Embedded Questions Revisited: An answer, not necessarily The answer

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MIT LingLunch (08/11/2007)*

Introduction: Typology of question-embedding verbs (adapted from Lahiri 2002, pp. 286-287)

Predicates that take interrogative complements

Rogative
wonder, ask, depend on, investigate...

Responsive

Veridical
know, remember, forget
discover, show, ...

tell, communicate

Non-Veridical
be certain about
agree on, conjecture about

‘emotive predicates’ → be surprised, amaze...
do not embed yes-no questions

unclear case → decide

Responsive Predicates:
(i) take both declarative and interrogative complements
(ii) express a relation between the holder of an attitude and a proposition which is an answer to the embedded question
(iii) show quantificational variability effects

(1) a. Jack knows that it is raining
   b. Jack and Sue agree that it is raining (reciprocal reading: Jack agrees with Sue that…)

(2) Jack knows whether it is raining
   >>>> Jack knows that S, where S is the true answer to is it raining?

(3) Sue and Peter agree on whether it is raining
   >>>> Either both believe that it is raining, or both believe that it is not raining
   i.e.: Sue and Peter agree that S, where S is a potential answer to is it raining?

QVE:
(4) Jack knows, for the most part, which students attended the seminar
(5) Sue and Peter agree, for the most part, on which students attended the seminar
(6) * Sue wonders, for the most part, which students attended the seminar

* Thanks to Marta Abrusan for her detailed data about Hungarian. Thanks to Emmanuel Chemla, Elena Guerzoni, Irene Heim, Richard Holton, Roni Katzir, Nathan Klinedinst.
**veridical-responsive:** Responsive predicates that express a relation to the actual true answer (= extensional predicates in Groenendijk & Stokhof’s sense)

**non-veridical-responsive:** Responsive predicates that express a relation to a potential answer (not necessarily the true answer)

**Illustration:**

(7) Jack knows whether it is raining
    >> entails that Jack has a true belief as to whether it is raining

(8) Sue and Peter agree on whether it is raining
    >> true even if Sue and Peter both believe that it is raining while in fact it isn’t

**Problem:**

- Is there a uniform characterization, for all responsive predicates, of the semantic relation between the interrogative complement variant and the declarative complement variant?

- Can we predict which responsive predicates are veridical and which are not, on the basis of their meaning when they take a declarative complement?

**Conjecture:** veridical responsive predicates are exactly those which are factive or veridical w.r.t their declarative complement.

**NB:**
- A predicate is veridical w.r.t. its declarative complement if it entails the truth of its declarative complement
- It is furthermore factive if it presupposes the truth of its declarative complement

*It is clear that* is veridical but not factive:

(9) a. # It is clear that John left, but maybe he didn’t leave.
    b. It is not clear that John left, maybe he didn’t leave.

**Problem:** *tell* is widely considered to be counterexample to the conjecture (Karttunen 1977, G&S 1982, Lewis 1982, Berman 1990, Lahiri 2002), since it is not assumed to be veridical w.r.t its declarative complements, and yet it seems to allow only for veridical readings of embedded questions:

(10) Sue told Jack that it is raining
    >> Sue may have been mistaken

(11) Sue told Jack whether it is raining
    >> Sue was right

- Mostly on the ground of this exception (*guess* is a more complicated case), it is widely assumed that whether a responsive predicate is veridical or not is to be encoded in its lexical semantics on a case by case basis (see for instance Groenendijk & Stokhof 1993, Sharvit 2002).
• All exceptions actually involve “communications verbs”: tell, say, predict, announce. We will not provide a full account of their behavior, but will show that they display a more complex pattern than has been assumed, and do not so clearly refute our conjecture.

What we want to do:

A. – having a closer look at communication verbs  
   - exhibiting minimal pairs that support the conjecture

B. Provide a general semantic characterization of the relationship between the interrogative-taking variants and the declarative-taking variants of responsive predicates

>> A first implementation commits us to the claim that the only reading Grammar generates for responsive predicates is the *strongly exhaustive one*, contrary to what many assume.

C. Give a more sophisticated implementation in order to account for presupposition projection and derive the *weakly exhaustive reading* of embedded questions.

