ON *WH*-NOMINAL/ADVERB INTERACTION AND THE LEFT PERIPHERY*

Barry C.-Y. Yang
National Tsing Hua University

1. Introduction

It is generally observed that *wh*-movement exhibits Superiority effect:

(1) a. Who$_i$ t$_i$ bought what

b. *What$_i$ did who buy t$_i$

Huang's (1982) ECP account can account for the superiority effect above. (1b) is out because the subject trace is not properly governed (neither head-governed nor antecedent-governed) as illustrated in (2b):

(2) a. [what$_j$ [who$_i$]]$_i$ [t$_i$ buy t$_j$]

b. *[who$_i$ [what$_j$]]$_j$ [t$_i$ buy t$_j$]

ECP can also account for the in-situ *wh*-adjuncts cases in (3), since as illustrated in (4) the adjunct trace t_j is not properly governed:

(3) a. * Who arrived why? (Reinhart 1998)

b. * Who fixed the car how? (Bošković 2000)

(4) a. *[why$_j$ [who$_i$]]$_i$ [t$_i$ left t$_j$]

b. *[how$_i$ [who$_i$]]$_i$ [t$_i$ fixed the car t$_j$]

Yet, ECP cannot explain the following superiority cases since both the *wh*-traces will be properly head governed after LF-movement:

* This paper was mostly presented at Tsing Hua - Nanzan Workshop on Movement and Interpretation, Nazan University, Nagoya, Sept. 14-15, 2006. I thank Mamoru Saito, Dylan Tsai, Yuji Takano, Hisatsugu Kitahara, and Hiroshi Aoyagi for the comments and discussions. All errors are mine alone.

Nanzan Linguistics: Special Issue 1, Vol. 1, 165-186

(5) a. */?Whom did Lucie discuss what with e? (Reinhart 1998)

b. */?Who did Lucie persuade who [PRO to visit e]? (Reinhart 1998)

Similarly, the crossing effect in (6) cannot be accounted for by ECP since both *wh*-traces are properly head-governed:

(6) a. ?Which book$_i$ do you know who$_j$ to persuade t$_j$ to read t$_i$

b. *Who$_j$ do you know which book$_i$ to persuade t$_j$ to read t$_i$.

"Attract Closest" can be of help here: (Chomsky 1995, Bošković 1997, Kitahara 1997, Richards 2001)

(7) Attract (Richards 2001)
An attractor K attracts a feature F, creating a copy α' of an element α containing F, and Merging α' with K. The relations between α', K, and F must all obey Shortest.

The basic idea of Attract Closest is that the attractor will always attract the closest element first. The Attract Closest directly rules out the standard Superiority effect as in (1b) and the puzzling ECP case for Huang in (5) since in these examples what are attracted first by the C-head are not the closest *wh*-words.

Meanwhile, the crossing effect in (6) is nicely accounted for. As one can see from the derivation in (8) (=(6a)), when the sentence is built up to the embedded C, the highest *wh*-word *who* is attracted first to check the relevant [+Q] feature (8b). Later when the sentence hits the matrix C, the second *wh*-word *which book* is attracted (8d) since the first *wh*-word *who* has checked its uninterpretable feature and thus remains inert to the matrix C-head.

(8) a. Step 1
[Q [to persuade who to read which book]]]]

b. Step 2
[who$_j$ [to persuade t$_j$ to read which book]]]

c. Step 3
[Q [you know [who$_j$ [to persuade t$_j$to read which book]]]

d. Step 4

[Which book$_i$ [you know [who$_j$ to persuade t$_j$ to read t$_i$]]]

Also, some cases of *wh*-argument/adjunct interaction can be explained by Attract Closest,

assuming the *wh*-adjunct *why* a VP adverbial. (9a) is ruled out simply because the *wh*-object *who* is not the closest element to C.

(9) a. *Who$_i$ did [$_{IP}$ you [$_{VP}$ see t$_i$] why]? (Lasnik & Saito 1984:242)

b. Why$_i$ did you buy what t$_i$? (Huang 1982, Saito 2003)

However, if we turn back to the other in-situ *wh*-adjunct cases in (3) (repeated below), Attract Closest is of no help here.

(3) a. *Who arrived why? (Huang 1982, Reinhart 1998, Saito 2003)

b. *Who fixed the car how? (Bošković 2000)

Both Reinhart (1998) and Saito (2003) suggest that *why* in English should not remain in-situ. For Reinhart, in-situ *wh*-adverbs do not denote first order Choice function variables; for Saito *why* should always check the primary sub-feature of Q. Simply put, *why* should move first in English. This accounts for (3) and (9) above.

But still when *how/why* interacts with the *wh*-subject as exemplified in (10), the *why*-move-first approach (Reinhart 1998, Saito 2003) demands more explanation since both *why* and *how* have moved first:

(10) a. *Why did who leave?

b. *How did who fix the car? (Cheng & Demirdash 1990, Pesetsky 2000)

It seems that none of the above mentioned approaches can provide a satisfactory account.

Now, turning to relevant Chinese examples, one will find that they exhibit even more interesting phenomena. Generally speaking, Chinese simplex sentences allow multiple occurrences of *wh*-nominal as in (11).

(11) Shei mai-le shenme?
who buy-Prf what

'Who bought what?'

Since Chinese is a language without overt *wh*-movement, it is not easy to observe the superiority effect. To see this, we can only embed the multiple *wh*-clause with the matrix interrogative predicate like *wonder* as exemplified in (12). Yet, no superiority effect is observed because either the *wh*-subject or the *wh*-object can take the matrix scope (Huang 1982:267(198)):[1]

[1] Richards (2001:245) suggests that Chinese *wh*-words do obey Superiority (contra Huang (1982)). That is, Attract Closest seems to also apply at LF:

(12) Ni xiang-zhidao [shei mai-le shenme]?
you want-know who buy-Prf what

a. Lit. 'Who do you wonder ___ bought what?'
b. Lit. 'What do you wonder who bought ___?'

