An Interpretive Analysis of Alternative and Yes/No Questions in English

Pat Trainor

This paper attempts to develop an interpretive account of the syntax and semantics of alternative and yes/no, direct and indirect, questions. The first part of the paper deals with the aspects of questions related to their propositional content. A rule which carries the presupposition (in the sense of Jackendoff (1972)) of the first conjunct of an alternative question across into the second conjunct, is developed and shown to be necessary for semantic interpretation. It is then argued that all yes/no questions have two clauses on the semantic level, and that therefore the presupposition carrying rule applies to yes/no questions as well. The remainder of the paper deals with the specifically question-related aspects of the syntax and semantics of questions. A syntactic analysis is developed which accounts uniformly for alternative and yes/no, direct and indirect, questions. The semantics incorporates into the interpretive framework the basic insights of the Montague treatment of questions in Karttunen and Peters (1976).

1. The Propositional Content of Questions

1.1. Alternative Questions

In alternative questions, the second clause is frequently incomplete. For example, sentence (2) is understood as synonymous with sentence (1):

(1) Did John read the book or did Mary read the book?
(2) Did John read the book or did Mary?

This section addresses the problem of how the incomplete second conjuncts are to be assigned full semantic representations, and thus attempts to account for the synonymy of (1) and (2).

If an empty VP node is generated in the second clause of (2), then Jackendoff's (1972: 268) rule of VP-anaphora will associate with this empty VP node the semantic representation of the VP in the first conjunct, read the book, thereby providing (2) with a complete semantic representation and accounting for the synonymy of (1) and (2):
(3) **VP-anaphora**

Associate with VP₂ the semantic representation of VP₁ if

a. VP₂ is ₁ ; and
b. VP₂ does not both precede and command VP₁.

Note the essential role of the empty VP node as a trigger for the rule. Within this framework other more general rules of coordination reduction could be formulated, so that an empty node of whatever type in the second clause would be assigned the interpretation of the corresponding node in the first clause. Then if our theory will guarantee the presence of the appropriate empty nodes, our problem is essentially solved.

But will the appropriate empty nodes always be present? Consider sentence (2). Here the appropriate empty node will be obligatorily present if we assume almost any version of the X-bar theory of phrase structure rules, since a clause must obligatorily contain a VP, whether or not the VP is later lexically filled.

However, in the general case, the base rules will not always guarantee that empty nodes necessary for full semantic interpretation will in fact be syntactically present. For example, consider sentence (4):

(4) Did John go to Japan by boat or did he go by plane?

The second clause of (4) is necessarily interpreted as including the semantic representation of to Japan, even though to Japan is not syntactically present. The theory I have been outlining will account for this fact if an empty PP node is obligatorily generated in the second clause, so that the rules of coordination reduction are triggered and the semantic material corresponding to to Japan is carried into the second clause. But there is nothing in the theory which would require the base rules to generate a PP node, and so under this analysis a sentence like (4) is falsely predicted to be ambiguous as to whether to Japan is understood to be part of the second clause, depending on whether or not an empty PP node happens to be generated on a given derivation.

Although the phrase structure rules do not make the
presence of a PP node obligatory, one might suspect that something in the subcategorizational features of the verb does. But go does not require a PP in general, as may be seen by comparing the behaviour of go with that of put, which does:

(5) a. He went.
    b. *He put the book.

(6) a. He went to Japan by boat, but she went by plane.
    b. *He put the cookies in the jar very carefully, but she put them rather carelessly.

Sentence (7) further demonstrates the inadequacy of this approach:

(7) Does John eat crackers when he's sick, or does he eat jello?

It is clearly ridiculous to think of eat as subcategorizing an adverbial clause, and yet when he's sick is necessarily present semantically in the second clause.

Thus neither the base rules nor subcategorizational features will guarantee that empty nodes will be present when needed. A third attempt at a solution of this problem might be to require the clauses of an alternative question to be syntactically parallel. The problem then arises, at what level must they be parallel? Minimally, one would have to break the first clause of (4) into Aux-NP-V-PP-PP, so that the second clause would also be required to have two PPs, one of which would be empty. But then one would have to claim as well that the second clause of (8) contains a postverbal NP:

(8) Did John wash the dishes or did Mary walk out on him?

Clearly, such a claim is untenable, and therefore syntactic parallelism does not provide an answer to the problem.

Thus there seems to be no way of guaranteeing that an empty node will always be present when needed to trigger the rules of coordination reduction and VP-anaphora. Therefore, these rules are inadequate. Returning to sentence (4), what seems to be the case is that to Japan is semantically present in the second clause because it is presupposed in the first clause, using the notion of presupposition developed in Chomsky (1971) and Jackendoff (1972), where "presupposed" means "not focussed". The focus is considered
to be a surface constituent containing the main stress of the sentence, and the presupposition is determined by substituting an appropriate variable for the focus in semantic representation. I claim, then, that all material which is presupposed (in this sense) in an alternative question is carried across from the first clause into the second.