**A. Non-veridical question-embedding verbs: some data**

**A.1 Tell**

Absence of the inference in the question-embedding variant (judgments vary)

(12) Every day, the meteorologists tell the population where it will rain the following day, but they are often wrong  
(13) #? Every day, the meteorologists discover where it will rain the following day, but they are often wrong  
(14) # Every day, the meteorologists know where it will rain the following day, but they are often wrong

(15) I heard that Jack told you which students passed; but I don’t think he got it right  
(16) # I heard that Jack discovered which students passed; but I don’t think he got it right

Presence of a veridical inference with the declarative-taking variant in some contexts

- Is Tell necessarily veridical wrt to embedded questions? See Lewis 1982, p. 46, on the idea that “tell whether p” should mean “if p, tell p, and if not p, tell not p”:  
  “this is a *veridical* sense of telling whether, in which telling falsely whether does not count as telling whether at all, but only as purporting to tell whether. This veridical sense may or may not be the only sense of ‘tell whether’; it seems at least the most natural sense.”

(17) Sue told Jack whether Mary came  

>> One *does* infer that Sue told Jack the actual true answer.

(18) Sue didn’t tell anybody that she was pregnant  
(19) Did Sue tell Jack that Mary was pregnant?  
(20) Neither Mary nor Sue told us that she was pregnant.

(21) Wait a minute! I didn’t know that Sue was pregnant!
Schlenker (2007) on “Part-Time triggers”: if “Sue tells X that P” contextually entails the truth of P, then P starts behaving as if it were presupposed, i.e., projects under negation and so on.

A.2 Predict, Announce

(22) Jack announced who won the game  
(23) Every day, the meteorologists announce where it will rain on the following day, but they are often wrong  
(24) Jack did not announce that dinner was ready  
(25) Did Jack announce that dinner was ready?  
(26) None of these girls announced that she was pregnant  
(27) Sue predicted who would win the elections  
(28) Every journalist predicted who would win the elections, but some proved wrong  
(29) Sue did not predict that she would be pregnant  
(30) Did Sue predict that she would be pregnant?  
(31) None of these girls had predicted that she would be pregnant

A.3. Minimal pairs

A.3.1. Learn in Hungarian (Marta Abrusan’s data, Abrusan 2007, p.c.)

Learn is ambiguous in English (get to know / being taught). Both meanings are lexically distinguished in Hungarian between a factive and non-factive meaning. Both factive and non-factive versions embed questions, but only the factive one entails that Peter got to know the truth:

(32) Péter tanulta az iskolában, hogy ki bombázta le Gdanskot.  
Peter learned the school.IN that who bombed PRT Gdansk.ACC  
‘Peter learned in school who bombed Gdansk’

(33) Péter tanulta az iskolában, hogy jövő év-re esni fog-e az esőt.  
Peter learned the school.IN that next-year fall.INF will-QuesP the rain  
‘Peter learned in school whether it will rain next year’

(32) and (33) do not entail that Peter learned the truth. But (34) and (35) do:

(34) Péter megtudta, hogy ki bombázta le Gdanskot.  
Peter got-to-know that who bombed PRT Gdansk.ACC  
‘Peter has learned who bombed Gdansk’

(35) Péter megtudta, hogy jövő év-re esni fog-e az esőt.  
Peter got-to-know that next-year fall.INF will-QuesP the rain  
‘Peter has learned whether it will rain next year’

A.3.2 Tell in Hungarian: Mond, Elmond and Megmond (Marta Abrusan’s data, p.c.)

- **Mond** : non-veridical, both with that-clauses and questions.  
- **Elmond, Megmond** : veridical, both with that-clauses and questions (elmond is factive; megmond seems to have a weaker presupposition, namely that the attitude-holder and the speaker believe the complement to be true, but not necessarily that other people believe it).  
- **El-** : perfective particle
a) The case of declarative complements

(36) Péter azt mondta Marinak, hogy az Eiffel-torony össze fog dölni
Peter that told Mary.DAT that the Eiffel tower PRT will collapse
‘Peter told Mary that the Eiffel tower will collapse’
→ « he was fooling her »