More interestingly, in Mandarin Chinese a *wh*-nominal generally cannot co-occur with a *wh*-adverb:[2]

(13) a. *Shei weishenme^{R} likai? (Chen & Rooryck 2002: (49b), Hunag 1982:545(57))
who why leave

'Who left why?'

b. *Weishenme^{R} shei hui cizhi? (Tsai 2004: (77))
why who will resign

'Why will who resign?'

Please note that in this paper the *wh*-adverbs are limited to the reason-*why weishenme* 'why' and the manner-*how zenme(yang)* 'how'. Both the reason-*why* and the manner-*how* are the genuine *wh*-quantifiers subject to island constraints at LF (Tsai 1994, 1999, see also Reinhart 1998). A superscript is added to indicate the reading of the *wh*-adverbs, i.e., *weishenme*^{R} referring to the reason-*why*, *zenme(yang)*^{M}, the manner-*how*.

ECP and Attract Closest cannot explain (13a) while the *why*-move-first approach cannot explain (13b). In section 2, I will illustrate a general paradigm of the *wh*-nominal/adverb interaction in simplex and complex sentences in Mandarin Chinese. Section 3 lists potential accounts for the paradigm illustrated in section 2 and shows that none of them can account for

---

(i) Jingcha xiang-zhidao [shei sha-le shei]?
police want-know who kill-Prf who

a. 'Who$_i$ are the police trying to find out who$_j$ t_i killed t_j?
b. *'Who$_j$ are the police trying to find out who$_i$ t_i killed t_j?

According to my informants, including myself, both readings in (i) are acceptable. Even though (ia) is more prominent, (ib) is still fine. In other words, there is no apparent superiority effect in such an example. Our judgment is therefore akin to Huang's (1982:267(198)) judgment.

[2] We use the term *wh*-nominal and *wh*-adverb in this study instead of the traditional term *wh*-argument and *wh*-adjunct because according to Tsai (1994, 1999) *wh*-nominals refer to both *wh*-arguments and nominals-encoded *wh*-adjucts, e.g. purpose-*why* and method/instrument-*how*, both of which are subject to unselective binding, whereas *wh*-adverbs, e.g. reason-*why* and manner-*how* are genuine *wh*-operators/quantifiers which have to undergo LF-movement to take their scopes. In this study, all the *wh*-adverbs interacting with *wh*-nominals are limited to the LF-moving operators/quantifiers.

this paradigm. Section 4 provides a plausible analysis involving intervention effect. Section 5 concludes this study with possible theoretical implications and consequences.

2. More observations

In what fllows, I will show that in simplex sentences, a *wh*-nominal cannot co-occur with a *wh*-adverb/A-not-A-operator in Mandarin Chinese, regardless of the ordering. On the other hand, When embedded with an interrogative matrix predicate like 'wonder', the *wh*-nominal can co-occur with the *wh*-adverb/A-not-A-operator. Meanwhile, only the *wh*-nominal can take the matrix scope at LF.

2.1 The simplex sentence

Let's look at the simplex sentences first. The examples in (14-17) suggest that a *wh*-adverb cannot co-occur with a *wh*-nominal.

(*wh*-subject vs. *why*)

(14) a. *Shei weishenme^{R} likai? (Chen & Rooryck 2002: (49b))
who why leave
'Who left why?'

b. *Shei weishenme^{R} bu lai? (Huang 1982:545)
who why not come
'Who does not come why?'

c.??Shei weishenme^{R} hui cizhi? (Tsai 2004: (77a))
who why will resign
'Who will resign why?'

d. *Weishenme^{R} shei hui cizhi? (Tsai 2004: (77b))
why who will resign
'Who will resign why?'

(*wh*-object vs. *why*)

(15) a.??Weishenme^{R} ni mai-le shenme? (Ochi 2003, due to J. Huang)
why you bought what
'Why did you buy what?'[3]

3 Ochi (2003) provides an example, due to J. Huang, where *why* can co-occur with *what* in Chinese:

b. *Ni weishenme^{R} hui kangjian shei?
you why will see whom

'Why will you see whom?'

c. *Ni weishenme^{R} hui pa shei?
you why will afraid whom

'Why are you afraid of whom?'

(*wh*-subject vs. *how*)

(16) a. *Shei zenme(yang)^{M} duen nurou?
who how stew beef

'Who stewed beef how?'

b. *Shei zenme(yang)^{M} pa Zhangsan?
who how fear Zhangsan

'Who fears Zhangsan how?'

(i) Ni weishenme mai-le shenme?
you why bought what

'Why did you buy what?'

For me, this sentence can only denote, if any, the purpose-*why* reading which according to Tsai (1999b) is due to the purpose-*why* being merged in VP-adjoined position. The sentence thus only has the reading akin to 'For what purpose did you buy what?'

The following tests from Stepanov and Tsai (2006) can prove my claim. They suggest that the sentient verb and the locative-existential predicate require the non-agentive subjects which in turn are only compatible with the reason-*why*. Now, the *weishenme* 'why'in the following example is restricted to the reason-*why* reading and the sentence is not acceptable.

(*transitive sentient verb*)

(ii) *Ni weishenme pa shenme?
you why fear what

'Why did you fear what?'

(*locative-existential predicates*)

(iii) *Chuang-shang weishenme tang-le shenme-ren?
bed-o why lie-Prf what-person

Lit. 'On the bed why lies who?'

(*wh*-object vs. *how*)

(17) a. *Zhangsan zenme(yang)^{M} xiu shenme?
Zhangsan how fix what

'How did Zhangsan fix what?'

b. *Zhangsan zenme(yang)^{M} pa shei?
Zhangsan how fear who

'How does Zhangsan fear who?'

Meanwhile, since Huag (1982) the A-not-A question in Chinese has been patterned with *wh*-questions where the A-not-A operator undergoes LF-movement and is subject to island constraints. Interestingly, the A-not-A operator simply cannot co-occur with a *wh*-nominal:

(*wh*-subject vs. A-not-A)

(18) a. *Shei xi-bu-xihuan Lisi? (Huang 1982:545)
who like-not-like Lisi

Lit. 'Who likes Lisi or not?'

b. *Hui-bu-hui shei xihuan Lisi?
will-not-will who like Lisi

Lit. 'Will it be the case or not that who likes Lisi?'