Rules which carry presuppositions from one clause to another were proposed in Akmajian (1970) (see also Akmajian (1973) and Jackendoff (1972)). In these works, presupposition carrying rules are used to interpret certain anaphoric expressions, like it, it happen, do so, do the same, etc. Thus a sentence like (9) is interpreted by Jackendoff's rule of happen-prosententialization, stated in (10).

(9) Goldwater won in the west, but it would never happen here.

(10) Happen-Prosententialization
Let \( S_2 \) be an anaphoric sentence of the form \{that\}
\( \text{aux happen PP} \), in which the PP is the focus, and let \( S_1 \) be its antecedent. To form the reading of \( S_2 \),
   a. substitute the reading of the aux and sentence adverbs in \( S_2 \) for those in the presupposition of \( S_1 \),
   b. superimpose the resulting reading on the (minimally specified) presupposition of \( S_2 \),
   c. substitute the focus of \( S_2 \) for the variables in the presupposition to form the assertion.

Note the essential role of the anaphoric expression, in this case happen, as a trigger for the rule. In alternative questions the situation is different, since there is no anaphoric element to act as a trigger. Instead, the rule of presupposition carrying will have to apply obligatorily in all alternative questions, and will actually add elements to the semantic representation rather than interpreting anaphoric expressions, which may be viewed as place holders with respect to semantic representations.

Let us look at how such a rule would operate. The first problem is to determine the focus. In alternative questions, each clause contains an element which is contrasted with a corresponding element in the other clause, and these items constitute the foci of their respective clauses. Thus in (2) the foci are John and Mary; in (4), by boat and
by plane. Consider just sentence (4). Extracting the focus by boat from the semantic representation of the first clause and replacing it with an appropriate variable gives the presupposition (11):

(11) John went to Japan (by) x.

where x ranges over means of travelling to Japan. Carrying the presupposition (11) into the second clause of (4), and substituting the second-clause focus by plane for the variable x, gives (12) as the propositional content of the second clause, as desired:

(12) John went to Japan by plane.

Since the rule of presupposition carrying is obligatory in alternative questions, the necessary presence, semantically, of to Japan in the second clause is accounted for.

In Jackendoff's rule of happen-prosententialization, the minimal presupposition of the second clause is formed, and then the presupposition of the first clause is superimposed over this minimal presupposition. In alternative questions, however, it seems that the minimal presupposition of the second clause will never be different from the corresponding part of the presupposition of the first clause, since the only parts of the conjuncts which differ are the foci, and these are removed from the presupposition.

Now consider sentence (13):

(13) Was it green peas or beans?

This sentence is ambiguous as to whether the meaning of green is present in the second conjunct or not. The rule of presupposition carrying accounts for this ambiguity, as follows. There are two choices of foci in (13): the NPs green peas and beans, or the Ns peas and beans. In the first case, the presupposition of the first clause is (14):

(14) It was x.

Carrying (14) into the second conjunct and substituting the focus beans for x gives the reading (15):

(15) It was beans.

If the focus of the first conjunct is peas, however, then the presupposition is (16):

(16) It was green x.

and then substituting beans for x gives (17) as the
propositional content of the second clause:

(17) It was green beans.

(Actually, I am oversimplifying somewhat. Under Jackendoff's account of presupposition, when the focus is removed and replaced with an appropriate semantic variable, it is not the presupposition itself which is being formed, but rather the presuppositional function \( \text{Presupp}_e(x) \). From the presuppositional function another object is formed, called the presuppositional set and written \( \lambda x \text{Presupp}_e(x) \). This set contains the values which yield a true proposition when substituted for \( x \) in \( \text{Presupp}_e(x) \). The presupposition is then that \( \lambda x \text{Presupp}_e(x) \) is well-defined, coherent, under discussion, etc. Finally, the assertion of the sentence is that the focus is a member of the presuppositional set, i.e. \( \text{Focus} \in \lambda x \text{Presupp}_e(x) \). Thus, strictly speaking, the presupposition carrying rule forms the assertion of the second clause by saying that the second clause focus is a member of the presuppositional set of the first clause.)

I have shown that the ambiguity of sentence (13) is accounted for by the presupposition carrying analysis. In fact, though, this ambiguity is predicted by an analysis involving empty nodes which are interpreted by rules of coordination reduction, since an empty adjective node may or may not be generated in the second clause. However, such an analysis says nothing about the relation between intonation contour and semantic reading. The presupposition carrying analysis, on the other hand, predicts correctly that the intonation pattern represented in (18a) is associated with the reading in (18b), and similarly for (19a) and (19b).

(18) a. Was it GREEN PEAS or BEANS?
    b. Was it green peas or was it beans (of any colour)?

(19) a. Was it green PEAS or BEANS?
    b. Was it green peas or was it green beans?

A similar case is sentence (20), which is ambiguous as to whether in pajamas is semantically present in the second clause.

(20) Does John drink coffee in pajamas or does he read the paper?

As in the example of sentence (13), the explanation is based on the existence of two possible choices of foci,
the VPs drink coffee in pajamas and read the paper, or the sequences of V+NP drink coffee and read the paper.