(37) Péter mondta Marinak, hogy az Eiffel-torony össze fog dölni
Peter told Mary.DAT that the Eiffel tower PRT will collapse
‘Peter told Mary that the Eiffel tower will collapse’

→ « no factive reading, but « tends to be interpreted with some sort of verbal focus on tell, and when it tends to get the reading that maybe one could call “motherese factive” or “backwards in time factive” (I TOLD you it would be cold outside…). So the most natural context for (31) would be: ‘he told her, she did not believe, and look what happened, she is under the ruins’ »

(38) Péter elmondta Marinak, hogy az Eiffel-torony össze fog dölni
Peter EL 4.told Mary.DAT that the Eiffel tower PRT will collapse
‘Peter told Mary that the Eiffel tower will collapse’

→ « It is a scientifically established fact that the collapse is unavoidable »

(39) Péter megmondta Marinak, hogy az Eiffel-torony össze fog dölni
Peter MEG.told Mary.DAT that the Eiffel tower PRT will collapse
‘Peter told Mary that the Eiffel tower will collapse’

→ « Peter and I the speaker, we believe this. (and possibly others too) »

b) The case of interrogative complements

Mond, Elmond and Megmond all embed (polar and constituent) questions: megmond and elmond are veridical wrt embedded questions, but mond is not necessarily so. Here we report on M. Abrusa’s data on constituent questions, but the facts are similar with polar questions:

(40) Péter megmondta Marinak, hogy ki fog nyerni
Peter meg.told Mary.DAT, that who will win.INF
‘Peter told Mary who will win’

→ « he either knew it from his sources that there is a pre-established winner, and he told mary who it was, or he somehow divined it himself (he is a sorcerer or something). Either way, he was correct ».

(41) Péter elmondta Marinak, hogy ki fog nyerni
Peter el.told Mary.DAT, that who will win.INF
‘Peter told Mary who will win’

→ « he knew it from his sources that there is a pre-established winner, and he told mary who it was »

(42) Péter azt mondta Marinak, hogy ki fog nyerni
Peter that told Mary.DAT, that who will win.INF
→ « here for some reason az in the matrix has to be contrastive.(he said p and not some other q) But there is no implication that he told the truth. The facts would be similar with MARY in focus ».

« If nothing is focussed (or mond is focussed, these are not easy to tell apart): »

(43) Péter mondta Marinak, hogy ki fog nyerni
Peter told Mary.DAT, that who will win.INF
‘Peter told Mary who will win’
\[\rightarrow \text{« it is harder to judge here, but I think he does not have to be right »}\]

A.3.3. Prédire vs. Deviner (French)

(44) Jacques avait prédit, à tort, qu’il pleuvrait.
‘Jacques had predicted, wrongly, that it would rain’

(45) Jacques n’avait pas prédit qu’il pleuvrait
‘Jacques had not predicted that it would rain’

\[\text{>> available inference that Jacques failed to announce a certain fact}\]

(46) Jacques avait prédit qui serait candidat à l’élection
‘Jacques had predicted who would be candidate for the election’

\[\text{>> inference that Jacques made the correct prediction}\]

(47) Chacun des enquêteurs a prédit quels suspects seraient condamnés, mais certains se sont trompés.
‘Every investigator predicted [made a prediction as to] which suspects would be condemned, but some of them got it wrong’

(48) *Chacun des enquêteurs a deviné quels suspects seraient condamnés, mais certains se sont trompés
‘Every investigator guessed [factive] which suspects would be condemned, but some of them got it wrong’.

A.4. How to interpret the data?

Unclear at this point

- It is actually hard to argue for the separate existence of a factive reading of the declarative-taking variants – these inferences might as well be contextual entailments of a non-factive reading. At least some informants perceive the “factive” inferences as deriving from a distinct reading.

- The problem here is that the “factive” variant always entails the non-factive one, so every case that could induce a presuppositional failure might come out true on the non-factive reading. And the ‘wait-a-minute’-test is not so reliable.

- Yet we seem to have at least some evidence that the question-embedding variants are not as systematically factive as is, say, know.

- We conclude that the apparent exceptions to our proposed generalization form a natural class (“communication verbs”) whose behavior suggests that they are not that clearly counterexamples, though further investigation is clearly needed.