(*wh*-object vs. A-not-A)

(19) *Ni xi-bu-xihuan shei?
you like-not-like whom

Lit. 'You like whom or not?'

A general pattern is illustrated below where either ordering of the *wh*-nominal and the *wh*-adverb/A-not-A-operator is ruled out:

(20) a. *['*who/what*' … '*why/how/A-not-A*' …]

b. *['*why/how/A-not-A*' … '*who/what*' …]

2.2. The complex sentence

Let's look at the complex sentences now. As first observed by Huang (1982), when embedded as interrogative clauses, the above mentioned sentences in Chinese turn out to be good. The *wh*-nominals can co-occur with the *wh*-adverbs reason-*why* or manner-*how* or the A-not-A operator. Meanwhile, only the *wh*-nominals in question can take the matrix scope.

(*wh*-subject vs. '*why*'/'*how*'/*A-not-A*)

(21) a. Ni xiang-zhidao [shei weishenme^{R} mai-le shu] (Huang 1982:525)[4]
you want-know who why buy-Prf book

?Lit. 'Who do you wonder ___ why bought books?'
#Lit. 'Why do you wonder who ___ bought books?'

b. Ni xiang-zhidao [shei zenme(yang)^{M} mai-le shu] (Huang 1982:526)
you want-know who how buy-Prf book

?Lit. 'Who do you wonder ___ how bought books?'
#Lit. 'How do you wonder who ___ bought books?'

c. Ni xiang-zhidao [shei xi-bu-xihuan ni] (Huang 1982:530)
you want-know who like-not-like you

?Lit. 'Who do you wonder ___ likes you or not?'
#Lit. 'Is it the case or not that you wonder who likes you?'

(*wh*-object vs. '*why*'/'*how*'/*A-not-A*)

(22) a. Ni xiangzhidao [Lisi weishenme^{R} mai-le shenme] (Huang 1982:526)
you wonder Lisi why buy-Asp what

?Lit. 'What do you wonder why Lisi bought ___?'
#Lit. 'Why do you wonder Lisi ___ bought what?'

b. Ni xiangzhidao [Lisi zenme(yang)^{M} mai-le shenme] (Huang 1982:526)
you wonder Lisi how buy-Asp what

?Lit. 'What do you wonder how Lisi bought ___?'
#Lit. 'How do you wonder Lisi ___ bought what?'

c. Ni xiangzhidao [Lisi xi-bu-xihuan shei]
you wonder Lisi like-not-like who

?Lit. 'Who do you wonder whether Lisi likes ___ or not?'
#Lit. 'Is it the case or not that you wonder Lisi likes who?

A general pattern is illustrated below where only the *wh*-nominal can take the matrix scope at LF.

[4] Still the matrix reading of *who* is not so natural. My informants would have to parse the sentence for a while to get it. Yet, it has a sharp contrast with the unacceptable matrix *why* reading. I therefore put a "?" to the matrix *who* reading and a "*" to the matrix *why* reading.

(*wh*-subject vs. '*why*'/'*how*'/*A-not-A*)
(23) S-S: […'wonder' ['*who/what*' … '*why/how/A-not-A*' …]]

a. LF: ?['who_i/$what_i$'] […'wonder' [t_i … '*why/how/A-not-A*' …]]

b. LF: *['why_j/how_j/*A-not-*A_j'] […'wonder' ['*who/what*' …t_j…]]

(*wh*-object vs. '*why*'/'*how*'/*A-not-A*)
(24) S-S: […'wonder' ['*why/how/A-not-A*' … '*who/what*' …]]

a. LF: ?['who_i/$what_i$'] […wonder ['*why/how/A-not-A*' … t_i …]]

b. LF: *['why_j/how_j/*A-not-*A_j'] […wonder [t_j … '*who/what*' …]]

Summary:
- In Simplex sentences, a *wh*-nominal CANNOT co-occur with a *wh*-adverb/A-not-A operator, regardless of the ordering.
- When embedded with the interrogative matrix predicate 'wonder', the *wh*-nominal CAN co-occur with the *wh*-adverb/A-not-A-operator. Meanwhile, only the *wh*-nominal can take the matrix scope at LF.

3. Potential accounts

The following accounts can only partially explain the paradigm illustrated above.

3.1. Subjacency account

Although the complex sentences in (21-22) seem to exhibit the weak island effect, we do not know why the simplex sentences in (14-18) are ruled out since there is no way for any of the *wh*-elements to violate Subjacency.

3.2. ECP account

ECP cannot explain why (15), (17) and (19) involving *wh*-objects are out since obviously the *wh*-object trace, t_j, is properly head-governed as illustrated in the general structure (25), even if we assume Comp-indexing (Aoun, Hornstein, & Sportiche 1981) at LF and Huang's (1982) LF-movement of in-situ *wh*-words.

(25) ['what$_j$' ['why$_i$/how$_i$/A-not-A$_i$']]$_i$ [$_{IP}$ t_i …[$_{VP}$ V t_j] (= the LF of (15), (17) and (19))

Meanwhile, as Bošković (2000:(24)) points out, the ECP account cannot explain the overt *wh*-nominal/adverb interaction in the overt *wh*-fronting languages such as Bulgarian (see also Haider 1986). In (26) the *wh*-adjunct trace is not properly governed after Comp-indexing.

(26) [$_{CP}$ [[Koj] kak] [$_{C'}$ e kupil kniga]]
who how is bought book

'Who bought the book how?'

3.3. Superiority account

The superiority account cannot explain why the *wh*-nominal/adverb interactions in simplex sentences as in (14-19) are ruled out since they do not violate the Superiority condition (even if we adopt mechanisms like Attract Closest and Fewest Steps (Chomsky 1995, Bošković 1997, Kitahara 1997, Richards 2001)). On the other hand, even though we may treat the complex sentences in (22) as the crossing phenomenon like the English case in (6), we do not know why the same phenomenon disappears in (21) where the higher *wh*-subject presumably can be fixed in the embedded CP while the lower *wh*-adverb/A-not-A-operator takes the matrix scope.

