THE NATURE OF CHINESE WH-QUESTIONS*

The scope properties of Chinese Wh-elements, which are in situ in the syntax, are usually accounted for by assuming that they are raised at LF as operators. Not only does such an account rely on costly stipulations but it also fails to generalize to Wh-elements which are not XPs. The proposal here is that Wh-elements be treated as variables bound by a QUESTION (Q) operator which assigns scope to the Wh-elements in its domain. The Q operator can be attached to a verb and realized as the A-not-A form of the verb when there is no Wh-element in its domain. The Q operator, including the one realized as the A-not-A verb form, is raised at LF to satisfy selectional restrictions and its movement is regulated by the standard constraints. The scope properties of Wh-elements and the distribution of A-not-A verbs are accounted for within the current theoretical framework without further stipulation.

0. INTRODUCTION

It is well known that Wh-elements in Chinese questions remain in situ in the syntax and yet display scope properties that do not correspond to their S-structure positions. Huang (1982a) points out that the scope of Chinese Wh-elements is affected by the selectional restrictions of certain verbs, as is the case with Wh-elements in English (Katz and Postal 1964, Baker 1970). The following sentences (from Huang 1982b, p. 254), for example, differ from one another only in the choice of matrix verb. The Wh-phrase *shei* 'who' in the complement clauses of these verbs has distinct scope as a result.[1]

(1) Zhangsan wen wo [shei mai le shu].
Zhangsan ask me who buy ASP book
Zhangsan asked me who bought books.

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[1] The following symbols are used in this paper:

ASP	aspect marker
BEI	a morpheme that is either a preposition or passive marker
CL	classifier
DE	a morpheme functioning as complementizer and NP modifier marker
PART	particle
POSS	possessive marker
QUES	question marker

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(2) Zhangsan xiangxin [shei mai le shu]?
Zhangsan believe who buy ASP *book*
Who does Zhangsan believe bought books?

(3) Zhangsan zhidao [shei mai le shu].
Zhangsan know who buy ASP book
i. Who does Zhangsan know bought books?
ii. Zhangsan knows who bought books.

The verb *wen* 'ask' in (1) is a [+WH] verb (Bresnan 1972) and requires an interrogative complement. *Xiangxin* 'believe' in (2) is a [−WH] verb which cannot take an indirect question as its complement. *Zhidao* 'know' in (3) can take either a declarative or an interrogative complement. The difference in the selectional restrictions of the matrix verbs is reflected in the scope of the Wh-phrase in the embedded clauses. The sentence in (1) can only be interpreted as a statement, (2) can only be a direct question and (3) can be either a question or a statement.

The by now standard explanation for this phenomenon is that the Wh-elements are raised at LF to the SPECIFIER (Spec) of CP so that they take scope over the relevant CP, just like overtly moved English Wh-elements do. Such an analysis captures the similarity between moved Wh-elements and WH in situ, but it also raises several serious problems. This paper is an attempt to provide an alternative analysis which keeps the insight of the raising analysis but avoids its problems.

1. WH Elements as Quantifiers

The analysis in which a WH in situ is raised at LF stems from a proposal made by Chomsky (1976). He argues that a Wh-phrase can be treated as a quantifier (operator) and that its interpretation is determined at a level of LOGICAL FORM (LF) in which the Wh-phrase is raised to a sentence-initial position and binds a variable in its original position.

The assumption that Wh-elements are operators has been adopted and developed in many works on Wh-questions and Wh-phrases. One of the first works to apply it within the Government and Binding Theory framework is that of Huang (1982b). Assuming that the mapping from S-structure to LF operates on the same principles that regulate the mapping from D-structure to S-structure, he argues that the correct interpretation for a WH in situ is obtained at the level of LF by raising it to the appropriate COMP (cf. Aoun, Hornstein and Sportiche 1980). In his

system, the logical form of Chomsky (1976) is derived via a process identical to Wh-movement in the syntax. The driving force for the LF raising is the selectional restrictions of complement-taking verbs. A verb like *wen* 'ask' in (1) requires a [+WH] COMP for its complement clause, while *xiangxin* 'believe' of (2) requires a [−WH] COMP. In languages like English, the selectional restrictions are satisfied in the syntax but in languages like Chinese, the same restrictions are satisfied at LF. He thus reduces the typological difference between English and Chinese to the level at which selectional restrictions are satisfied.

The LF raising of Wh-elements is assumed to be an instance of move-α which can move the Wh-elements to any position, subject to the constraints of various modules of the grammar. An exception is that some constraints on overt Wh-movement seem irrelevant to the LF raising of a Wh-element.

The Wh-phrase *shei* 'who' in (4) below, for example, is located inside a complex NP. In the syntax, such an element cannot be extracted from the relative clause. However, since (4) receives a direct question interpretation, *shei* 'who' must be assumed to raise out of the island at LF. In (5), a Wh-phrase is inside an adjunct adverbial clause. It is assumed to be raised to the matrix COMP at LF, but extraction from this position in the syntax is prohibited by the CONDITION ON EXTRACTION DOMAIN (CED) (Huang 1982b, p. 505). Huang's (1982b) solution to these problems is to assume that the Subjacency Condition and the CED apply only in the syntax and not at LF.

(4) Ni zui xihuan [[shei xie] de shu] ne?
you most like who write DE book QUES
You like the most the book who wrote?[2]

(5) Lisi yinwei [shei mei lai] bu goaxing ne?
Lisi because shei not come not happy QUES
Lisi is unhappy because who did not come?

There is no independent motivation for assuming that the Subjacency Condition and the CED, which is subsumed under the Subjacency Condition in Chomsky (1986), do not apply at LF. To circumvent this stipulation, Choe (1987) suggests that in cases like (4) and (5), it is the complex NP or the adjunct clause that is raised at LF. The WH in situ is pied-

[2] The English glosses for Chinese Wh-questions are direct translations. They are not always grammatical in English.

piped to COMP together with the subordinate clause and is not involved in further movement. No Subjacency violation occurs.

Fiengo et al. (1988) take Choe's analysis one step further to avoid complications with respect to superiority effects (cf. Huang 1982b, Chomsky 1981). Assuming that the Subjacency Condition holds at LF, they adopt the stipulation from Chomsky (1986) that an element will lose its barrierhood if it is an A′-binder. It is thus possible for the WH in situ to be pied-piped together with the island to adjoin to the matrix IP. The island, having become an A′-binder, loses its barrierhood, and the Wh-element can be raised out of it to the Spec of CP without crossing any barrier, i.e., without a Subjacency violation.

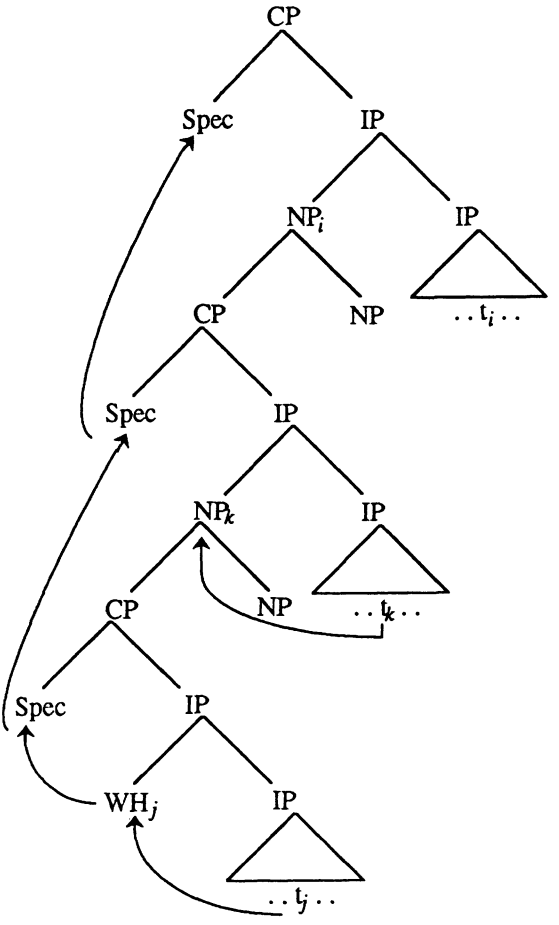
This analysis has its own share of problems. One obvious obstacle involves Wh-elements in complex NPs that are inside other complex NPs. As shown in (6), such a Wh-phrase can have matrix scope even though it is separated from the Spec of the matrix CP by two islands.