B. A weak semantics for embedded questions

Both G&S’s and Karttunen analyze $X V Q$ as:

- $X V Q$ is true in a world $w$ if and only if the referent of $X$ is, in $w$, in the relation denoted by $V$ to the proposition that is the complete answer to $Q$ in $w$ (= the true answer to $Q$ in $w$)

The data we examined above suggest that a weaker semantics is appropriate:
• \(X V Q\) is true in a world \(w\) if and only if the referent of \(X\) is, in \(w\), in the relation denoted by \(V\) to some proposition \(A\) that is a potential complete answer to \(Q\), i.e. such that there is a world \(w\) such that \(A\) is the complete answer to \(Q\) in \(w\).

Consequences

• **Consequence 1**: whenever an extensional verb \(V\) is veridical, then for \(X V Q\) to be true (with \(Q\) a question), \(X\) must be in the relation denoted by \(V\) to a true proposition that is a potential complete answer to \(Q\).

• **Consequence 2**: an extensional verb \(V\) is veridical both wrt to declarative and interrogative complements, or wrt neither of them.

• **Consequence 3**: this approaches forces us to adopt GS’s notion of a complete answer (over Hamblin-Karttunen’s)

Reminder: Two notions of complete answer

(49) Who left?

Suppose the relevant domain consists of three individuals, Mary, Susan and Ernest. Take a world in which Mary and Susan left and Ernest didn’t. Then the complete answer in Karttunen’s sense in \(w\) is *Mary and Susan left*. But the complete answer in G&S’s sense is *Mary and Susan left and Ernest didn’t*.

For K “Mary left” is the complete answer in all worlds in which Mary and nobody else left. Therefore, in the above scenario, “Mary left” is, under K.’s definition, a potential complete answer, which is furthermore true in the actual world (though it is not the complete answer in the actual world). Hence the following inference should be contextually valid (and in fact, should always be so).

(50) John knows that Mary left
John knows who left

For G&S, *Mary left* is not a potential complete answer: in a world in which Mary came and nobody else, the complete answer in G&S’s sense is the proposition that states that Mary came and nobody else did.

B. 1. **Not taking into account certain facts about presupposition projection**

• Assume GS’s semantics for *wh*-complements, namely a question \(Q\) denotes its GS intension, namely a function \([Q]\) that to each world \(w\) associates the true complete answer to \(Q\) in \(w\)

• \([Q](w)\) denotes the true complete answer to \(Q\) in \(w\) (the GS extension of the question)

• Let \(P\) be a predicate that has two arguments: an individual and a proposition. \(P\) is then of type \(<<s,t>,<e,t>>\). Then if \(P\) also embeds interrogatives (an interrogative being of type \(<<s,<s,t>>,e,t>>\), the lexical entry for the variant \(P_{int}\) that embeds an interrogative is as follows:

(51) \([P_{int}](w) = \lambda Q_{<<s,t>,<e,t>>}.x. \exists w'(\([P]\)(Q(w')))(x) = 1\)

• Illustration with *know*:

(52) Jack knows whether \(p\)

\(([\text{know}](w) [[p]](J) = 1\)
\[(\lambda x. \exists w' (\lbrack \text{know} \rbrack (w) \lbrack \text{?p} \rbrack (w'))(x) = 1) (J)\]
\[\exists w' (\lbrack \text{know} \rbrack (w) \lbrack \text{?p} \rbrack (w'))(J) = 1\]

Since ‘know’ is veridical, we have:

For any \(w'\) (\(\lbrack \text{know} \rbrack (w) \lbrack \text{?p} \rbrack (w'))(J) = 1\) only if \(\lbrack \text{?p} \rbrack (w') = \lbrack \text{?p} \rbrack (w)\). Hence this is equivalent to:

\(\lbrack \text{know} \rbrack (w) \lbrack \text{?p} \rbrack (w))(J) = 1\)

**B. 2. Adding presupposition projection**

(53) Jack and Peter agree on whether \(p\)

Roughly, what the current literature assumes is that this simply asserts that either both Jack and Peter believe that \(p\) is true, or both believe that \(p\) is false. But then what about:

(54) Jack and Peter don’t agree on whether \(p\) comes out true if they are both uncertain.