3.4. Merging '*why*' at CP (Epstein 1998, Ko 2003, 2006, Stepanov & Tsai 2006)

For Stepanov & Tsai (2006), they can explain Chinese examples in (14d) and (15) (general structure illustrated below) by assuming the Unselective Binding analysis (Tsai 1994) since the slot for merging a Q-operator at CP has already been taken by *wheishenme* 'why' rendering the Unselective Binding unavailable.

(27) *[$_{CP}$ '*why*' [$_{IP}$ …'*who/what*'…]
↑
(no binder for the *wh*-nominal)

Yet, they are vague in the examples like (14a-c) and (21a) (general structure illustrated below as (28)) where they suggest that it is "the *wh*-subject that renders an intervention effect for a potential LF movement/Agree of the reason *why*". This seems to suggest that the *wh*-adverb *why* is adjoined to IP and undergoes subsequent LF-movement to CP, instead of being merged at CP.

(28) *[$_{CP}$ '*who*' '*why*' [$_{IP}$ …]

For Ko (2003, 2006), she judges the paradigm in (14d) and (15) to be grammatical, which, as already shown in footnote 3, can be acceptable only with the purpose-*why* reading. What we are discussing here is the reason-*why* reading with which the paradigm in (14d) and (15) can not be grammatical.

For the paradigm in (14a-c) (general structure illustrated in (28) above), she suggests that *wh*-topicalization is never possible in Chinese, contrary to fact (see Jianxin Wu 1999 for a detailed illustration on Chinese *wh*-topicalization (or focus movement)). Even so, she still cannot explain why (21a) (repeated below) is acceptable.

(21) a. Ni xiang-zhidao [shei weishenme^{R} mai-le shu] (Huang 1982:525)
you want-know who why buy-Prf book

?Lit. 'Who do you wonder ___ why bought books?'
#Lit. 'Why do you wonder who ___ bought books?'

Furthermore, the "merging-*why*-at-CP" approach cannot be extended to constructions involving the other *wh*-adverb manner-*how* and the A-not-A operator, which exhibit the same pattern as the *wh*-adverb reason-*why* with respect to the *wh*-nominal/adverb interaction in Mandarin Chinese.

4. An intervention effect account

In this section I would like to propose that the paradigm illustrated in section 2 can be explained by the intervention effect (de Swart 1992, Beck 1996, Beck and Kim 1997, Pesetsky 2000, Ko 2003). More specifically, the ungrammatical sentences/readings in the paradigm in section 2 are attributed to the intervention effects on the LF-moving *wh*-adverbs/ A-not-A-operator. On the other hand, the grammatical sentences/readings in the same paradigm are simply due to the fact that Chinese *wh*-nominals generally do not exhibit intervention effect. Before we move on to the analysis, a brief introduction to intervention effect is necessary.[5]

---

[5] What is under discussion in this paper is different from the "strong" notion of intervention effect developed by Kim (2002, 2005) and Beck (2005). They limit their discussions to a core set of intervention effect, i.e., focus effect, since it enjoys a stable blocking phenomenon across languages.

(i) *[$_{CP}$ Q_i [FocP […wh_i …]]] (Kim 2002, 2005)

By "strong" I mean that even in Mandarin Chinese the *wh*-nominals are also ruled out by the focus effect as exhibited in (ii) where *shi* (focus marker similar to English cleft construction), *zhiyou* 'only', *lian* 'even' are focus markers.

(ii) a. *Shi Zhangsan chi-le shenme?
SHI Zhangsan eat-ASP what

'What was x such that it was Zhangsan that ate x?'

b. ?*Zhiyou Zhangsan chi-le shenme?
only Zhangsan eat-ASP what

'What did only Zhangsan eat?'

c. ?*Lian Zhangsan dou chi-le shenme?
even Zhangsan all eat-ASP what

'What did even John ate?'

In this paper, what is served as the diagnostics on covert movement is the "weak" notion of intervention effect to which only the *wh*-adverbs are sensitive as already exhibited in the contrast

4.1. Intervention effect in Mandarin Chinese

Generally speaking, the intervention effect may serve as a diagnostics on covert *wh*-movement. As illustrated in (29), a scope-bearing element X blocks the LF-movement of a *wh*-word:

(29) Intervention effect
*wh_i… X … wh_i …,
where X is a scope-bearing element, and the *wh*-dependency is created by LF movement of a *wh*-word (adapted from Ko 2003)

The German example below shows that LF-movement of the in-situ *wh*-word *wen* 'whom' or *wo* 'where' is blocked by an intervening scope-bearing element *niemand* 'nobody'. Hence the sentences are ruled out.

(German, Beck 1996:3)
(30) a. ??Was glaubt *niemand* wen Karl gesehen hat?
what believes nobody whom Karl seen has

'Who does nobody believe that Karl saw?'

b. ??Wen hat *niemand* wo gesehen?
whom has nobody where seen

'Where did nobody see whom?'

In Mandarin Chinese, *wh*-nominals are not sensitive to intervention effect whereas *wh*-adverbs/A-not-A-operator are sensitive to it (Cheng & Rooryck 2002, Tsai 2004, Soh 2005,):

(*wh*-nominal)
(31) a. *Suoyou de xuesheng dou* jian-guo shei?
all DE student all meet-EXP who

'Who has all the students meet?'

b. Ta *mei* jian-guo shei?
he NEG meet-EXP who

'Who has he not meet?'

---

between (31) and (32). (See Yang 2006 for the discussion on the strong/weak contrast in intervention effect.)