One might wonder at this point why sentence (4) is not ambiguous. The answer lies in the fact that the foci of an alternative question must be parallel to each other on the semantic level, and perhaps on the syntactic level as well. To get a reading on which to Japan is not part of the second clause, to Japan would have to be part of the first clause focus. But then the focus of the first clause would be to Japan by boat, which is not parallel to the second clause focus by plane either on the syntactic or semantic levels. (Semantically, a means plus a destination are opposed to simply a means.) Hence to Japan must be part of the presupposition and must, therefore, always be carried into the second clause.

I have shown that a presupposition carrying rule is necessary to account for sentences like (4), and has the desirable property of associating different intonation contours with the appropriate semantic readings in sentences like (13) and (20). Since the rule is necessary and obligatory, it will apply to a sentence like (2), which as we saw before was adequately accounted for by a theory involving empty nodes and the rule of VP-anaphora. In general, the presupposition carrying rule will always duplicate the effects of any application of the rules of coordination reduction and VP-anaphora in alternative questions, thereby rendering these rules superfluous with respect to alternative questions.

All the examples in this section have been direct questions. However, everything I have said holds equally for indirect questions, as can be seen, for example, by substituting sentence (21) for sentence (4):

(21) I wonder whether John went to Japan by boat or whether he went by plane.

Furthermore, the rule of presupposition carrying apparently applies to either/or statements as well:

(22) Either John went to Japan by boat or he went by plane.
1.2. Yes/No Questions

Yes/no questions may be divided into two types. One type, which I will call Type A, has a focussed element, with the rest of the sentence being presupposed. Questions of this type can be paraphrased by the construction *Was it Focus that Presupposition?*, as the following pairs demonstrate:

(1) a. Did JOHN eat the jam?
   b. Was it JOHN who ate the jam?

(2) a. Did John go to JAPAN?
   b. Was it to JAPAN that John went?

Various expanded versions of yes/no questions exist. These are all like alternative questions in form, in that they have two clauses and hence two foci. Thus the questions in (3) are synonymous with those in (1), and similarly for (4) and (2):

(3) a. Did JOHN eat the jam or did someone ELSE (eat it)?
   b. Did JOHN eat the jam or was it someone ELSE (who ate it)?
   c. Did JOHN eat the jam or wasn't it HIM (that ate it)?

(4) a. Did John go to JAPAN or (did he go) somewhere ELSE?
   b. Did John go to JAPAN or was it somewhere ELSE (that he went)?
   c. Did John go to JAPAN or wasn't it THERE (that he went)?

If the bracketed elements in (3) and (4) are not present, their meanings will be added to the semantic representation by the rule of presupposition carrying developed in the preceding section, since the questions in (3) and (4) have the form of alternative questions.

Recall that the assertion of a clause is expressed as Focus ∈ λxPresupps(x), where λxPresupps(x) is the presuppositional set (that is, the set of x's for which the presuppositional function Presupps(x) is true). The construction *It was Focus that Presupposition* expresses this assertion quite directly. Thus the assertion of the second clause of (3b) is that someone else is in the set of people who ate the jam. Just as *It was Focus that Presupposition* asserts that Focus ∈ λxPresupps(x), *It wasn't Focus that Presupposition* asserts that Focus ∉ λxPresupps(x). Thus the second clause of (3c) asserts that him (=John) is not
in the set of people who ate the jam. That is, the second clause of (3b) asserts (5a), while the second clause of (3c) asserts (5b):

(5) a. someone else $\in \lambda x \text{Presupp}_S(x)$
   b. John $\notin \lambda x \text{Presupp}_S(x)$

But (3b) and (3c) are synonymous, so we must show that (5a) and (5b) are equivalent. Sentences like (3) and (4) are often said to carry an existential presupposition (this is a different sort of presupposition than that which this paper is primarily concerned with). That is, in (3) it is presupposed that there exists someone who ate the jam. Given this presupposition, it is clear that (5b) is equivalent to (5a), since if John didn’t eat the jam, as (5b) asserts, then someone else must have done so, which is what (5a) asserts; and conversely, if someone other than John ate the jam, as (5a) asserts, then John couldn’t have done so, which is what (5b) asserts. Jackendoff’s (1972) rule of association of the negative with the focus gives the same result. Associating the negative with the focus in (3c) gives the assertion in (6):

(6) not John $\in \lambda x \text{Presupp}_S(x)$

which is clearly equivalent to the assertion in (5a).

Thus the synonymy of the sentences in (3) is accounted for, and, by extension, the synonymy of the sentences in (4). It remains to account for the synonymy of (3) with (1), and of (4) with (2). In showing the sentences of (3) to be synonymous, I showed that each question contained the same two foci (and, of course, the presuppositions were the same). But how can (1) and (3) be synonymous when each sentence in (3) contains two foci, but the sentences in (1) contain only one focus? This suggests that the sentences in (1) and (2) actually contain two foci on the semantic level, even though only one is syntactically present. This suggestion is not unreasonable, since the second-clause foci in (3) and (4) are in fact predictable - they are the converses of the first-clause foci. I will return to this question later.