In fact, (53) and (54) both presuppose that Jack and Sue are opinionated w.r.t. \(p\) (and more than this, see below) (being opinionated w.r.t. \(p = \text{believe} p\) or \(\text{believe not} p\))

We want our proposal to predict in a systematic way the presuppositions induced by the question-embedding construction in terms of the presupposition triggered by the embedding predicate when it takes a declarative complement.

**Proposal:**

‘\(X \lor Q\)’ presupposes that there is a potential complete answer \(S\) to \(Q\) such that the presupposition associated to \(X \lor S\) is true, and asserts \(X \lor S\).

adopting Heim & Kratzer’s (1998) notation:

\[\lbrack P \lor w \rbrack (w) = \lambda Q_{\prec \prec Q \succ} \lambda x. \exists w' (\lbrack P \rbrack (w)(Q(w')) (x) is defined). \exists w' (\lbrack P \rbrack (w)(Q(w')) (x) = 1\]

which is equivalent to:

\[\lbrack P \lor w \rbrack (w) = \lambda Q_{\prec \prec Q \succ} \lambda x. \exists w' (\lbrack P \rbrack (w)(Q(w')) (x) is defined). \exists w' (\lbrack P \rbrack (w)(Q(w')) (x) is defined \& \lbrack P \rbrack (w)(Q(w')) (x) = 1\]

**B.2. 1. know**

If \(P\) is factive (presupposes the truth of its declarative complement), the presupposition becomes vacuous when we turn to the question-embedding variant:

(55) Jack knows who came

\(\geq\) Presupposes that for some complete answer \(S\) to ‘who came’, the presupposition of ‘Jack knows \(S\)’ is true, i.e. \(S\) is true.

i.e. : presupposes that one complete answer is true, which is a tautology.

**B.2. 2. Agree with**

- **Agree with + declarative**

(56) Jack agrees with Sue that it is raining
(57) Jack doesn’t agree with Sue that it is raining

>> Both (56) and (57) presuppose:
- Sue believes that it is raining
- Jack either believes that it is raining or that it is not raining (i.e. is opinionated)
(Evidence: (57) entails that Jack believes that it is not raining)

>> (56) asserts Jack that believes it is raining.
>> (57) asserts that it is not the case that Jack believes that it is raining

(58) \( \text{agree} (w) = \lambda \phi \lambda \alpha \lambda \beta \lambda \gamma \lambda \chi: \text{y believes } \phi \text{ in } w \text{ and } \alpha \text{ is opinionated wrt } \phi \text{ in } w \text{. } x \text{ believes } \phi \text{ in } w \)

- **Agree with + whether p**

(59) \( \text{agree}_{\text{int}} (w) = \lambda Q \lambda \chi \lambda \beta \lambda \gamma \lambda \chi: \exists w' (\text{y believes } Q(w') \text{ in } w \text{ and } \alpha \text{ is opinionated wrt } Q(w') \text{ in } w \text{. } x \text{ believes } Q(w')) \)

(60) Jack agrees with Sue on whether p

- Presupposes: for some member q of \{p, \neg p\}, Sue believes q and Jack is opinionated with respect to q.
- Asserts: for some member q of \{p, \neg p\} such that Sue believes q and Jack is opinionated with respect to q, Jack believes q

i.e.

- Presupposes: Either Sue believes that p and Jack is opinionated wrt p or Sue believes that nonP anddd Jack is opinionated, i.e. **Sue and Jack are opinionated wrt p**
- Asserts: If Sue believes p, then Jack believes p, if Sue believes not-p, then Jack believes not-p

(61) Jack doesn’t agree with Sue on whether p

- Presupposes: they are both opinionated
- Asserts: For the q in \{p, \neg p\} such that Sue believes q and Jack is opinionated wrt q, Jack does not believe q, i.e. **Sue and Jack are both opinionated wrt p, and have different opinions**

Note that it is predicted that Jack agrees with Sue on whether p is equivalent to Sue agrees with Jack on whether p.