(*wh*-adverb)

(32) a. Ta weishenme^{R}/zenme(yang)^{M} da Lisi?
he why/how beat Lisi

'Why/how did he beat Lisi?'

b. **Bingfei* ta weishenme^{R}/zenme(yang)^{M} da Lisi?
not he why/how beat Lisi

Lit. 'Why/how was it not the case that ___ he beat Lisi?'

c..**Suoyou de xuesheng dou* weishenme^{R}/zenme(yang)^{M} da Lisi?
all DE student all why/how beat Lisi

'Why/how did all the students beat Lisi?'

(*A-not-A operator*)

(33)a. Ta hui-bu-hui jian Lisi?
he will-not-will meet Lisi

'Will he or not meet Lisi?'

b. **Bingfei* ta hui-bu-hui jian Lisi?
not he will-not-will meet Lisi

Lit.'It is not the case that he will meet Lisi or not?'

c..**Suoyou de xuesheng dou* hui-bu-hui jian Lisi?
all DE student all will-not-will meet Lisi

'Will all the students meet Lisi or not?'

Meanwhile, it is suggested in the literature that that Chinese *wh*-nominals should involve no movement at all whereas *wh*-adverbs do undergo covert movement (or feature movement) (Tsai 1994, 1999, Reinhart 1998, Cheng & Rooryck 2002). It is therefore safe to investigate into the intervention effect of these LF-moving *wh*-adverbs/A-not-A-operator which, as will be clear later, in turn leads to the ungrammatical sentences/readings discussed in the paradigm in section 2.

4.2. Attract Closest revisited

I will maintain Attract Closest in my analysis. Though at first sight it seems not to be able to account for the language paradigm in section 2, I propose that by assuming Tsai's (1994) unselective binging (or Reinhart's (1998) Choice Functional approach) and Rizzi's left periphery system of CP, the Attract Closest may remain intact while the paradigm under discussion is well accounted for.

Let's recapitulate the problems of Attract Closest first. As one can tell from example (12)

(repeated below) which involves two *wh*-nominals, Attract Closet would predict it to exhibit crossing phenomenon as in (6), contrary to fact (see also footnote 1).

(12) Ni xiang-zhidao [shei mai-le shenme]?
you want-know who buy-Prf what

a. Lit. 'Who do you wonder ___ bought what?'
b. Lit. 'What do you wonder who bought ___?'

On the other hand, as already mentioned in section 3.3, Attract Closet cannot explain why all the simplex sentences in (14-19) involving *wh*-nominal/adverb interaction are ruled out. Also, with respect to crossing effect in the complex sentences in (21) and (22), there is no knowing why only the *wh*-nominal takes the matrix scope since at least in (21) the higher *wh*-subject presumably can be fixed in the embedded CP while the lower *wh*-adverb/A-not-A-operator takes the matrix scope in the same vein as (6).

For the constructions involving two *wh*-nominals like (12), the unselective binding approach (Tsai 1994, see also Reinhart 1998) comes in handy. The unselective binding is generally assumed to be insensitive to locality effect. Therefore, either *wh*-nominal can be bound by either Q-operator as illustrated in (34). Hence, no crossing effect is observed.

(34) Ni xiang-zhidao [shei mai-le shenme]?
you want-know who buy-Prf what

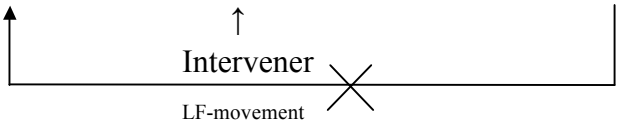
a. Q_x [you wonder Q_y[who(x) bought what(y)]]
b. Q_y [you wonder Q_x[who(x) bought what(y)]]

For the constructions involving *wh*-nominal/adverb interaction, I will adopt Rizzi's (1999) "Split-CP" system where C_{FOC} is the merging site for a Q-operator binding the *wh*-nominals and C_{INT} is the landing site for the LF-moving *wh*-adverbs/A-not-A-operator. Simply put, what is traditionally assumed to be one C-head as the attractor for both *wh*-nominals and *wh*-adverbs is now split into two independent C-heads, C_{FOC} and C_{INT}, attracting their corresponding *wh*-elements.

(35) [C_{INT} … C_{FOC} [IP …]]
where C_{INT} = the landing site for *wh*-adverbs/A-not-A-operator; C_{FOC} = the merging site for a *Q*-operator binding the *wh*-nominals 'who/what'

The basic idea to account for the *wh*-nominal/adverb interaction is this. Since Chinese *wh*-nominals do not exhibit intervention effect while *wh*-adverbs/A-not-A-operator do exhibit so, what leads to the ungrammatical sentences/readings in the *wh*-nominal/adverb interaction is then the intervention effect of the LF-moving *wh*-adverbs/A-not-A-operator. Namely, these LF-moving elements are the intervenees. Meanwhile, the Q-operator responsible for licensing *wh*-nominals in Chinese serves as the intervener.

(36) [C_{INT} … C_{FOC} Q-OP_x [IP …*wh*(x)… '*why/how/A-not-A*'…]] (order irrelevant)



In this sense, Attract Closest remains intact. On the one hand C_{FOC} is responsible for the *wh*-nominals only. The Q-operator merged at C_{FOC} unselectively binds its corresponding *wh*-nominals regardless of a higher *wh*-adverb or A-not-A operator because the *wh*-nominals and the *wh*/adverbs/A-not-A-operator are of different type (Tsai 1994, Reinhart 1998). On the other hand the C_{INT} attracts its corresponding *wh*-adverbs/A-not-A-operator, only that the subsequent LF-movement of the *wh*-adverb/A-not-A-operator may be blocked by an intervening Q-operator merged at C_{FOC}.

In what follows, I will illustrate in detail the derivations for the *wh*-nominal/adverb interactions in the left periphery of CP.

4.3. Simplex sentence

Recall that in Chinese simplex sentences a *wh*-nominal generally cannot co-occur with a *wh*-adverb, regardless of the ordering of these two types of *wh*-elements. In this section I show that such a phenomenon results from the intervention effect on the LF-moving *wh*-adverbs/A-not-A-operator. Let's start from the general structure (20a) (repeated below) where '*who/what*' precedes '*why/how/A-not-A*'.