(6) Ni renshi [$_{NP}$ [t_i zhuadao [$_{NP}$ [t_k sha shei] de
you know *catch* *kill who DE*
xiongshou$_k$]] de neige jingcha$_i$] *ne*?
murderer *DE that CL policeman QUES*
You know the policeman that caught the murderer that killed whom?

It is not clear with which complex NP the Wh-phrase in (6) should be pied-piped. If it is pied-piped with the inner complex NP, the raising has to cross the outer complex NP and will violate the Subjacency Condition. If the whole outer complex NP is raised first, it will be a step-by-step raising. The outer complex NP is adjoined to the matrix IP first, and the inner complex NP is then raised to adjoin to the IP of the outer relative clause. The Wh-phrase is finally raised to adjoin to the IP of the inner relative clause. The result of this step-by-step raising is the configuration in (7). The next step is for the Wh-phrase to move to the Spec of the matrix CP. However, there are two CP nodes on its path, which are not L-marked and are thus barriers (Chomsky 1986). The raising of the complex NPs does not void the barrierhood of these CPs. No matter whether the Wh-phrase crosses the two barriers in one step or crosses them one by one, given the assumption that the Subjacency effect is cumulative (Chomsky 1986, p. 38), a violation of the Subjacency Condition will

occur.[3] It seems that the Subjacency Requirement cannot be circumvented in all cases, and thus the stipulation that the Subjacency Condition applies only in the syntax has to be retained to sustain the LF raising analysis of Wh-elements.

(7)



Another problematic issue facing the LF raising analysis concerns the categorial status of Wh-elements. A standard assumption in generative

[3] There are other possible routes for raising the two complex NPs. One possibility is for the outer complex NP to adjoin to the matrix IP first, and then for the inner complex NP to adjoin to the outer NP node, given the assumption of Fiengo et al. (1988) that an NP in an A′-position is no longer a barrier and can be an adjunction site. The Wh-word is finally moved out of the raised inner NP to the Spec of matrix CP. However, at least one barrier (CP) is crossed by each of those movements, and a violation of the Subjacency Condition will still occur, given the cumulative effect of barrier-crosslng.

grammar is that A′-movement affects only maximal projections (e.g., Dobrovie-Sorin 1990) and that X^0 items can only be involved in head-to-head movement (cf. Chomsky 1986). An implicit assumption in the LF raising analysis is that all Chinese Wh-elements are maximal projections and thus may undergo A′-movement. This is, however, not a correct generalization. Some Chinese Wh-elements seem to have a status of less than X^{max}, namely, that of X^0 or X′.

The object in (8), for example, is a genitive NP with a Wh-element *shenmo* 'what' as the possessed and a pronoun as the possessor. A common analysis is to treat the possessor and the possessed as sisters under the NP node (cf. Huang 1982b). In the DP analysis, the possessor is generated under the Spec of NP and the possessed is dominated by the N′ node (Tang 1990, cf. Abney 1987). It is not clear whether the N' branches further so that the possessed will be under the N node, but it is obvious that the possessed does not have the status of an NP.

(8) Ta tou le nide shenmo ne?
he steal ASP your what QUES
He stole your what?

The complex NP in (9) has a Wh-element *shenmo* 'what' as its head. Although the status of the head of a complex NP is not clear, at least in some analyses it is considered as the head noun (cf. Chomsky 1986), namely, an N^0.

(9) Ni maile yiben [[Lisi xie] de shenmo] ne?
you buy-ASP one-CL Lisi write DE what QUES
You bought a copy of what that Lisi wrote?

The status of Wh-predicates seems to be clearer. In addition to taking the place of an intransitive verb as predicate, the Chinese Wh-element *zenmo* 'how' can replace a transitive verb and take a direct object. In the question in (10), for example, *zenmo* 'how' takes a pronoun *ni* 'you' as direct object. The same Wh-element takes a *BA* phrase in (11). It is generally agreed that the NP in a *BA* phrase is the direct object (e.g., Huang 1982b, Li 1985), so that *zenmo* 'how' here is also a transitive verb, i.e., a V^0.

(10) Wo zenmo ni le?
I how you PART
What did I do to you?

(11) Shei ba Lisi zenmo le ne?
who BA Lisi how ASP QUES
Who did what to Lisi?

Apart from the obvious problem of accounting for how a zero level Wh-element is raised at LF, the existence of Wh-heads poses another interesting problem. A Wh-head can take another Wh-element as its complement or specifier. This type of complex Wh-phrase can sometimes have split scope. Consider the sentence in (12a). It allows two direct question readings, with either *shenmo* 'what' or *sheide* 'whose' having the matrix reading, and takes either (12b) or (12c) as an appropriate answer.[4]

(12)a. Ni xiangzhidao ta xihuan sheide shenmo?
you wonder he like whose what

i. What is the thing x such that you wonder whose x he likes?
ii. Who is the person y such that you wonder what of y's he likes?

b. Wo xiangzhidao ta xihuan sheide xiaoshuo.
I wonder he like whose novel
I wonder whose novel he likes.

c. Wo xiangzhidao ta xihuan Cao Yu de shenmo.
I wonder he like Cao Yu DE what
I wonder what of Cao Yu's he likes.

Under the LF raising analysis, the interpretation (12ai) means that at LF the head of the embedded object NP is raised to the Spec of the matrix CP while its specifier is raised to the Spec of the embedded CP. The reading (12aii) entails an LF configuration in which the specifier of the embedded object NP is raised to the Spec of the matrix CP and the head is raised to the Spec of the embedded CP. The analysis of the question in (13a) is similar: either the head of the embedded VP or its complement can have matrix scope.

(13)a. Ta wen ni Lisi ba shei zenmo le?
he ask you Lisi BA who how ASP

i. What is the action x such that he asked you to who Lisi did x?

[4] The Wh-element with matrix scope is usually stressed, while the one with embedded scope is not. By stressing one (or several) of the Wh-elements, the speaker indicates which Wh-element(s) he is seeking new information about. The stressed Wh-element is thus the one with the matrix direct question reading (cf. Chafe 1976).

ii. Who is the person *y* such that he asked you what Lisi did to *y*?

b. Ta wen wo Lisi ba shei sha le.
he ask me Lisi BA who kill ASP
He asked me who Lisi killed.

c. Ta wen wo Lisi ba Zhangsan zenmo le.
he ask me Lisi BA Zhangsan how ASP
He asked me what Lisi did to Zhangsan.

It is not too hard to design a possible derivation for the LF representation of (12aii) or (13aii), in which the specifier of NP or the complement of the VP has matrix scope. Given the framework of Fiengo et al. (1988) (cf. Chomsky 1986), it is possible to raise the entire embedded (WH) object NP in (12a) to the Spec of the embedded CP first, and then raise its specifier to the Spec of the matrix CP. Each step involves only one maximal projection and no barrier is crossed in either movement.

What is problematic is the LF representation of (12ai) or (13ai), where the head of an NP or VP has matrix scope. Within the current theoretical framework, it is not possible for an X^0 element to undergo A′-movement to a position for an X^{max}, given the Head Movement Constraint of Chomsky (1986, p. 71). A derivation in which the entire embedded (WH) object NP of (12a) is raised to the Spec of the embedded CP and then the Wh-head is raised to the Spec of the matrix CP is therefore illicit. The same constraint also prohibits any attempt to raise the head and the specifier of the embedded (WH) object NP separately. The ECP requirement that every trace be properly governed renders impossible a derivation in which the entire embedded object is raised to the Spec of the matrix CP first and the specifier is then lowered to the Spec of the embedded CP. There seems to be no legitimate way to derive the representation for (12ai), nor for (13ai), under the LF raising analysis.