The second type of yes/no question does not involve focus on a specific element. It is the truth of the whole
proposition which is being questioned, whereas in Type A questions it is only the choice of focal element that is being questioned, and the rest of the sentence is presupposed to be true. Type B questions differ in intonation from Type A questions, in that in a Type A question, the focus receives heavier stress than any element in a Type B question. Thus (2a) contrasts with (8a) in that Japan receives heavier stress in (2a) than in (8a). Was it Focus that... paraphrases are not really possible with Type B questions - the closest to such a paraphrase is Is it the case that...

(7) a. Did John eat the jam?
    b. Is it the case that John ate the jam?

(8) a. Did John go to Japan?
    b. Is it the case that John went to Japan?

Expanded versions of Type B questions again resemble alternative questions. In this case the second alternative is the negative of the first, with the element containing the negative receiving the heaviest stress:

(9) a. Did John eat the jam or didn't he (eat it)?
    b. Did John eat the jam or not?

(10) a. Did John go to Japan or didn't he (go to Japan)?
    b. Did John go to Japan or not?

In discussing the use of negative sentences, Givon (1978) states, "a felicitous discourse context for the negative is the previous mention of the corresponding affirmative, or alternatively the belief by the speaker that the hearer has heard of the possibility of that corresponding affirmative being true". A very similar condition seems to apply in the case of Type B questions. That is, a Type B question is asked only when the proposition being questioned has been mentioned, or is believed to be possible or likely.

In Type A questions, it is clear what the foci are. It is less clear in the case of Type B questions. However, notice that in the expanded versions (9a) and (10a), the element that receives the highest stress in the second clause is the element that contains the negative. Also, in (9b) and (10b), the second clause contains only not. These facts suggest that the foci in (9) and (10) are affirmative and negative. The presupposition is formed by substituting
an appropriate variable for the focus, and it seems that an appropriate variable will stand for a truth value. Thus the presuppositional function is $\text{xF}$, where $\text{F}$ is the propositional content of the question and $\text{x}$ is a variable ranging over affirmative and negative, or true and false.

Note that the non-focal part of a Type B question, the proposition $\text{F}$, is not presupposed to be true, since if that were the case, there would be no point in asking the question. In contrast, the non-focal part of a Type A question is presupposed to be true. For example, in (1), someone ate the jam - the only question is whether it was John or someone else who ate it. In this respect, Type A questions are like alternative questions. The rule of presupposition carrying apparently applies to all presuppositions derived by substituting a variable for the focus, whether the presuppositions are of truth or of prior mention or possibility. In the shorter version of (10a), for example, to Japan is necessarily present in the second clause semantically, but there is no syntactic reason that an empty node would have to be generated in that position. Hence the rule of presupposition carrying is necessary to guarantee the correct semantic interpretation of the question.

To demonstrate the operation of the presupposition carrying rule in a Type B question, consider (9b). Removing the first-clause focus gives the presuppositional function (11a), and then substituting the second-clause focus not for the variable $\text{x}$ gives (11b) as the propositional content of the second clause:

(11) a. $\text{x(John ate the jam)}$
   b. $\text{not(John ate the jam)}$

In this way the synonymy of (9b) with (9a) is accounted for, and similarly for the synonymy of (10a) and (10b).

As with Type A questions, the synonymy of single-clause Type B questions with the corresponding two-clause versions must also be accounted for; that is, the synonymy of (7) with (9) and (8) with (10) must be accounted for. The presuppositions are the same among the members of each set, but (7) and (8) appear to contain only one focus, affirmative or true, whereas (9) and (10) contain two foci. This
suggests that (7) and (8) both contain a second focus, negative or false, on the semantic level.

I have shown that considerations of synonymy suggest that single-clause yes/no questions of both Types A and B have a second focus, and hence a second clause, in semantic structure. I am certainly not the first to suggest that yes/no questions have two clauses on some level or other. In earlier works, such as Langacker (1970), it was claimed that yes/no questions derived from fully specified two-clause syntactic deep structures by means of deletion rules. However, a little thought shows that such an analysis suffers from the same basic problems as does the analysis involving empty nodes plus rules of coordination reduction. In any case, ignoring disagreements about the appropriate level for representing two full clauses, arguments in favour of two clauses have been of three basic types.