General structure I:
(20a) *['*who/what*' … '*why/how/A-not-A*' …]

Derivations:
(37) a. *Structure before LF-operation*
[$C_{INT[+Q]}$ … $C_{FOC[+Q]}$ ['*who/what*' … '*why/how/A-not-A*' …]

b. *Step 1*: Merging a Q-operator at $C_{FOC[+Q]}$ to bind *who/what* (Tsai 1994)
[$C_{INT[+Q]}$ … $C_{FOC[+Q]}$Q-OP ['*who/what*' … '*why/how/A-not-A*' …]

c. *Step 2*: $C_{INT[+Q]}$ attracts '*why/how/A-not-A*', triggering intervention effect
[$C_{INT[+Q]}$ … $C_{FOC[+Q]}$Q-OP ['*who/what*' … '*why/how/A-not-A*' …]

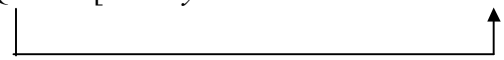
As one can tell from (37c), the Q-operator merged at C_{FOC} serves as a scope-bearing element which in turn blocks the LF-movement of '*why/how/A-not-A*', an obvious intervention effect.

Now, let's try the other ordering (20b) where '*why/how/A-not-A*' precedes '*who/what*':

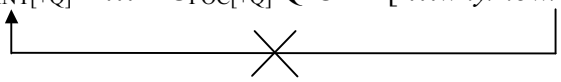
General structure II:
(20b) *[‘*why/how/A-not-A*’ … ‘*who/what*’ …]

Derivations:
(38) a. *Structure before LF-operation*
[$C_{INT[+Q]}$ … $C_{FOC[+Q]}$ […‘*why/how/A-not-A*’ … ‘*who/what*’ …]

b. *Step 1*: Merging a Q-operator at $C_{FOC[+Q]}$ to bind *who/what*
[$C_{INT[+Q]}$ … $C_{FOC[+Q]}$Q-OP […‘*why/how/A-not-A*’ … ‘*who/what*’…]



c. *Step 2*: $C_{INT[+Q]}$ attracts *why/how/A-not-A*, triggering intervention effect
[$C_{INT[+Q]}$ … $C_{FOC[+Q]}$ Q-OP […*why/how/A-not-A …… who/what* …]



Note that in (38b) the ‘*why/how/A-not-A*’ does not block the unselective binding of the *wh*-nominal ‘*who/what*’ from the Q-operator merged at C_{FOC} since on the one hand unselective binding does not follow locality constraint, while on the other hand what the O-operator needs is the *wh*-nominal serving as a variable, instead of the quantifier-/operator-like *wh*-adverbs/A-not-A-operator. Meanwhile, (38c) exhibits the same intervention effect as in (37c).

In this section, I have shown that the reason why in Chinese simplex sentences a *wh*-nominal generally cannot co-occur with a *wh*-adverb/A-not-A-operator is because of the intervention effect on the LF-moving *wh*-adverb/A-not-A-operator. In the next section, I will show that in Chinese complex sentences, where a *wh*-nominal interacts with a *wh*-adverb/ A-not-A-operator in the embedded clause, it is still the intervention effect that filters out the ‘*why/how/A-not-A*’ reading.

4.4. Complex sentence

Recall that when the ungrammatical sentence in the previous section is further embedded with a matrix interrogative predicate like ‘wonder’, the whole complex sentence turns out to be grammatical and only the *wh*-nominals can take the matrix scope reading. This section works on such derivations in detail. I will show that the matrix ‘*why/how/ A-not-A*’ reading is ruled out due to the intervention effect.

Let’s start from the general structure (23a) and in the following derivations (39) I show how the matrix ‘*why/how/A-not-A*’ reading is ruled out:

General structure III:
(23a) […‘wonder’ [‘*who/what*’ … ‘*why/how/A-not-A*’ …]] (matrix *who/what* reading only)

Derivations: (*matrix '*why/how/A-not-A*' reading)

(39) a. *Structure before LF-operation*

[$C_{INT[+Q]}$ … 'wonder' [$C_{FOC[+Q]}$ ['*who/what*' … '*why/how/A-not-A*' …]]

b. *Step 1*: Merging a Q-operator at $C_{FOC[+Q]}$ to bind *who/what*

[$C_{INT[+Q]}$ … 'wonder' [$C_{FOC[+Q]}$Q-OP ['*who/what*' … '*why/how/A-not-A*' …]]

c. *Step 2*: $C_{INT[+Q]}$ attracts *why/how/A-not-A y* (intervention effect))

[$C_{INT[+Q]}$ … 'wonder' [$C_{FOC[+Q]}$Q-OP ['*who/what*' … '*why/how/A-not-A*' …]]

(39a) is the structure before LF-operation. Due to principles of economy, only the necessary head for interpretation is projected. Here we want '*why/how/A-not-A*' to take the matrix scope while '*who/what*', the embedded scope, so the C_{INT} is projected at the matrix CP while the C_{FOC} is projected at the embedded CP.[6] In (39b) a Q-operator is merged at C_{FOC} binding '*who/what*'. Nothing goes wrong with this step. In (39c), however, the subsequent LF-movement of '*why/how/A-not-A*' is blocked due to the intervening Q-operator. Therefore, the matrix '*why/how/A-not-A*' reading is never possible.

Now, I show how the matrix '*who/what*' reading is derived. To yield the desired reading, the C_{FOC} is projected at the matrix CP whereas the C_{INT} is projected at the embedded CP (40a). In (40b) the embedded C_{INT} attracts the closest corresponding *wh*-element '*why/how/A-not-A*'. Nothing goes wrong with this step. In (40c), a Q-operator is merged at the C_{FOC} of the matrix CP. The Unselective Binding relation is built up between the Q-operator and it corresponding '*who/what*'. No intervention effect is observed and the matrix '*who/what*' reading is successfully derived.