Dialectal differences among native speakers raise further problems. An important motivation for the raising analysis is to account for the argument/adjunct asymmetry among Chinese Wh-elements. Huang (1982b) notes a distinction between the scope-taking properties of argument Wh-elements like *shei* 'who' or *shenmo* 'what' and those of adjunct Wh-elements like *zenmo* 'how' or *weishenmo* 'why'. He claims that the different status of such elements is responsible for the contrast between (14a) and (14b):

(14)a. Ni xiangzhidao [shei mai le shenmo]?
you wonder who buy AAS what

i. What is the thing x such that you wonder who bought x?
ii. Who is the person x such that you wonder what x bought?

b. Ni xiangzhidao [shei weishenmo mai shu]?
you wonder who why buy book

Who is the person x such that you wonder why x bought books?

According to Huang (1982b), the question in (14a) allows two readings with either *shei* 'who' or *shenmo* 'what' having matrix scope. The one in (14b), on the other hand, only permits one interpretation, that in which *shei* 'who' takes matrix scope, and disallows the reading in which *weishenmo* 'why' takes matrix scope. His explanation for this contrast is that traces left by LF raising of Wh-elements must be properly governed in order to satisfy the ECP. Since an object NP is lexically governed by the verb and a subject NP is governed by INFL, which Huang assumes to be lexical in Chinese,[5] the trace left by the raised *shei* 'who' or *shenmo* 'what' in (14a) would satisfy the ECP requirement. Either Wh-element can thus take matrix scope even though it is moved out of a Wh-island at LF. The Wh-element *weishenmo* 'why' is an adjunct which is not governed by the verb or by INFL. When it is raised, its trace has to be antecedent-governed. In the configuration of (14b), such a trace can be antecedent-governed only from the embedded COMP, but not from the matrix COMP. *Weishenmo* 'why' in (14b) can thus take only embedded scope, though the subject NP *shei* 'who' of the same clause can take matrix scope. A similar account is given for the two questions in (15).

(15)a. [$_{NP}$[Shei chu] de shigu] zui yanzhong ne?
who have DE accident most serious QUES

The accident that who had is the most serious?

b. *[$_{NP}$[Ta zenmo chu] de shigu] zui yanzhong?
he how have DE accident most serious

The accident that he had how is the most serious?

Within Huang's framework, the Wh-phrase *zenmo* 'how' in (15b) must undergo raising at LF to get matrix scope, but the closest COMP, that of

[5] INFL in Chinese is assumed to be nonlexical in this analysis. See note 15 for further discussion.

the relative clause, is not available for it to move through. It must move in one step to the matrix COMP. From that position it cannot antecedent-govern its trace and, being an adjunct, its trace is not lexically governed, either. The direct question reading of (15b) is thus ruled out by the ECP.[6] When the Wh-phrase *shei* 'who' of (15a) is raised at LF, its trace is governed by INFL and satisfies the ECP. The direct question in (15a) is therefore grammatical.

A problem encountered by this approach to LF argument/adjunct asymmetry is that native speakers' judgments are not consistent. Apart from the argument/adjunct asymmetry of Huang (1982b), Lin (1989) perceives an asymmetry between the adjuncts, i.e., between *zenmo(yang)* 'how' and *weishenmo* 'why'. According to his judgment, *zenmo(yang)* 'how' can be raised freely at LF, but the raising of *weishenmo* 'why' obeys some locality constraint. Xu (1990) reports similar judgments. Tsai (1990) claims that there is an asymmetry between different interpretations of the same adjunct. The Wh-phrase *zenmo(yang)* 'how' can be raised freely at LF when it is interpreted as a manner adverb. The LF raising of the same Wh-phrase is constrained when it has an instrumental reading. Similarly, there is an asymmetry between causal *weishenmo* 'why' and purposive *weishenmo* 'for what'. The former is restricted in its LF raising but the latter is not.

To a large number of native speakers, including myself, there is no argument/adjunct asymmetry at all. The contrast between (14a) and (14b), as well as that between (15a) and (15b), simply does not exist. Either Wh-phrase in (14b) can have matrix scope, and the direct question in (15b) is grammatical.

According to our judgments, an adjunct Wh-element behaves the same as an argument Wh-element with respect to scope in direct questions. The question in (16a), for example, asks about the pairing of a set of individuals and a set of reasons. It will take as an appropriate answer a statement like (16b). Similarly, the question in (17a) is about the pairing of certain entities that have been stolen and different manners in which the theft was carried out, and takes (17b) as an answer. The question in (18) has an adjunct Wh-element in its sentential subject and is grammatical despite the predicted ECP violation (cf. Huang 1982b).

[6] The sentence in (15b) does not allow a noninterrogative reading. It is not acceptable at all according to Huang (1982b).

(16)a. Shei weishenmo mei lai ne?
who why not come QUES
Who did not come why?

b. Zhangsan *Lisi* yinwei tai mang mei lai; Lisi yinwei
Zhangsan Lisi because too busy not come Lisi because
shengbing mei lai.
be sick not come
Zhangsan did not come because he was too busy; Lisi did not come because he was sick.

(17)a. Lisi zenmoyang tou le shenmo?
Lisi how steal ASP what
How did Lisi steal what?

b. Lisi gongkaide tou le qiche, qiaoqiaode
Lisi openly steal ASP car quietly
tou le qian.
steal ASP money
Lisi stole a car openly; (and) stole money quietly.

(18) [Women zenyang jiedai keren] zui heshi ne?
we how receive guest most appropriate QUES
It is most appropriate for us to receive guests how?

The analysis in which Wh-words are raised at LF can only partially account for the behavior of Chinese Wh-words and relies on costly stipulations. Although such an account is compatible with Huang's (1982b) judgment on the extractability of Wh-words, it makes the wrong predictions about the judgments of other speakers. Since so many speakers have contrary judgments, it is worthwhile to pursue an account for this other dialect and seek an alternative analysis.

2. Wh-Elements as Variables

The alternative to the LF raising analysis explored here is to depart from the common assumption that the predicate logic representation of the scope of Wh-elements should be associated with a parallel structural configuration at LF. In this account the derivation of the LF representations

of Wh-questions does not parallel syntactic Wh-movement. The basis of this approach is to treat Wh-elements as variables, not as operators. In order to account for the scope properties of Wh-elements, I adopt an analysis by Baker (1970) (cf. Katz and Postal 1964) and developed by Aoun and Li (1990), in which each question, whether direct or indirect, is generated with a QUESTION (Q) morpheme under its INFL node.[7] Q morphemes function as operators and bind Wh-elements. The scope of a given Wh-element is determined by the Q morpheme which binds it. If a Wh-element is bound by a matrix Q, it has matrix scope, i.e., a direct question interpretation. If it is bound by an embedded Q, it is interpreted as having embedded scope, i.e., an embedded indirect question reading.

This assumption requires an alternative account of the way the selectional restrictions of verbs are satisfied. It is usually assumed, following Chomsky and Lasnik (1977) (cf. Bresnan 1970), that the Spec of CP (COMP) has the feature values [±WH], indicating whether the clause is a question or not. The selectional restriction of a given verb is satisfied when the Spec of its complement CP has the correct [WH] feature value, and is either filled with a [+WH] element or left empty at the relevant stage of derivation (Lasnik and Saito 1984). Under the assumption adopted here, the relevant selectional restriction of a verb is satisfied when its complement clause has the correct [Q] feature value. A clause (CP) is [+Q] if a Q morpheme appears under its C node at the relevant stage. The relevant selectional restriction is now understood as the relationship between a verb and the head of its complement clause. This is consistent with the standard assumption of X′ theory, that the categorial status of a maximal projection is determined by its head, not its specifier (Chomsky 1981).

Since the Q morpheme is assumed to be generated under INFL, it is necessary to assume that Q can be raised to the C node at some stage to provide the [+Q] feature for the CP and to satisfy the selectional restriction of the verb. Given this assumption, it is possible for the Q morpheme to be generated under the INFL node of any IP and then be raised to the relevant C node. Constraints on such movement thus determine the distribution of the Q morpheme. The details of this head-to-head movement will be discussed in section 3.