The first is that of synonymy between single-clause and two-clause yes/no questions. I have made the argument more precise by analysing questions in terms of presuppositions and foci. Bolinger (1978) attempts to invalidate the synonymy argument by presenting cases where single-clause and two-clause yes/no questions are not equally appropriate, or where they give rise to different indirect speech acts. But such examples do not show that the two questions are not synonymous, since synonymy is a semantic, not a pragmatic, matter. To make this point more clearly, consider a somewhat different case. The two questions Are you able to pass the salt? and Can you pass the salt? would seem to be excellent candidates for synonymous sentences, due to the apparent synonymy of can and be able, and yet on the pragmatic level, the second question very readily gives rise to an indirect speech act, namely that of a request, while the first question strongly resists such an interpretation. The fact that two synonymous sentences can have very different properties with respect to implicature is a pervasive problem in pragmatics. Bolinger's solution would presumably be to claim that if two sentences give rise to different implicatures then they must be non-synonymous. But this serves
merely to obscure the fact that implicatures may depend on both meaning and form, and as well it redefines the term "synonymous" to mean identical in use rather than identical in meaning. This is not the place to attempt to resolve this issue, but it does seem likely that the most useful and workable theory will be one which distinguishes semantics from pragmatics, literal meaning from implied meaning, and treats "synonymous" as meaning identical in literal meaning. Under such a theory, Bolinger's objections to the synonymy argument for the biclausal nature of yes/no questions are misdirected and invalid. Hence we may continue to regard the synonymy argument as valid.

A second argument for the biclausal nature of yes/no questions is Langacker's (1970) argument based on intonation. He argues that, except for single-clause yes/no questions, rising intonation invariably signals a mid-sentence break, whereas sentence-final position is signaled by falling intonation. This generalization could be made complete if superficial sentence-final position in single-clause yes/no questions corresponded to a sentence-internal break in underlying structure, providing, of course, that intonation is assigned before the deletion rules operate. In an interpretive model this precise solution is not available. However, if rising intonation was assigned to a first clause if there followed a second clause in semantic structure, then the same generalization could be captured.

A third indication that yes/no questions have two clauses is found in the morpheme which introduces these in indirect questions in English, whether. It seems fairly evident that whether is composed of wh plus either (and it is so treated in, for example, Katz and Postal (1964) and Lieberman (1967)). Either is clearly a positional variant of or (compare, for example, French ou...ou...), and it doesn't make sense to use or unless there are at least two alternatives. Hence the fact that or is part of whether provides further evidence that yes/no questions contain two alternatives.

A fourth argument to be added to these three runs as
follows. The claim that all yes/no questions have two clauses semantically should either be true universally or not at all. Accordingly, evidence for two clauses in a language other than English supports this proposed universal and therefore supports the analysis for English. Such evidence is found in Japanese, in which language all indirect yes/no questions must have two clauses syntactically present. This is demonstrated in the following examples (doo corresponds to the sentence pronoun soo as doko 'where' corresponds to soko 'there', dore 'which one' corresponds to sore 'that one', etc.):

(12) a. Nihon e itta ka, (nihon e) ikanakatta ka, Japan to go-past Q Japan to go-neg-past Q
know-neg
b. Nihon e itta ka, doo ka, wakarimasen.
c. *Nihon e itta ka, wakarimasen.
I don't know whether he went to Japan or not.

These four arguments establish the biclausal nature of the semantic representations of yes/no questions. The question now arises, how are these clauses to be filled out? The rule of presupposition carrying will carry the presupposition of the first clause over into the second, and so it only remains to fill in the focus and form the assertion of the second clause. This will be done by a rule which takes the converse of the first clause focus, or forms the converse of the first clause assertion. In the case of a Type A question like (1), where the first clause focus is John, this rule will form the equivalent assertions someone else $\in \lambda x \text{Presupp}_{S}(x)$, or John $\notin \lambda x \text{Presupp}_{S}(x)$, where $\lambda x \text{Presupp}_{S}(x)$ is the set of people under discussion who ate the jam. In a Type B question like (?), where the first-clause focus is true or affirmative, this rule will form the assertion false $\in \lambda x \text{Presupp}_{S}(x)$, which is equivalent to true $\notin \lambda x \text{Presupp}_{S}(x)$, where $\lambda x \text{Presupp}_{S}(x)$ is the (unit) set of truth values of the proposition John ate the jam.

In this section I have distinguished two types of yes/no questions, those with focus on a specific element of the sentence, and those with focus on the truth value of the
sentence as a whole. I added to the existing arguments for claiming that yes/no questions have a second clause in semantic structure, by making the synonymy argument more specific in terms of focus and presupposition, and by presenting some syntactic evidence from Japanese. The second clause is filled out by the rule of presupposition carrying plus a rule which forms the converse of the first-clause focus or assertion. Note that, as with alternative questions, everything I have said in this section about direct questions applies equally to indirect questions and to either/or statements.

2. The Questioning Aspects of Questions

The first problem concerns the syntactic structures of alternative and yes/no questions. Alternative questions have been little discussed in the literature, but I will discuss briefly a few attempts at describing yes/no questions.