- **Agree with + wh-question**

(62) Jack agrees with Sue on which of these sentences are grammatical

- Presupposes: for some complete answer S to “which of these sentences are grammatical”, Sue believes S and Jack is opinionated wrt S
- Asserts: for some complete answer S’ such that Sue believes S’ and Jack is opinionated wrt S’, Jack believes S’

Necessarily S’ = S. Indeed, complete answers are mutually exclusive. So if S is a potential complete answer such that Sue believes S, then there is no other such complete answer. So we end up with:

- Presupposes that for some complete answer S, Sue believes S and Jack is opinionated wrt S, and asserts that Jack believes that very proposition S.
(63) Jack doesn’t agree with Sue on which of these sentences are grammatical

- Presupposes that for some complete answer S, sue believes S and Jack is opinionated w.r.t S, and asserts that Jack does not believe that this proposition S is true (hence he believes that S is false)

Note that (63) is predicted to presuppose that Sue has a clear opinion about what the complete answer is, while Jack may well have no definite opinion besides that fact the he believes that Sue is wrong. So (63) is not predicted to be equivalent to Sue doesn’t agree with Jack on which of these sentences are grammatical.

B.2.3. ‘Reciprocal’ Agree

(64) Jack and Sue agree on whether it is raining
(65) Jack and Sue do not agree on whether it is raining

Both (64) and (65) suggest that Jack and Sue are opinionated. Assume this is the presupposition of reciprocal agree. Assume further that (64) asserts (and (65) negates) that both Jack and Sue believe it is raining. It this were all there is to say, (65) would be appropriate and true if Jack and Sue both believed that it is not raining. Indeed, they would then both be opinionated, and it would be true that they do not believe that it is raining.

→ we need to add the following presupposition: at least one of the two believes that it is raining. Then the assertion, in the case of (65), is that the other one does not believe this, hence, since (s)he is opinionated, believes it is not raining.

Basic lexical entry for ‘reciprocal’ agree

\[ \text{\text{agree}}(w) = \lambda \phi \cdot \lambda X : X \text{ is a plural individual and at least one atomic part of } X \text{ believes } \phi \text{ and every atomic part of } X \text{ is opinionated w.r.t } \phi. \text{ Every member of } X \text{ believes } \phi \text{ in } w \]

In words: ‘X agree that \( \phi \)’ presupposes that all the members of X are opinionated wrt \( \phi \) and that at least one believes that \( \phi \) is true, and asserts that they all in fact believe \( \phi \).

(66) Jack and Sue agree on whether \( p \)

- Presupposes: there is a world \( w' \) such that both Jack and Sue are opinionated w.r.t. \( [\lceil p \rceil](w') \) and one of the two believes \( [\lceil p \rceil](w') \)

  i.e. : Jack and Sue are both opinionated wrt \( p \) or wrt to \( \neg p \) and one of them believes \( p \) or \( \neg p \)
  i.e. : Jack and Sue are both opinionated

- Asserts: \( \exists w'. ([\text{\text{agree}}](w) [\lceil p \rceil](w')) (J + S) = 1 \)

equivalent to:

\[ [\text{\text{agree}}](w)(p) (J+S) \text{ or } [\text{\text{agree}}](w)(\neg p) (J+S) \]

>> presupposes that they are both opinionated

>> asserts that they have the same opinion

(67) Jack and Sue don’t agree on whether \( p \)

>> presupposes that they are opinionated

>> asserts that they disagree
(68) Jack and Sue agree on who came among Peter, Mary and Jack
>> presupposes that there is a complete answer S such that a) one of the two believes S, and b) the
other one is opinionated wrt S
>> asserts that there is a complete answer S’ that they both believe

→ Necessarily S’ = S. Indeed, one of the two, say Jack, believes S. Since complete answers are
mutually exclusive (recall that we use G&S’s notion of complete answer), Jack necessarily believes all
other potential complete answers to be false (assuming his beliefs are consistent). Since he believes S’,
S’ = S.

End result: (68) is true only if they both believe that a certain potential answer is true

(69) Jack and Sue do not agree on who came
>> presupposes that there is a complete answer S such that a) one of the two believes S, and b) the
other one is opinionated w.r.t. S
>> asserts that there is no complete answer that they both believe

From the presupposition, it follows that one of the two believes that S is true, where S is a potential
complete answer. From the assertion, it follows that the other one does not believe that S is true; but
then, since (by the presupposition) the other one has to be opinionated wrt S, it follows that he does
not believe S

>> End result: There is a potential complete answer such that one of the two believes it and the other
one believes its negation

NB: it is not predicted that (68) presupposes that both Jack and Sue have a definite opinion about
who came, only that one of the two does. For instance, if Jack is convinced that Peter came and
nobody else did, and if Sue believes that this is false, but is however not sure about who exactly came,
(68) should come out felicitous and true. This seems to us to be correct.