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[7] Whether the INFL node should be factored into several functional nodes will not be our concern and is of no direct consequence to the issues discussed here.

Whether Q should be generated under a C node will not be discussed here and has no significant theoretical consequence for this analysis. There are certain technical advantages to assuming that Q is generated under C, but also some disadvantages with regard to the analysis of A-not-A questions.

An underlying assumption here is that a Wh-element in Chinese has to be licensed by a Q morpheme in order to function as an interrogative. This captures the fact that the Wh-words/phrases *shenmo* 'what', *shei* 'who', *nali* 'where', *zenmo* 'how' and so on do not always function as question words and can be assigned different interpretations by other operators. For instance, they can be interpreted as negative polarity items when they fall under the domain of a negative morpheme (Progovac 1988, cf. Ladusaw 1979, Linebarger 1981). They can also yield interpretations equivalent to that of universal quantifiers when they are within the domain of the morpheme *dou* 'all' (Lee 1986). It is reasonable, then, to assume that they function as Wh-words only when they are licensed by a Q morpheme.[8]

Following Aoun and Li (1990), the relationship between a Q morpheme and a Wh-element is assumed to be that of binding.[9] Following Baker (1970), it is assumed that a Q morpheme can license any number of Wh-elements as long as they are in its domain, namely, c-commanded by it.[10] The relation between a bindee and its antecedent is not affected by the distance within their binding domain. Barriers thus play no role in the relation between a Q morpheme and a Wh-element (cf. Chomsky 1981,

[8] In a sense, Chinese Wh-elements, used as interrogatives, may be considered as Q polarity items that must be licensed by a separate morpheme. In this respect, they resemble the negative polarity items, which are not independent but have to be licensed by another element such as negation (Ladusaw 1979, Linebarger 1981).

[9] The binding relation between a Q morpheme and the Wh-element in its domain can be characterized in terms of the generalized binding framework of Aoun (1986) and Aoun et al. (1987). The Wh-element can be considered as an A′-anaphor that has to be bound by an A′-antecedent within a certain domain. Notice that a Chinese Wh-element is not necessarily a maximal projection. This is compatible with the generalized binding system, in which an A′-anaphor can be an X^{max}, an X′ or an X^0.

In that system, the domain in which the Wh-element has to be bound, i.e., the governing category, is defined in terms of a SUBJECT accessible to the anaphor. Given the assumption that such A′-anaphors are subject to the Binding Principle C as well (i.e., they have to be A-free in the domain of their operators), Wh-element does not have an accessible SUBJECT and has to take the root clause, where its operator is located, as the governing category (cf. Chomsky 1981, 1985). In other words, a Wh-element can be bound either in the matrix clause or in an embedded indirect question, where a Q is located.

[10] In Baker's (1970) framework, a Q operator has two or more indices when it binds the same number of Wh-elements. In many recent works, it is assumed that each operator has one index and binds one variable only (e.g., Koopman and Sportiche 1982, Chomsky 1986). The assumption underlying the analysis here is that a Q operator has only one index. When it binds two or more Wh-elements, it binds them as a group. The concept of group licensing is compatible with the semantic content of multiple Wh-questions. The speaker asking such a question is interested in the choice of identity for every member of the Wh group, not that of any individual Wh-element (cf. Chafe 1976, see also the discussion of example (16)). All the Wh-elements in the group form a collective variable, even though they may be structurally disjoint. See Shi (1992) for further discussion.

Aoun 1986). The Subjacency Condition, including the CED, is therefore irrelevant to the relation between a Wh-element and the Q morpheme which binds it. A Wh-element inside a complex NP or an adjunct clause is not expected to behave differently from those in other positions. In addition, since no movement of Wh-words is involved and no trace created, the ECP will not apply in this case and argument/adjunct asymmetries are not expected.

A straightforward account of the properties of Chinese Wh-elements can be built on the basis of these assumptions. For instance, when a verb like *wen* 'ask' takes a complement clause, as in (19), a Q morpheme must be generated inside the complement clause to provide the [+Q] feature selected by the verb. When the Q operator raises from the head of IP to the head of the embedded CP, it will c-command every constituent dominated by the embedded CP. It is possible, then, for any Wh-element dominated by the embedded CP to be bound by the Q operator and to have an embedded indirect question reading. Since the Subjacency Condition and the ECP are irrelevant to binding, it will not matter whether such a Wh-element is an adjunct or is further embedded in an island, as with the *zenmo* 'how' in (19).

(19) Ta wen wo [[[ni zenmo chu] de chehuo] zui yanzhong].
he ask me you how have DE accident most serious
He asked me the accident you had in what manner is the most serious.

If a Wh-element is generated in a sentence without a verb requiring a [+Q] complement, the Wh-element can be bound only by a matrix Q operator. The Q will appear in the matrix C node at the relevant stage and c-command everything in this CP. Any Wh-element in this sentence can thus be bound by the Q and have a matrix direct question reading, even if it is inside an island, like the adjunct *weishenmo* 'why' in the complex NP in (20).

(20) Ni renwei [[ta weishenmo cizhi] de shuofa] bijiao
you think he why resign DE claim more
kekao ne?
reliable QUES
You think the claim that he resigned why is more reliable?

As an operator, the Q morpheme must bind at least one Wh-element,

given the usual prohibition against vacuous quantification (e.g., May 1985, Chomsky 1986). This will account for the phenomenon illustrated in (21).

(21) Ni xiangzhidao shei weishenmo cizhi.
you wonder who why resign

i. You wonder who resigned why.
ii. Who is the person x such that you wonder why x resigned?
iii. What is the reason y such that you wonder who resigned because of y?

(22)a. $[_{CP} \ldots [_{CP} \ldots Q_e \ldots WH_1 \ldots WH_2 \ldots]]$
b. $[_{CP} \ldots Q_m \ldots [_{CP} \ldots Q_e \ldots WH_1 \ldots WH_2 \ldots]]$

the verb *xiangzhidao* 'want to know, wonder' in (21) selects a [+Q] complements, so a Q must be generated in the embedded clause; When no Q is generated in the matrix clause, as in (22a), both Wh-elements must be interpreted as having an embedded indirect question reading, as in (21i). This is because Wh-words must be bound by an operator and the embedded Q is the only one available. When an additional Q is generated in the matrix clause (Q_m), as in (22b), the sentence will allow two direct question readings, with either Wh-element having matrix scope. Neither the reading in which both Wh-elements have the matrix direct question reading nor the one in which both Wh-elements have embedded indirect question reading is available here, since in either case, one of the Q morphemes would be a vacuous operator.

The analysis of Wh-elements as variables bound by a Q operator is designed for Chinese but is also applicable to other languages where questions are not marked by the syntactic movement of Wh-elements. In addition, it is not incompatible with languages with overt syntactic movement of Wh-elements. A prominent feature of Chinese questions is that they are usually overtly marked by a special morpheme which appears in sentence-final position, such as the question marker *ma* for yes/no questions and the marker *ne* for Wh-questions. In some other languages that do not mark questions with movement, such as Japanese and Korean, a question marker is obligatory for non-echo questions (cf. Choe 1987, Lasnik and Saito 1984). If it can be assumed that the movement of Wh-elements and the use of question markers are equivalent ways for a language to overtly mark a question, the analysis presented here can be adapted for languages like English. In essence, Wh-elements in these languages are moved in the syntax to mark a direct or indirect question. Wh-elements may be moved to the Spec of CP and c-command the clause

over which they have scope, as in the case of English; but they may be moved to other positions, as in the case of Hungarian (Horvath 1986). The scope for Wh-elements, moved and in situ alike, is determined by the Q operator which binds them.

This analysis will not affect accounts of overt A′ movement, such as Wh-movement in languages like English and topicalization in languages like Chinese, but it does require some modifications of the treatment of WH in situ. However, a detailed analysis of the properties of Wh-elements in English and other languages is beyond the scope of this paper. Instead, the analysis of a particular phenomenon will be offered to illustrate the way in which this analysis provides a possible solution.

