: these are Y-N and constituent questions whose nucleus is, on the current proposal, *in years*-friendly (see (85)). However, there are other constructions with negation where there is a contrast in acceptability between “strict” and “weak” NPIs: while *What Mary doesn’t think is that she has ever had a real friend* is acceptable, *What Mary doesn’t think is that she has had a real friend in years* is considerably degraded. A detailed investigation of these contrasts awaits further research.

7 Summary and Open Problems

Inspired by Larson’s approach to Y-N questions as ‘alternative’ questions, we have proposed that: (i) some though not all questions contain covert disjunction; (ii) of those questions that contain overt or covert disjunction, some though not all contain overt or covert negation; (iii) no other question type contains inherent negation; and (iv) question words such as *which* and *whether* are not NPI licensors in the question nucleus (whereas negation is). This, we showed, affords a unified analysis of ‘alternative’, Y-N and constituent questions, correctly predicting the distribution of NPIs in them.

Many problems still await a solution. Among these, the biggest unknown concerns the precise principles that govern ellipsis and pronunciation. While we assume that ellipsis occurs under identity, it is not clear which “pieces” must elide under identity, what drives the optional non-pronunciation of *or not* in Y-N questions, what makes *whether* and *or not* unpronounceable in (English) constituent questions, and what prevents ellipsis in the first disjunct of ‘alternative’ questions. In addition, it is not completely clear to us why some speakers accept NPIs – marginally or not – inside CP in *whether CP or not* questions. The results of a pilot experiment conducted at UCLA are compatible with the hypothesis that in order to salvage an otherwise ungrammatical structure, some speakers insert a pause between *whether CP* and *or not*, making *whether CP* grammatical by turning *or not* into a syntactically independent “afterthought”-phrase. The overall experimental results, however, did not conclusively show that pause-insertion depends exclusively on the presence of an NPI.

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