Katz and Postal (1964) postulate an abstract Q morpheme in direct questions, which has a performative reading "I request that you tell me...", and serves to trigger subject-auxiliary inversion. As well, direct and indirect yes/no questions contain an initial adverb constituent which dominates the morphemes wh, either, and or:

(1) did John sleep (or not)

(2) 

```
Sentence
    | Q
    |    
    | Adverb
    |    | Nucleus
    |    | Theme
    |    |   |
    |    |   | NP
    |    |   | John
    |    |   | Aux
    |    |   | past
    |    |   | Main V
    |    |   | V
    |    |   | V
    |    |   | sleep
```

This analysis is unsatisfactory in many respects. First, wh+either+or is not an adverb. Second, either and or are positional variants of the same morpheme, so it seems odd to include them both in the same constituent - much like entering go and went under the same verb node. Third, or requires two alternatives, but only one is present here. Fourth, the above structure is meant to account for did John sleep or not, but there is no source for the not.
Fifth, Katz and Postal's Q morpheme is unsatisfactory for a number of reasons presented in Baker (1970).

Lieberman's (1967) analysis for question (1) would be as follows:

(3)

\[
\begin{aligned}
& S \\
& \quad \text{Main S} \\
& \quad \quad \text{Q} \\
& \quad \quad \quad \text{Adv} \\
& \quad \quad \quad \quad \text{wh} \\
& \quad \quad \quad \quad \text{either} \\
& \quad \quad \quad \quad \text{NP} \\
& \quad \quad \quad \quad \quad \text{John} \\
& \quad \quad \quad \quad \quad \text{past} \\
& \quad \quad \quad \quad \quad \text{V} \\
& \quad \quad \quad \quad \quad \text{sleep} \\
& \quad \quad \quad \quad \text{Adj} \\
& \quad \quad \quad \quad \text{Theme} \\
& \quad \quad \quad \quad \text{VP} \\
& \quad \quad \quad \quad \quad \text{neg} \\
& \quad \quad \quad \quad \quad \text{or} \\
& \quad \quad \quad \quad \quad \text{NP} \\
& \quad \quad \quad \quad \quad \quad \text{John} \\
& \quad \quad \quad \quad \quad \quad \text{past} \\
& \quad \quad \quad \quad \quad \quad \text{V} \\
& \quad \quad \quad \quad \quad \quad \text{sleep} \\
& \quad \text{Main S} \\
& \quad \text{S} \\
& \text{S} \\
& \# S \# \\
\end{aligned}
\]

Unlike Katz and Postal, Lieberman matches either and or with two clauses. However, he calls the sequences wh+either and neg+or adverbs, when it is clear that they are not. He also maintains Katz and Postal's Q morpheme. To make matters worse, he assigns Q only to the first clause, which is not only intuitively incorrect, but also means that his subject-auxiliary inversion transformation cannot operate in the second clause, so that he would produce (4a) instead of (4b):

(4) a. Did John sleep or John didn't sleep?  
b. Did John sleep or didn't John sleep?

Some of the confusion about the Q morpheme was cleared up by Baker (1970), who argued that both direct and indirect questions contain a clause-initial Q which has no performative content. Bresnan (1970) went one step further, arguing that a special Q node was unnecessary since WH is a complementizer and hence occurs in the sentence initial COMP position in both direct and indirect questions.

An explicit account of the semantics of questions is given in a Montague framework by Karttunen and Peters (1976) and Karttunen (1978). They propose that, syntactically, all questions are built up out of "proto-questions". To form a proto-question, the symbol Q is prefixed to a declarative clause, and the corresponding semantic rule represents the proto-question as a set of propositions. The set contains the proposition represented by the declarative clause if that proposition is true, and is the null set otherwise. Proto-questions can be combined with each other to provide the basis for alternative questions, in a way to be
discussed later. Although this analysis is attractive in many respects, it suffers from serious shortcomings. The syntactic rules are quite unsatisfactory, as Karttunen and Peters themselves note. An arbitrary symbol $?_1$ is required, comparable to Baker's (1970) Q morpheme, and so the analysis is ad hoc compared to Bresnan's (1970) analysis which avoided the use of arbitrary symbols. As well, a number of syntactic rules are required specifically for forming questions, whereas a less ad hoc analysis would involve more independently motivated rules. A further objection to a Montague system is that the rule of presupposition carrying developed in section 1.1, and shown to be necessary for the semantic interpretation of alternative and yes/no questions, cannot be expressed in a Montague grammar. This is because, in a Montague grammar, the syntactic and semantic rules are in a 1-to-1 correspondance. For every syntactic rule that combines two elements of categories A and B to form an element of category C, there is a corresponding semantic rule which provides a semantic interpretation for the element of category C in terms of the semantic representations of the elements of categories A and B. For example, the semantic representation of a sentence is expressed in terms of the semantic representations of its major components, say NP and VP. But the rule of presupposition carrying cannot be expressed in this form. There is no syntactic rule which corresponds to it, nor does it operate in terms of the categories of a Montague grammar. Such a rule is expressible only in an interpretive framework.

The analysis I present here will therefore be an interpretive one. My aim is to avoid arbitrary symbols, like $?_1$ and Q, to avoid unmotivated category assignments, and to use only independently motivated rules in so far as possible. I want to provide a uniform account of alternative and yes/no, direct and indirect, questions. Finally, I want to incorporate the basic insights of Karttunen and Peters' semantic analysis, such as representing questions by sets of propositions, into the interpretive framework.