Aoun, Hornstein and Sportiche (1980) notice an interesting difficulty for the LF raising analysis of Wh-phrases. The French verb *savoir* 'know' requires an interrogative complement in the configuration of (23) and *quoi* 'what' is accordingly moved to the embedded COMP in the syntax. The question they raise is why *quoi* 'what' cannot be further moved at LF to produce a direct question reading with both Wh-phrases having matrix scope. Their answer is the stipulation that LF raising only affects Wh-phrases in A position, but not ones already in COMP.

(23) Qui sait quoi faire?
who know what do
Who knows what to do?

Lasnik and Saito (1984) provide a different analysis for the same phenomenon. They assume that traces of Wh-phrases are [−WH]. If *quoi* 'what' in (23) is raised at LF, the movement will create a [−WH] trace in a COMP that is required to be [+WH]. This will rule out the LF raising of *quoi* 'what' in (23), as desired.

A problem for this line of analysis is an illicit LF derivation for questions like (24).

(24) Who wonders where we bought what?

If *where* in (24) is raised to the matrix COMP at LF and *what* is then raised to the evacuated slot, the embedded COMP will have the [+WH] feature to satisfy the selectional restriction requirement and this will produce a nonexistent reading in which *where* has matrix scope. In order to rule out this kind of LF movement, Lasnik and Saito introduce the notion HEAD OF COMP. They stipulate that the first Wh-phrase appearing in a COMP is the head of that COMP and assigns its index to the COMP. Since *where* in (24) is moved to the embedded COMP in the syntax, it

has the status of the head of COMP and assigns its index to the COMP. The only way for *what* to supply the [+WH] feature for the embedded COMP is for it to replace the trace of *where*. In that case, the embedded COMP will become a category with contra-indexed head, which they assume to be illicit, and the derivation will be ruled out.

The analysis proposed here provides a simple account of the questions raised by both (23) and (24) without additional stipulations. Within the framework assumed here, the scope of a given Wh-element is assigned by a Q operator. There are two Q operators in both (23) and (24), a matrix Q in the matrix C at LF and an embedded Q in the embedded C. The issue is thus reduced to why the Wh-element which has been moved to the Spec of the embedded CP in the syntax cannot be bound by the matrix Q at LF, even though it is c-commanded by both Q operators at LF. Chomsky (1986, p. 27) suggests that the independently motivated principle of Spec-head agreement should hold between the Spec of an interrogative CP and its C node at LF. Given this assumption, it is expected that the Wh-element in the Spec of the embedded CP in (23) or (24) be bound at LF by the Q in the embedded C, so that the Spec and head of the embedded CP agree in binding features/indices. If the Wh-phrase in question is bound by the matrix Q, the Spec of the embedded CP will share features with the matrix C but not the embedded C. Such a binding relation leads to a violation of the Spec-head agreement requirement and the reading in which the Wh-phrase in the Spec of the embedded CP has matrix scope is ruled out.

The embedded *what* in (24), on the other hand, is not in a Spec. The co-indexing of *what* with either the matrix Q or the embedded Q will not cause an agreement problem. Since *what* is c-commanded by both Qs, it has the option of being bound by either Q, i.e., having either matrix or embedded scope.

3. Morphological Realization of the Q Morpheme

The central assumption of this paper is that Wh-elements are not operators, but variables. The scope properties of Chinese Wh-elements are accounted for on the basis of this assumption without further stipulation. Some elaboration is in order here, though. Covered under the LF raising analysis of Wh-elements in Chinese are not only the properties of Wh-questions, but also other phenomena. A prominent one is the behavior

of so-called A-not-A questions (e.g., Huang 1982b).[11] In this section, it will be argued that the LF raising analysis of A-not-A questions should be retained, but in a different form, based on the Q morpheme analysis.

Like yes/no-questions, A-not-A questions are employed when the speaker is interested in whether a given statement is true or not. The surface form of such questions is marked by the presence of an A-not-A verb,[12] which is constructed by copying the verb (or its first syllable), prefixing the copy to the stem and inserting a negative morpheme between the two. Such a question form can appear as a direct matrix question or an embedded indirect question, as in (25) and (26), respectively:

(25) Ni qu-bu-qu Niuyue?
you go-not-go New York
Will you go to New York or not?

(26) Ta wen wo ni hui-bu-hui shuo Yingyu.
he ask me you can-not-can speak English
He asks me whether you can speak English or not.

In A-not-A questions, the focus of interrogation is on the truth value of the whole expression, independent of the verb that appears in the A-not-A form. The A-not-A verb of a direct question does not have to appear in the matrix clause, and may even appear in the complement clause of a verb that does not require an interrogative complement. The direct question in (27) thus contrasts with (26).

(27) Ni renwei ta hui-bu-hui shuo Yingyu?
you think he can-not-can speak English
Do you believe it or not that he can speak English?

In contrast to Wh-elements in situ, the distribution of A-not-A verbs is subject to very strict locality constraints. An A-not-A verb cannot give rise to a direct question if it occurs within an adjunct adverbial clause, a

[11] Another phenomenon accounted for under the LF raising analysis is the behavior of the emphatic marker *shi*. According to Huang (1982b), *shi* is a nonargument operator that behaves like the A-not-A morpheme and adjunct Wh-phrases such as *zenyang* 'how'. It undergoes LF raising and its movement is subject to various constraints because of the ECP.

The properties of emphatic *shi* will not be discussed here. Suffice it to say that *shi* behaves differently from either the adjunct Wh-phrase or the A-not-A morpheme.

[12] In a given clause, it is always the first verbal element that takes the A-not-A form. When there are modals in the clause, it is the first modal that. takes the A-not-A form, as in (26). This issue is not directly related to the discussion here.

relative clause, a subject clause or an NP complement clause. Sentences (28), (29), (30) and (31) are all unacceptable direct questions.

(28) *Ni yinwei [Lisi lai-bu-lai] shengqi ne?
you because Lisi come-not-come angry QUES
Are you angry or not because Lisi came?

(29) *Ni xihuan [[Lisi mai-bu-mai] de shu] ne?
you like Lisi buy-not-buy DE book QUES
Do you like it or not the book Lisi bought?

(30) *[Women jiedai-bu-jiedai Lisi] zui heshi?
we receive-not-receive Lisi most appropriate
Is it most suitable or not that we receive Lisi?

(31) *Ni kan le [[Bushi qu-bu-qu Jianada] neitiao
you watch ASP Bush go-not-go Canada that-CL
xinwen]?
news
Did you watch the news or not that Bush went to Canada?

Another constraint is that an A-not-A verb cannot take scope over the same clause with a Wh-element, whether in direct or indirect questions. The direct question in (32) is therefore not acceptable, and the embedded question in (33) does not allow the reading in which both the Wh-element and the A-not-A verb have embedded scope. In addition, note that (33) is not ambiguous. It only has the interpretation in which the A-not-A verb has embedded scope and the Wh-element has matrix scope.

(32) *Shei lai-bu-lai?
who come-not-come
*Who will come or not?

(33) Ta wen ni [shei hui-bu-hui lai]?
he ask you who will-not-will come
Who is the person x such that he asked you whether x will come or not?

There are two well-known accounts of the properties of A-not-A verbs and their interaction with Wh-elements, both of which assume LF raising of both the A-not-A verb and Wh-elements. Baltin (1991) suggests that

the A-not-A verb moves to the relevant C node at LF via head movement, and that Wh-phrases are raised to the Spec of CP. By assuming that the LF head movement is subject only to the ECP, but not to the Head Movement Constraint of Chomsky (1986), and that the A-not-A verb moves through the Spec of the embedded CP on its way to the matrix C node, he is able to rule out the reading of (33) in which the A-not-A verb has matrix scope while the Wh-phrase has embedded scope. Such a reading would require that the Wh-phrase be moved to the Spec of the embedded CP and the A-not-A verb to the matrix C. The A-not-A verb cannot go through the Spec already occupied by the Wh-phrase and has to skip that Spec on its route from the embedded C to the matrix VP. Since Baltin assumes that the A-not-A verb is adjoined to the C node and is not the head of CP, the embedded CP thus blocks antecedent government of the trace of the A-not-A verb under the embedded C, given the minimality condition in (34) (Chomsky 1986). The trace of the A-not-A verb created by such movement is thus ungoverned, leading to an ECP violation.