Derivations: (matrix '*who/what*' reading)

(40) a. *Structure before LF-operation*

[$C_{FOC[+Q]}$ … 'wonder' [$C_{INT[+Q]}$ ['*who/what*' … '*why/how/A-not-A*' …]]

b. *Step 1*: $C_{INT[+Q]}$ attracts *why/how/A-not-A*

[$C_{FOC[+Q]}$ …'wonder' [$C_{INT[+Q]}$ ['*who/what*' … '*why/how/A-not-A*' …]]

[6] Even if both the C_{INT} and C_{FOC} are projected in the embedded CP to avoid the cyclicity violation, the derivations still work as (39) suggests, only that the intervention effect occurs at the embedded CP when '*why/how/A-not-A*' first lands at the embedded C_{INT} crossing the intervening Q-operator at the embedded C_{FOC}.

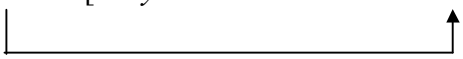
c. *Step 2*: Merging a Q-OP at matrix $C_{FOC[+Q]}$ binding the in-situ *who/what*
(no intervention effect)
[$C_{FOC[+Q]}$Q-OP… 'wonder' [$C_{INT[+Q]}$ '*why*$_i$/*how*$_i$/*A-not-A*$_i$' [*who/what* ... t_i …]

Similar derivations can also be observed in the general structure (24a) (repeated below) where '*why/how/A-not-A*' precedes '*who/what*' in the embedded clause. Following my illustration above, one can easily tell only the matrix '*who/what*' reading is possible whereas the matrix '*why/how/A-not-A*' reading is ruled out by the intervention effect.

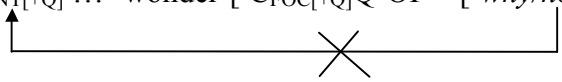
General structure IV:
(24a) [… 'wonder' ['*why/how/A-not-A*' … '*who/what*' …]] ('*who/what*' reading only)

Derivations: (*matrix *why* reading)
(41) a. *Structure before LF-operation*
[$C_{INT[+Q]}$ … 'wonder' [$C_{FOC[+Q]}$ ['*why/how/A-not-A*' … '*who/what*' …]]

b. *Step 1*: Merging a Q-OP at embedded $C_{FOC[+Q]}$ binding the in-situ '*who/what*'
[$C_{INT[+Q]}$ … 'wonder' [$C_{FOC[+Q]}$Q-OP ['*why/how/A-not-A*' … '*who/what*' …]]

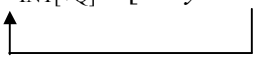


c. *Step 2*: $C_{INT[+Q]}$ attracts '*why/how/A-not-A*' (intervention effect))
[$C_{INT[+Q]}$ … 'wonder'[$C_{FOC[+Q]}$Q-OP ['*why/how/A-not-A*' … '*who/what*' …]]

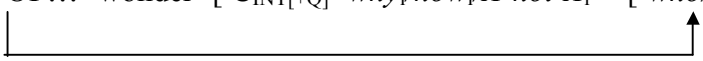


Derivations: (matrix '*who/what*' reading)
(42) a. *Structure before LF-operation*
[$C_{FOC[+Q]}$ … 'wonder' [$C_{INT[+Q]}$ ['*why/how/A-not-A*' … '*who/what*' …]]

b. *Step 1*: $C_{INT[+Q]}$ attracts *why/how/A-not-A*
[$C_{FOC[+Q]}$ … 'wonder' [$C_{INT[+Q]}$ ['*why/how/A-not-A*' … '*who/what*' …]]



c. *Step 2*: Merging a Q-OP at matrix $C_{FOC[+Q]}$ binding the in-situ '*who/what*'
[CFOC$_{[+Q]}$ Q-OP… 'wonder' [$C_{INT[+Q]}$ '*why*$_i$/*how*$_i$/*A-not-A*$_i$' ['*who/what*' … t_i …]]



5. Theoretical implication and consequence

At first sight, the Attract Closest adopted in this paper seems to be selective in the sense that different C-heads attract their corresponding *wh*-elements (C_{FOC} attracts '*who/what*' and C_{INT} attracts '*why/how/A-not-A*'. Yet, such a concern can be eased with the checking theory where different elements are checked by their corresponding checking heads. The attractor

only attracts the elements of the relevant features corresponding to the attractor. Therefore, the Attract Closest remains virtually intact.

Meanwhile, as Dylan Tsai (p.c.) points out, assuming two independent C-heads within the same CP would lead to the situation where the *wh*-elements attracted by the higher C c-command and thus scope over those attracted by the lower C. For the *wh*-nominals, in this study the *wh*-nominals are unselectively bound by a Q-operator merged at C_{FOC}, which is on a par with the Baker-style "absorption". Therefore, the *wh*-nominals take the same scope within one CP. As for the *wh*-adverbs/A-not-A-operator, there is no knowing if they, i.e., '*why/how/A-not-A*' at C_{INT}, do scope over '*who/what*' at C_{FOC} within one CP domain since in Mandarin Chinese these two types of *wh*-elements cannot co-occur in a simplex sentence. We may simply assume that the whole CP is one general scope domain for *wh*-elements even if the CP is split into two or more layers. I will leave the issue open.

The analysis addressed in this study may have the following typological prediction. In a CP-prominent language, such as Chinese, *wh*-nominals and *wh*-adverbs have their independent positions/projections at CP respectively. Attract Closest thus attracts the *wh*-elements of the same kind/feature as the attractor, i.e., C_{FOC} attracts *wh*-nominals while C_{INT} attracts *wh*-adverbs. On the other hand, in a non-CP-prominent language, such as English, there is only one C-head. Attract Closest simply attracts the closet *wh*-element regardless of its type.

With such a typological prediction, let's go back to the English cases (3) and (9), repeated below, and try to account for the distribution with an intervention account.