The necessary base rules, aside from regular rules for
expanding \( S \), are the following, all of which are independently necessary (the latter two were first proposed in Bresnan (1970):

\[
\begin{align*}
S & \rightarrow \{\text{and}\} \ S^* \\
S & \rightarrow \text{COMP} \ S \\
\text{COMP} & \rightarrow \{\text{that}\} \\
& \quad \{\text{for}\} \\
& \quad \{\text{WH}\}
\end{align*}
\]

These rules generate the structure (6), which I claim is the underlying structure for all alternative and yes/no, direct and indirect, questions (although, of course, alternative questions may contain more than two clauses, and indirect questions are embedded in a higher clause):

\[
\begin{tikzpicture}
  \node (S0) at (0,0) {\( S_0 \)};
  \node (S1) at (-1,-1) {\( S_1 \)};
  \node (S2) at (1,-1) {\( S_2 \)};
  \node (COMP) at (0,-2) {\text{COMP}};
  \node (WH) at (0,-3) {\text{WH}};
  \draw[->] (S0) -- (S1);
  \draw[->] (S0) -- (S2);
  \draw[->] (COMP) -- (S1);
  \draw[->] (COMP) -- (S2);
\end{tikzpicture}
\]

The difference between direct and indirect questions is simply whether or not the structure (6) is an (underlying) main or embedded clause. The difference between alternative and yes/no questions depends on the relation of the \( S \) clauses. If they are interpreted as meaning the same thing except for the presence of a negative in the second clause, then (6) represents a yes/no question; if they differ in more than the presence of a negative, then (6) represents an alternative question. The second \( S \) need not be fully specified, of course, and in fact it may be entirely empty, as in a single-clause yes/no question. The interpretive rules discussed in section I will fill out the semantic representation of the second clause.

A number of minor rules are required to derive the surface structure. Conjunction copying inserts \text{or} between the two (or more) clauses. Initial \text{or} becomes \text{either}, and then \text{either} combines with the \text{WH} in \text{COMP} to give \text{whether}. Conjunction copying must be constrained not to copy a conjunction before a lexically unfilled \( S \), or else a deletion rule is needed to eliminate conjunctions in such a position. Note that the only syntactic rule in this analysis which is not independently motivated and necessary for sentences other
than questions, is that which writes either *WH* as *whether*. Note that this analysis depends on the fact that single-clause yes/no questions have two clauses in semantic structure, because the rewriting of *WH* as *whether* depends on the presence of *or*, and *or* requires there to be at least two clauses on the semantic level.

I turn now to a consideration of the semantic rules; specifically, to the question of how to incorporate Karttunen and Peters' insights into an interpretative framework. The first step is to note that the structure (7)

(7)

\[
\text{COMP} \quad \overrightarrow{\text{S}} \quad \text{WH}
\]

corresponds directly to Karttunen and Peters' proto-question, which had the form ?S. Accordingly, the semantic rules will interpret structures of the form (7) as sets of propositions. Where P is the proposition represented by S, (7) means \{P\} if P is true, and \emptyset otherwise. Karttunen and Peters combined proto-questions ?S₁ and ?S₂ to form a single constituent ?S₁?S₂. Under the analysis proposed here, this complex proto-question corresponds to the structure (6), and so the meaning of (6) will be represented along the lines suggested by Karttunen and Peters for ?S₁?S₂. This is, (6) will be interpreted as the set which is the union of the sets represented by the S₁ and S₂ nodes.

There are four possibilities, where P₁ and P₂ are the propositions represented by S₁ and S₂ respectively:

(8) \[
\begin{align*}
\{P₁\} & \quad \text{if } P₁ \text{ is true and } P₂ \text{ is false} \\
\{P₂\} & \quad \text{if } P₂ \text{ is true and } P₁ \text{ is false} \\
\{P₁, P₂\} & \quad \text{if } P₁, P₂ \text{ are both true} \\
\emptyset & \quad \text{if } P₁, P₂ \text{ are both false}
\end{align*}
\]

As an example, consider the Type B yes/no question (9):

(9) Does John eat beans?

The rules discussed in the first section tell us (10):

(10) \[
\begin{align*}
P₁ &= \text{John eats beans} \\
P₂ &= \neg\text{neg(John eats beans)}
\end{align*}
\]

and so theoretically the representation of the question is as in (8) with the values given in (10) for P₁ and P₂. But note that P₁ is true iff P₂ is false and vice versa, so that, logically, P₁ and P₂ cannot both be either true or false.
Hence the representation of the question (9) reduces to (11):

(11) \{P_1\} if \(P_1\) is true
     \{P_2\} if \(P_2\) is true

That is, (9) means \{John eats beans\} if John eats beans, and \{neg(John eats beans)\} if he doesn't.