(34) γ is a barrier for β if γ is (a projection, the immediate projection) of δ, a zero level category distinct from β.

In addition to the theory-internal question of how a head moves at LF through an X^{max} position, Baltin's analysis faces several empirical problems. Given his assumption about the LF movement of the A-not-A verb and Wh-phrases, the A-not-A verb in (32) can move to the matrix C at LF and the Wh-phrase *shei* 'who' to the Spec of CP. Neither of these movements violates the ECP. He thus wrongly predicts that (32) is acceptable. Similarly, the reading of (33) in which both the A-not-A verb and the Wh-element have embedded scope is incorrectly available within his framework.

Baltin's motivation for assuming LF head movement of A-not-A verbs is that he wishes to account for the fact that an A-not-A verb is an X^0 category that can take matrix scope in questions like (27). However, the embedded Wh-verb *zenmo* 'how' in (35) is also an X^0 category which can take matrix scope. There is no mechanism in Baltin's system to distinguish these two types of question verb. The Wh-verb should be predicted to undergo head movement at LF as well; and yet an X^0 Wh-verb does not show the same locality effects as A-not-A verbs do, as illustrated in the question in (36), where *zenmo* 'how' can take matrix scope over a Wh-clausemate.

(35) Ni shuo [Lisi zenmo ni le]?
you say Lisi how you PART
What did you say Lisi did to you?

(36) Ta wen ni [shei ba Lisi zenmo le].
he ask you who BA Lisi how PART
i. What is the action x such that he asked you who did x to Lisi?
ii. Who is the person y such that he asked you what y did to Lisi?
iii. He asked you who did what to Lisi.

Huang (1982b, 1989) analyzes A-not-A questions as clauses generated with an abstract A-not-A morpheme, which is assumed to be a question operator generated under the INFL node and then attached to the verb at a later stage to trigger A-not-A verb formation. The A-not-A morpheme is taken to pattern with nonargument Wh-phrases and is thus raised to the relevant COMP at LF. Since the A-not-A morpheme is an adjunct, its LF movement is restricted by island constraints because of the ECP (see the discussion in section 1).

By analyzing the A-not-A verb as the combination of a verb and an adjunct question operator, Huang accounts for the island effects displayed by A-not-A verbs within his more general account of argument/adjunct asymmetries. He also provides an account for the unacceptable status of (32). Both the Wh-phrase *shei* 'who' and the A-not-A morpheme of (32) must be raised to the matrix COMP at LF. Since Huang assumes that when the COMP is filled with two or more elements, the COMP will receive the index from none of them, neither the Wh-phrase nor the A-not-A morpheme can assign its index to COMP at LF and neither trace is antecedent-governed. Since the trace of the A-not-A morpheme is not lexically governed either, the question in (32) is ruled out by the ECP.

One problem for Huang's attempt to conflate the behavior of A-not-A verbs with Wh-adjuncts is that the two do not always behave the same with respect to co-occurrence with Wh-elements. The question in (16a), for example, is similar to (32) in structure but has an adjunct Wh-phrase *weishenmo* 'why' instead of an A-not-A operator. In contrast to (32), (16a) "does not have the entirely unacceptable status of an ECP violation" according to Huang (see Lasnik and Saito 1984, p. 251) and is acceptable to most speakers.

(16)a. Shei weishenmo mei lai ne?
who why not come QUES
Who did not come why?

The contrast between the two sentences in (37) is more revealing. The question in (37a) is perfect for most people and is "almost fully acceptable" to Huang (see Lasnik and Saito 1984, p. 251) in spite of the co-occurrence of an argument Wh-phrase and an adjunct Wh-phrase. The co-occurrence of an argument Wh-phrase and an A-not-A verb in the direct question in (37b), on the other hand, is unacceptable to all speakers. The A-not-A morpheme behaves differently from Wh-adjuncts.

(37)a. Ni gen shei shuo Yuehan weishenmo bei kaichu le?
you to who say John why BEI fired ASP
You said to whom that John had been fired why?

b. *Ni gen shei shuo Yuehan you-mei-you bei kaichu?
you to whom say John have-not-have BEI fired
Did you say it or not to whom that John had been fired?

Apparently, it is not desirable to treat A-not-A verbs simply as question verbs; nor is it desirable to account for the properties of A-not-A questions on a par with those of Wh-questions. An alternative analysis is needed to account for the strict locality restriction on the distribution of A-not-A verbs with matrix scope and the mutual exclusion of A-not-A verbs and Wh-elements. The proposal here is designed to retain the advantages of both Baltin's and Huang's analyses while avoiding the above problems.

The A-not-A question is assumed to be generated with an A-not-A morpheme. However, it is not a special operator as in Huang (1982b). The A-not-A morpheme is assumed to be the same Q morpheme that licenses Wh-words. If it does not license any Wh-word, it will attach to the appropriate verb in its own clause[13] and trigger the process of A-not-A verb formation. An A-not-A verb is the morphological realization of the Q morpheme.

The attachment of Q to the verb is treated as an instance of syntactic movement and the morphological change of the verb a PF phenomenon (cf. Huang 1982b, 1989). The amalgamated V-Q compound is assumed to be a verbal element, along the lines of V-I compounds created by V-to-I movement (e.g., Chomsky 1986). The V-Q compound has the function of

[13] It is not our concern here whether the Q is lowered to the verb or the verb is raised to the INFL. Either analysis is possible, depending on the X-bar structure posited for Chinese.

the verb and not that of an operator. It cannot license Wh-elements.[14] Thus, when the matrix *Q* of a direct question is incorporated into a V-Q compound, no Wh-element in that sentence can have a question reading. The question in (32) is therefore not acceptable, since the Wh-phrase *shei* 'who' cannot be bound by the matrix Q morpheme.

(32) *Shei lai-bu-lai?
who come-not-come
*Who will come or not?

In (33) the Q of the embedded indirect question has been incorporated into a V-Q compound. As a result it cannot license any Wh-element. The reading in which both *shei* 'who' and the A-not-A verb have embedded scope is therefore not available.

(33) Ta wen ni [shei hui-bu-hui lai]?
he ask you who will-not-will come
Who is the person *x* such that he asked you whether *x* will come or not?

The reading of (33) in which the A-not-A verb is given matrix scope and *shei* 'who' has embedded scope would require the matrix Q to be generated in the embedded clause, so that the Q can be incorporated into the embedded verb and subsequently raised to the matrix C. However, the Wh-phrase would have to be licensed by another Q in the embedded question to allow it to have embedded scope. Two nonconjoined Q mor-

[14] The two assumptions made here, that A-not-A verbs are the morphological realization of the Q morpheme and that the V-Q compound cannot license Wh-elements but can satisfy the selectional restrictions of verbs that take an interrogative complement, can be adopted to solve some problems involving English *whether*. If *whether* is treated as the lexical realization of the Q operator (Baker 1970, p. 207) and is assumed to be under the C node at the relevant stage (cf. Chomsky 1986, p. 50), an account for sentences like (i) can be constructed along the same lines.

(i) *I wonder whether John bought what.

(ii) I wonder where John bought what.

As pointed out by Osvaldo Jaeggli (p.c.), many analyses based on LF raising of Wh-elements would wrongly predict that *what* in (i) should have an embedded reading, on a par with *what* in (ii). It is possible in most analyses for *what* to raise at LF to the Spec of the embedded CP in (i), regardless of which position *whether* is assigned to, since the trace of *what* is lexically governed and no ECP violation arises.

If it is assumed that *whether*, as the morphological realization of Q, cannot license Wh-elements even though it can satisfy the selectional restriction of *wonder*, no Wh-element in such an embedded clause will have embedded scope.

phemes would have to be generated under the same embedded INFL node on such a reading. This is an impossible configuration, given the usual assumption about the relationship between a head and its maximal projection in the X-bar system (cf., e.g., Chomsky 1986).