B.2. 4. Decide

We treat decide that as non-veridical here (a more complex account may be needed):

(70) Last year, Mary decided that she would go to Mali before Christmas, but she kept postponing
her trip, I don’t think she will ever go there.

Simplistic lexical entry, sufficient for our purpose:

We now treat propositions as sets of world-time pairs (of type <s,<a,t>>, where a= type for temporal
indices).

[[decide]] (w,i)= λφ.x<φ,<a,i,φ,>,. λx: if x wants φ, φ is more likely to be true in the future than ¬p, and if x
wants ¬φ, ¬φ is more likely to be true in the future than φ. In (w,i), x wants φ to be true at some time i’
after i.

(71) Jack has decided whether he will go to Mali
>> presupposes that if Jack wants to go to Mali now, then his going to Mali is more likely to be true
in the future than his not going, and that if Jack wants not to go to Mali now, then his not going is
more likely to be true in the future than his going.
>> asserts that Jack wants his going to Mali to be true

(72) Jack has decided who will come
presupposes that there is at least one potential complete answer to “who will come?” such that Jack has the ability to influence its future truth-value.

asserts that he wants one such answer to be true.

C. Accounting for weakly exhaustive readings

C. 1. An observation regarding surprise: weak assertion, strong presupposition

(73) It surprised Mary which of her six students passed.

Can be continued with:

(74) …but it didn’t surprise Mary which of her six students failed.

We do not predict this, as, under G&S’s semantics, and assuming that every student either passed or failed, which of her six students passed and which of her six students failed have exactly the same denotation. Here it seems that the weakly exhaustive reading is available. It has been argued that it is also the only possible reading (Berman 1991, Heim 1994, Sharvit 2002).

What does (73) presupposes?

that Mary knows which of her six students passed and which of them failed.

(73) is a little bit weird in a situation in which we simply know that Mary just learnt, say, that Peter and Sue passed, and does not know that all the other failed – even if she is surprised that Peter and Sue passed.

This point gets reinforced when we look at negated sentences:

(75) It didn’t surprise Mary which of her six students passed.

- Situation: Mary knows that a and b passed and has yet to know that the others failed.

The ‘strong’ reading is therefore preserved in the presuppositional part. It in fact turns out that once we take into account presuppositions, it is possible to overcome the problem noticed above in section B (cf. Consequence 3)

C. 2. An amendment

Main intuition: the rule for presupposition projection makes reference to the complete answer in the strong sense, but the one that derives the assertion can make reference to the weak notion of complete answer.

(76) It surprises Mary that p

Presupposition: p and Mary believes p (= Mary knows p)

Our proposal, informally:
Terminology:
- the G&S-complete answer means the complete answer as defined by G&S
- The K-complete answer means the complete answer as defined by K

“It surprises Mary who came”

a) presupposes that there is a world w in which the G&S-complete answer A is such that the presupposition of It surprises Mary that A is true

b) asserts that the K-complete answer in the same world w, call it A’, is such that it surprises Mary that A’
i.e.

a) **presupposes** that there is a world w in which the G&S-complete answer A is such that the A is true and Mary believes that A is true

b) **asserts** that the K-complete answer in the same world w, call it A’, is such that it surprises Mary that A’

i.e.

a) **presupposes** that the actual complete answer in G&S –call it A - is true (trivial) and that Mary knows A

b) **asserts** that Mary is surprised by the fact that A’, the actual K-complete answer, is true

More formally:

Definitions:

\[ Q(w) = \{p_1, \ldots, p_n\} \] (= all the elementary answers that are true in w)

\[ \text{Ans}_1 \cdot Q(w) = p_1 & \ldots & p_n \]

\[ \text{Ans}_2 \cdot Q(w) = \lambda w'(Q(w') = Q(w)) \quad [\text{Heim 1994}] \]