At this point, I tentatively suggest a departure from Karttunen and Peters' analysis. If we use the assertions made by the two clauses \(S_1\) and \(S_2\) rather than the propositions they represent, then Type A and Type B questions can be distinguished. For example, suppose (9) is a Type B question. Then the assertions made by the two clauses \(S_1\) and \(S_2\) are as follows:

(12) \(S_1: \ true \in \lambda x\text{Presupps}(x)\)
     \(S_2: \ false \in \lambda x\text{Presupps}(x)\)

where \(\lambda x\text{Presupps}(x)\) is the (unit) set of truth values of the proposition \(\text{John eats beans}\). The representation of the question as a whole is (13):

(13) \{\text{true} \in \lambda x\text{Presupps}(x)\} if \(P_1\) is true
     \{\text{false} \in \lambda x\text{Presupps}(x)\} if \(P_2\) is true

Suppose now that (9) is a Type A question. Then the assertions made by \(S_1\) and \(S_2\) are as follows:

(14) \(S_1: \ \text{John} \in \lambda x\text{Presupps}(x)\)
     \(S_2: \ \text{John} \notin \lambda x\text{Presupps}(x)\)

where \(\lambda x\text{Presupps}(x)\) represents the set of people who are under consideration who eat beans. Accordingly, the representation of the question as a whole is (15):

(15) \{\text{John} \in \lambda x\text{Presupps}(x)\} if \(P_1\) is true
     \{\text{John} \notin \lambda x\text{Presupps}(x)\} if \(P_2\) is true

Thus using sets of assertions rather than sets of propositions allows Type A and Type B questions to be given distinct semantic representations.

Consider now an alternative question like (16):

(16) Does John eat beans or peas?

The rules of section 1 will determine the assertions made by \(S_1\) and \(S_2\) as follows:

(17) \(S_1: \ \text{beans} \in \lambda x\text{Presupps}(x)\)
     \(S_2: \ \text{peas} \in \lambda x\text{Presupps}(x)\)

where \(\lambda x\text{Presupps}(x)\) is the set of things under discussion that John eats. The representation of the question (16) will therefore be (18):


(18) \{\text{beans} \in \lambda x \text{Presupp}_S(x)\} \quad \text{if John eats beans, not peas}
\{\text{peas} \in \lambda x \text{Presupp}_S(x)\} \quad \text{if John eats peas, not beans}
\{\text{beans, peas} \in \lambda x \text{Presupp}_S(x)\} \quad \text{if John eats both}
\emptyset \quad \text{if John eats neither}

In the case of alternative questions, unlike yes/no questions, all four theoretical possibilities are logically possible. But when an alternative question is uttered, the speaker normally believes that one and only one of the alternatives he is presenting is true. To ignore this fact and leave all four possibilities listed in (18) on an equal footing is to miss an important characteristic of alternative questions. Karttunen and Peters say that it is not presupposed that only the first two theoretical possibilities are actually possible, since if the latter ones happen to be true, the question is still answerable, as follows:

(19) a. Actually, he eats both.
b. Actually, he eats neither.

They claim that, instead, a conventional implicature is associated with the direct or indirect question, which says that the speaker believes that the question represents a unit set.

What I have said concerning the incorporation of Karttunen and Peters' insights into an interpretive framework has been both sketchy and informal. Nevertheless, it is suggestive for future research in that it proposes grafting some of the explicit semantics of Montague grammar onto the rich syntax of the Extended Standard Theory, rather than working within Montague grammar to try to improve its impoverished syntax. This approach seems more fruitful, not only from the syntactic point of view, but also from the semantic, since the fact that the rule of presupposition carrying cannot be expressed in a Montague framework shows that Montague semantics by itself is inadequate.

The final question to be considered is how the meaning difference between direct and indirect questions is to be accounted for. Question clauses cannot have truth values, so that a representation as sets of propositions is appropriate. However, an indirect question does represent a proposition and does have a truth value. The sentence as
a whole states that the relation expressed by the verb holds between the subject and the embedded clause. For example,

(20) Mary doesn't know whether John eats peas or beans. states that the relation of not knowing holds between Mary and the set which represents the meaning of the embedded clause; that is, Mary does not know whether the clause represents \{peas ∈ \lambda x \text{Presupp}_s(x)\} or \{beans ∈ \lambda x \text{Presupp}_s(x)\}. This clearly has a truth value - either Mary knows which set the embedded clause represents, or she doesn't.

In a direct question, however, there is no higher clause, so there is no way to incorporate the question clause into a statement with a truth value. Hence when there is no higher clause, the question clause is interpreted as a request by the speaker to be told which of the possible sets the question actually represents. There is no need for a performative Q morpheme like Katz and Postal's, or for a higher clause I request that you tell me... in deep structure, since the performative aspects of a direct question are predictable on the basis of deep structure without any of these artificial constructs.

Footnotes

1. The material in section 1.1 was presented at the 1979 LSA Winter Meeting in Los Angeles, and a preliminary version of the whole paper was presented to the Toronto Linguistics Atelier in January 1980. I would like to thank E. A. Cowper for much helpful discussion of the issues, and J. K. Chambers and Craig Hoffman for their comments on an earlier draft of section 1.1. The research was supported by the Social Sciences and Humanities Research Council of Canada.

Bibliography