The only permissible configuration of (33) is for the matrix Q to be generated under the matrix INFL and the embedded Q under the embedded INFL. The embedded Q is then incorporated into a V-Q compound. The Wh-phrase is licensed by the matrix Q. This will give rise to the only possible reading of (33), in which the Wh-phrase has matrix scope and the A-not-A verb has embedded scope.

An A-not-A verb with matrix scope can be unboundedly embedded if it is inside a complement clause of so-called bridge verbs, but it can never occur inside an island. Apparently the distribution of A-not-A verbs is regulated by some kind of constraint on movement (cf. Chomsky 1977). As with the analyses considered above, the distinctive behavior of A-not-A verbs follows from the assumption that they undergo movement at LF. However, unlike Baltin (1991), such raising is not motivated by considerations of scope, nor is it motivated by the assumption that A-not-A verbs are adjunct operators, as in Huang (1982b, 1989). The LF movement of a V-Q compound, which is realized as an A-not-A verb at PF, is driven by the necessity of providing the appropriate [Q] feature value for a matrix CP or a complement clause. Recall that the head of a direct question or an indirect question is [+Q] while a noninterrogative CP has a [−Q] head. The selectional restriction of a verb is satisfied when its complement clause has the correct [Q] feature value. Since the Q operator is not generated under C, it must be raised to the head of the relevant CP at LF even if it has been incorporated into a V-Q compound.

The LF raising of the V-Q compound is assumed to be an instance of head movement. Adopting a suggestion made in Chomsky (1986) and developed by Cole et al. (1990), the LF raising of the V-Q compound is assumed to proceed strictly from one head position to another and to be subject to the ECP and the Head Movement Constraint. Since the trace of a V-Q compound is not lexically governed, an ECP violation will arise whenever the trace is not antecedent-governed.

An A-not-A verb with matrix scope can be embedded in questions like (27) because the V-Q compound it is derived from can be legitimately raised to the matrix C node. The V-Q compound crosses the VP, IP and CP of the embedded clause, and then the VP and IP of the matrix clause in the process of being raised to the matrix C, as shown in schema (38).

(27) Ni renwei ta hui-bu-hui shuo Yingyu?
you think he can-not-can speak English
Do you believe it or not that he can speak English?

(38) $[_{CP} \ldots C_2 \ldots [_{IP} \ldots I_2 \ldots [_{VP} \ldots V_1 \ldots [_{CP} \ldots C_1 \ldots$
$[_{IP} \ldots I_1 \ldots [_{VP} \ldots \text{V-Q} \ldots]]]]]]$

Adopting the analysis of V-to-I raising in Chomsky (1986), the embedded VP is assumed not to be L-marked prior to such LF raising, so that it is a barrier. After the V-Q is raised to I_1, however, the I node becomes lexical and L-marks the VP. The VP thereby loses its barrierhood and the raised V-Q now properly governs its trace. The movement of the V-Q compound from I_1 to C_1 is licit, given the usual assumption that IP is not a barrier (Chomsky 1986, p. 14). Since the embedded CP is L-marked by the matrix verb and is not a barrier, the V-Q can be raised from C_1 to V_2 legitimately. As in the embedded clause, the raising of V-Q from V_2 to I_2 will not cross any barrier, since the matrix VP loses its barrierhood after the movement, and IP is not a barrier.

An A-not-A verb with a matrix scope reading cannot occur inside a relative clause or an adjunct adverbial clause, because the related V-Q compound cannot be legitimately raised out of the clause in question. Neither the CP of a relative clause nor that of an adverbial clause is L-marked, as shown in (39a) and (39b), and thus they constitute barriers. The V-Q compound must cross the CP, but the trace it leaves at C cannot be antecedent-governed, and hence an ECP violation occurs.

(39)a. $[_{NP} [_{CP} \ldots C \ldots [_{IP} \ldots]] \text{ NP}]$
b. $[_{VP} [_{CP} \ldots C \ldots [_{IP} \ldots]] \text{ VP}]$

Similarly, an A-not-A verb with matrix scope cannot appear inside a sentential subject because of the ECP. The subject CP is not L-marked[15] and is a barrier (Chomsky 1986). When the V-Q crosses the CP, it leaves a trace not properly governed, and causes an ECP violation.

An A-not-A verb cannot take matrix scope within the complement clause of a complex NP either. However, an account along the above lines is not readily available here. The complement CP of an NP is assumed to be L-marked in Chomsky (1986), so that the CP node loses its barrierhood. One way to account for the locality restrictions in such cases is to invoke the Minimality Condition in (34). Under this definition, the complex NP

[15] Following Chomsky (1986), the INFL node is treated as nonlexical in this paper, contrary to a well-known assumption made by Huang (1982b) that the Chinese INFL is lexical. Huang's motivation is to account for the apparent lack of asymmetry between a Wh-phrase in the subject position and one in the object position with regard to LF raising (see the discussion in section 1). He needs some additional stipulation to explain the island properties of sentential subjects, since such clauses would be properly governed under his assumption and should not show the CED effect (cf Chomsky 1986). Neither stipulation is necessary within the framework of this paper.

node is a barrier to government for elements inside the complement clause. The movement of V-Q from the complement CP crosses the NP node and triggers an ECP violation.

There remains a potential problem, though. It has been pointed out (e.g., Dai 1990) that although an A-not-A verb never appears in a relative clause, it does occur in the complement clause of certain complex NPs, in some sentential subjects and, arguably, some adjunct clauses, as in (40), (41) and (42), respectively. This seems to be an unexpected pattern given the LF raising analysis of A-not-A verbs.

(40) Women yijing taolum guo [[Lisi neng-bu-neng biye]
we already discuss ASP Lisi can-not-can graduate
zhege wenti].
this-CL issue
We have already discussed the issue of whether Lisi can graduate.

(41) [Ni qu-bu-qu Niuyue] hai mei dingxialai.
you go-not-go New York yet not decided
It has not been decided whether you should go to New York.

(42) Wo dui [Lisi neng-bu-neng zou] bu zaihu.
I with Lisi can-not-can leave not concerned
I am not concerned with whether Lisi can leave.

In these cases, however, none of the A-not-A verbs has a matrix direct question reading. The A-not-A verb in (40), for example, can only be interpreted as part of an indirect question within the complex NP. This is comparable with the behavior of Wh-elements in similar sentences. The *shei* 'who' in (43), which has only an embedded indirect question reading, is such an example.

(43) Women yijing taolun guo [shei neng biye]
we already discuss ASP who can graduate
zhege wenti].
this-CL issue
We have already discussed the issue of who can graduate.

A very tempting account of this phenomenon is to assume that the NP complement clause is itself a proposition and has the status of a matrix

clause (cf. Xu 1990). Such a clause would allow a Q morpheme to appear under its C node to license Wh-elements, or to be realized as the A-not-A form of a verb. However, this analysis would predict that it is always possible for a Wh-element in an NP complement clause to have an embedded reading. This is apparently incorrect, since a Wh-element in the complement clause of some complex NPs can only have a matrix direct question reading, as is the case in (44).

(44) Ni bu xihuan [[shei neng biye] de shuofa]?
you not like who can graduate DE claim
Who is the person *x* such that you do not like the claim that *x* can graduate?

Another solution to this problem, following Baker (1970) and Bresnan (1970), is to assume that the head of complex NPs imposes selectional restrictions on its complement. Certain NPs, such as *zhege wenti* 'this issue, this question', select a [+Q] complement and can only take an embedded indirect question as complement. A Q morpheme has to be present under the C node of the complement clause of such NPs at LF. The Q morpheme can bind one or more Wh-elements in the clause and assign an embedded question reading to them. It can also be attached to a verb in the syntax which is realized as the A-not-A form at PF. The V-Q compound created at S-structure is raised to the embedded C at LF and the A-not-A verb has an embedded reading. The incorporated Q morpheme cannot license Wh-elements, so that any Wh-element in the complement clause can only be licensed by a matrix Q and have a matrix direct question reading, as is the case in (45).