New rule:

\[ [[P\text{nt}]](w) = \lambda Q.\lambda x : \exists w'([[P\text{nt}]](w)\text{Ans}_2 \cdot Q(w'))(x) \text{ is defined. } \exists w'([[P\text{nt}]]\text{Ans}_2 \cdot Q(w'))(x) \text{ is defined } & ([[P\text{nt}]] \text{Ans}_1 \cdot Q(w'))(x) = 1 \]

C. 3. Application to know

(77) Peter knows who came

>> **Presupposes** that for some w, the presupposition associated with “Peter knows S”, where S is the G&S-complete answer to “who came” in w, is true.

i.e. presupposes that one complete answer in G&S’s sense is true >> trivial

>> **Asserts** that there is a world w’ such that

a) the complete answer in w’ in G&S’s sense to “who came” is true, and

b) Peter believes the complete answer to w’ in K’s sense

Necessarily, w’ is a world in which the complete answer is the same as in the actual world

>> Weakly exhaustive reading – we avoid the undesirable consequence noted above.

Suppose that Mary and Peter came and nobody else. Then ‘Jack knows who came’ is true iff Jack knows that Mary and Peter came (he may be uncertain regarding others)

C. 4. Prediction for surprise

Scenario: Jack and Peter came, and Mary and Sue didn’t.

(78) It surprised Mary which of these six students came

>> **Presupposes** that she knows that Jack and Peter came and nobody else

>> **Asserts** that it surprised her that Jack and Peter came (but maybe she wasn’t surprised that the others didn’t come)

Seems correct as soon as we make the domain of quantification sufficiently explicit:

(79) It surprised Mary which of these six students left
>> Weird if it is known that Mary does not know the complete list of the students who left.

Conclusions and Perspectives

- A unified account of veridical and non-veridical readings of question-embedding verbs that take declarative complements.
- An account of both strongly and weakly exhaustive readings

Other explanatory options are possible to account for non-veridical responsive predicates. See appendix for some relevant data.

References


Appendix: prepositions and questions

Here we present further data which support Lahiri’s typology and suggest that *tell* behaves like *know* with respect to questions, while *agree (on)* does not. They also suggest that the presence of a preposition may correlate with a coercion phenomenon, mapping the standard veridical meaning of the question to some potential complete answer to the question. Note that this would be a different theory from the one we presented here.

The data support the following empirical generalization:

All verbs that support non-veridical readings of embedded questions, and only those verbs:

- i) accept “the question whether”
- ii) exclude if-clauses for embedded yes-no questions
- iii) are constructed with a preposition

- For yes-no questions, *know* and *agree (on)* differ on the selection of if-clauses vs. whether-clauses. If-complements and whether-complements are both permitted after *know* to express yes-no questions. If-clauses appear to be excluded after prepositions more generally:

  (1) John knows whether Mary left
  (2) John knows if Mary left
  (3) John and Bill agree on whether Mary left
  (4) *John and Bill agree on if Mary left
  (5) John is certain about whether Mary left
  (6) *John is certain about if Mary left

- *Know* and *agree on* also differ on the nominalization of embedded questions. “Know + Q” cannot be paraphrased as “know the question of Q”. For *agree on* and similar predicates constructed with prepositions, such a paraphrase is possible:

  (7) John and Bill agree on the question of whether Mary left
  (8) *John knows the question of whether Mary left
I am not absolutely certain on the question of whether or not society should view the sit-in as illegal (Google, but only 3 hits for “certain on the question of whether”, only 1 meaningful one for “certain about the question of whether”)

- *Tell* behaves like *know*:

  (10) John has not told Mary whether he had visited London
  (11) John has not told Mary if he had visited London
  (12) *John has not told Mary the question whether he had visited London

- *Decide* accepts if-complements, but also “the question whether” (especially in juridical reports), and is sometimes constructed with a preposition (decide about + Q)

  (13) John has not decided if he would visit London
  (14) I don't know if you've already identified the expensive market research reports and decided about whether you want to buy them or not.
  (15) If you were still a member of the High Court, how would you have decided the question whether the California Statute applied in Hall violated the equal protection clause?