(45) Nimen yijing taolun guo [[shei neng-bu-neng biye]
you already discuss ASP who can-not-can graduate
zhege wenti]?
this-CL issue
Who is the person *x* such that you have already discussed the issue of whether *x* can graduate?

The latter analysis not only accounts for the grammatical status of (40), (43) and (45), but also predicts that there will be three types of NPs, on a par with verbs, which select [+Q], [−Q] or [±Q] complements, respectively. This provides an explanation for a wide range of data.

Unlike the NP *wenti* 'question, issue' of (40), (43) and (45), which selects a [+Q] complement, the NP *shuofa* 'claim' of (44) selects a [−Q]

complement. Since the complement clause is [−Q], no Q can remain under its C node at LF to license Wh-elements. The only possible position for a Q at LF is the matrix C. In that case, the sentence is a direct question, and the Wh-element inside the complement CP is bound by the matrix Q and has a matrix direct question reading. If the matrix Q is generated inside the [−Q] complement clause and is incorporated into a verb in the syntax, the amalgamated V-Q compound would have to be raised out of the complement CP at LF. Such movement yields an ECP violation. As a result, no A-not-A verb can ever occur in the complement clause of this type of NP, as shown in (46). The matrix Q has to be generated outside the complement clause.

(46) *Ni bu xihuan [[Lisi neng-bu-neng biye] de shuofa].
you not like Lisi can-not-can graduate DE claim

The NP *shi* 'matter' in (47) and (48) differs from *wenti* 'question' and *shuofa* 'claim' in that it can take either a [+Q] complement or a [−Q] one. When it takes a [+Q] complement, a Q morpheme must be generated in the complement CP and remain under the C node at LF. The Q morpheme can license Wh-elements, yielding an embedded indirect question reading as in (47i), or attach to a verb to produce an A-not-A form with an embedded reading, as in (48).

(47) Tamen taolun [shei neng qu] de shi.
they discuss who can go DE matter

i. They discuss the issue of who can go.
ii. Who is the person *x* such that they discuss the issue of whether *x* can go?

(48) Tamen taolun [Lisi neng-bu-neng qu] de shi.
they discuss Lisi can-not-can go COMP matter

They discuss the issue of whether Lisi can go.

If the complement CP of the NP *shi* 'matter' is [−Q], no Q morpheme can remain under its C node at LF and no Wh-element can have an embedded reading. If a Q morpheme is generated in the sentence, it must appear under the matrix C at LF. Such a Q will assign matrix scope to all the Wh-elements in the complement clause. This will give rise to the reading (47ii). A Q cannot be generated inside the [−Q] complement clause, because it would have to be raised out at LF and such movement leads to an ECP violation. Consequently, no A-not-A verb can occur in the [−Q] complement clause. The observable effect of this phenomenon

is that the A-not-A verb in sentences like (48) can only have an embedded reading, although a Wh-element in a similar position can have either a matrix or an embedded reading.

A similar analysis can be applied to sentential subjects. It can be assumed that predicates which take clauses for subjects impose selectional restrictions on these subjects. If the predicate selects a [+Q] subject, Wh-elements in the subject clause can have an embedded indirect question reading and an A-not-A verb can occur in the sentential subject with an embedded reading, because a Q morpheme must remain under the C node of the subject clause at LF. This will account for the sentences in (41) and (49) below.

(41) [Ni qu-bu-qu Niuyue] hai mei dingxialai.
you go-not-go New York yet not decided
It has not been decided whether you should go to New York.

(49) [Ni qu nali] hai mei dingxialai.
you go where yet not decided
It has not been decided where you should go.

When the predicate selects a [-Q] subject, no Q morpheme can remain in the subject clause at LF. This will give rise to the familiar pattern in which Wh-elements in the sentential subject have a matrix direct question reading and no A-not-A verb can occur in the subject clause.

If the predicate takes either a [+Q] subject or a [−Q] subject, the pattern is comparable to similar cases with complex NPs. When the subject clause is [+Q], a Q must be present under its C node at LF. It assigns embedded scope to the Wh-elements in the subject clause. It can also be realized as an A-not-A verb with embedded scope. If the subject clause is [−Q], only the matrix C node can take a Q at LF. That Q morpheme assigns matrix scope to all Wh-elements in the subject clause. It cannot be realized as an A-not-A verb in the subject clause because it must be raised at LF, a movement that violates the ECP. The result is that a Wh-element in the sentential subject can have either a matrix or an embedded reading, as in (50), but an A-not-A verb can only have an embedded reading, as shown in (51).

(50) [Shei dang jingli] shi gongkaide mini.
who act as manager be open secret

i. Who is the person x such that it is an open secret that x will be the manager?

ii. It is an open secret who will be the manager.

(51) [Lisi dang-bu-dang jingli] shi gongkaide mimi.
Lisi act as-not-act as manager be open secret
It is an open secret whether Lisi will be the manager.

This analysis can be extended to sentences like (52) (=(42)) as well, which has an A-not-A verb in the oblique object clause of an adjunct PP. It has been argued (e.g., Zhang 1987) that the preposition and the matrix verb/adjective pair, i.e., the *dui . . . zaihu* 'concerned with' in (52), is a discontinuous predicate that takes as complement a clause with oblique case. If this is correct, it can be assumed that the discontinuous predicate imposes selectional restrictions on the clause in question. Structurally the clause remains part of an adjunct, so that a V-Q compound cannot be moved out of it at LF. The behavior of A-not-A verbs inside this type of adjunct clause can thus be accounted for on a par with that in a subject clause. The predicate *dui . . . bu zaihu* 'not concerned with' in (52) selects a [+Q] object, so that an A-not-A verb can occur in the object/adjunct clause and a Wh-element in the same clause has an embedded indirect question reading, as in (53).

(52) Wo dui [Lisi neng-bu-neng zou] bu zaihu.
I with Lisi can-not-can leave not concerned
I am not concerned with whether Lisi can leave.

(53) Wo dui [shei neng zou] bu zaihu.
I with who can leave not concerned
I am not concerned with who can leave.

The *ti . . . lianhong* 'feel ashamed for' in (54) and (55) selects a [−Q] complement, so that a Wh-element in the adjunct clause can only have a matrix reading, while an A-not-A verb cannot appear there, since it cannot be raised out at LF.

(54) *Ni ti [Lisi neng-bu-neng biye] lianhong?
you for Lisi can-not-can graduate ashamed

(55) Ni ti [shei buneng biye] lianhong?
you for who not-can graduate ashamed
Who is the person *x* such that you are ashamed that *x* cannot graduate?

The *gen . . . youguan* 'related to' of (56) and (57) selects either a [+Q] or a [−Q] complement. The result is that a Wh-element in the adjunct clause has either a matrix or an embedded reading, while an A-not-A verb can only have the embedded reading.

(56) Zhejian shi gen [ni qu-bu-qu] youguan.
this-CL matter with you go-not-go related
This issue is related to whether you will go.

(57) Zhejian shi gen [shei qu] youguan.
this-CL matter with who go related
i. This issue is related to who will go.
ii. Who is the person x such that this issue is related to the fact that x will go?

4. Concluding Remarks

In this paper Chinese Wh-elements are treated as variables instead of operators. They are assumed not to undergo raising at LF and their scope is determined by the Q operator that binds them. The V-Q compounds that give rise to A-not-A verbs in A-not-A questions are assumed to be raised at LF. The strict locality constraints on the distribution of A-not-A verbs are accounted for on the basis of the raising analysis.

The nonraising analysis of Wh-elements is partially motivated by the fact that there is a widespread dialect in which the so-called argument/adjunct asymmetries do not hold for Wh-elements. Consequently, such asymmetries should not be considered as structurally determined properties of Chinese. How they should be accounted for is open to debate. See Tsai (1990) and Xu (1990) for some of the possible solutions.

Another relevant issue is that, if this analysis can be extended to languages like English, an account has to be found for the obligatory syntactic movement of Wh-phrases in the question formation process of these languages. A possible explanation is that such movement is one way to overtly mark the question, on a par with the almost obligatory presence of Chinese question markers, although this is still an open question.

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