(3) a. *Who arrived why? (Huang 1982, Reinhart 1998, Saito 2003)

b. *Who fixed the car how? (Bošković 2000)

(9) a. *Who$_i$ did [$_{IP}$ you [$_{VP}$ see t_i] why]? (Lasnik & Saito 1984:242)

b. Why$_i$ did you buy what t_i? (Huang 1982, Saito 2003)

Suppose English is a non-CP-prominent language where, unlike Chinese, only one C-head is projected for the *wh*-movement. In (3) the *wh*-subject *who* is attracted first due to Attract Closest. Yet, subsequent LF-movement of *why/how* would cross the intervening *who*, triggering intervention effect.[7] (9a) is out simply because what is attracted first is not the higher VP-adjunt *why*, a violation of Attract Closest. On the other hand, (9b) is acceptable because the *wh*-object undergoes covert phrasal movement which according to Pesetsky's (2000) characterization does not induce intervention effect.

[7] I assume multiple specifier approach for the single C-head in English so that the first *wh*-word is attracted to the lower SpceCP while the second *wh*-word, the higher SpecCP.

(43) Intervention effect (universal characterization)
A semantic restriction on a quantifier (including *wh*) may not be separated from that quantifier by a scope-bearing element. (Pesetsky 2000:67)

The same reasoning extends to the sentence '*Who bough what?*' in English where the *wh*-object *what* undergoes covert phrasal movement. Hence, no intervention effect is observed.

How about (44)? We may have two possible solutions. The first one is that they both violate Attract Closest since *why/how* is lower than the *wh*-subject *who*. The second one is that the *wh*-subject in these sentences undergo feature movement (Pesetsky 2000) so that following Pesetsky's characterization above, these sentences are ruled out due to intervention effect.[8]

(44) a. *Why did who buy the books? (Huang 1982:559(92b))

b. *How did who fix the car? (Cheng & Demirdash 1990:(18b), Pesetsky 2000: fn. 95)

References:

Aoun, J., N. Hornstein and D. Sportiche. 1981. Some Aspects of Wide Scope Quantification. *Journal of Linguistic Research* 1, 69 - 95.

[8] As pointed out by Yuji Takano (p.c.), the first solution, Attract Closest approach, is not the determining factor since the following sentence is still out:

(i) *Why did John think who bought the book?

In the above sentence "why" is obviously the closest *wh*-element to the matrix C-head, whereas the sentence is still ruled out. Therefore, the first possible solution doesn't seem to work.

The following argument suggests that the second solution inspired by Pesetsky's (2000) notion of intervention effect may be the right one. Pesetsky's reasoning is this. He suggests that the following wrong sentences are due to the intervention effect where the wh-phrase '*which person*' undergoes feature movement so that the semantic restriction of it and its Q/wh feature is intervened by a negation marker:

(ii) *Which book didn't which person read? (Pesetsky 2000:60)
(cf. Which book did which person not read?)

(iii) *Which book didn't John think which person read?
(cf. Which book did John think which person didn't read?)

Following Pesetsky, we may judge the in-situ wh-subject '*which person*' here above as undergoing feature movement, sensitive to intervention effect. With this reasoning, we may account for the ungrammaticality in (44) and (1) above at the same time. That is, both the wh-subject '*who*' in (44) and (1b) undergo feature movement, which then is sensitive to intervention effect.

Beck, Sigrid. 1996. Quantified structures as barriers for LF movement. *Natural Language Semantics* 4:1, 1-56.

Beck, Sigrid. 2005. Intervention Effects Follow from Focus Interpretation, ms.

Beck, S. and S.-S. Kim. 1997. On wh- and operator scope in Korean. *Journal of East Asian*

Bošković, Željko (1997). On certain violations of the Superiority Condition, AgrO, and. economy of derivation. J*ournal of Linguistics* 33(1), 227-254.

Bošković, Željko. 2000. Sometimes in SpecCP, Sometimes In-situ, in R. Martin, D, Michael and J. Uriagereka (eds.), *Step by Step*, MIT Press, Cambridge, MA, pp. 53-88.

Cheng, L. and Hamida Demirdash. 1990. Superiority Violations, ms.

Cheng, L. and J. Rooryck. 2002. Types of *wh*-in-situ, ms. Leiden University.

Epstein, Samuel David. 1998. Overt scope marking and covert verb-second. *Linguistic Inquiry* 29: 181-227.

Haider, Hubert. 1986. Affect α: A reply to Lasnik and Saito, On the nature of proper government. *Linguistic Inquiry* 17: 113-126.

Huang, C.-T. James. 1982. *Logical Relation in Chinese and the Theory of Grammar*. Ph.D. dissertation, MIT.

Kim, S.-S. 2002. Intervention effects are focus effects. *Japanese/Korean Linguistics* 10, CSLI Publication, 615-628.

Kim, S.-S. 2005. Focus intervention effects in questions. Paper presented at TEAL Workshop 3, Harvard University.

Kitahara, Hisatsugu. 1997. *Elementary Operations and Optimal Derivations*, MIT Press, Cambridge, Mass.

Ko, Heejeong. 2003. Syntax of *Why*-in-situ: Merge into [Spec, CP] in the overt syntax, ms.

Ko, Heejeong. 2006. On the structural height of reason *wh*-adverbials: acquisition and consequences, ms.

Lasnik, Howard and Mamoru Saito. 1984. On the Nature of Proper Government. Linguistic Inquiry 15.2:235-289

Ochi, Masao. 2003. How come and Other Adjunct Wh-phrases: A Cross-Linguistic Perspective. *Language and Linguistics*, Vol. 5, Iss. 1, pp. 29-57.

Pesetsky, David. 2000. *Phrasal Movement and Its Kin*, MIT Press.

Reinhart, Tanya. 1998. Wh-in-situ in the framework of the minimalist program. *Natural Language Semantics* 6, 1:29-56.

Richards, Norvin. 2001. *Movement in language: Interactions and architectures*. OUP: Oxford.

Rizzi, Luigi. 1999. On the position of "Int(errogative)" in the left periphery of the clause. Ms. Università di Siena.

Rudin C. 1988. On Multiple Questions and Multiple WH-Fronting. *Natural Language and Lingustic Theory*. 6. 445-502.

Saito, Mamoru. 2003. Some Remarks on Superiority and Crossing. 4th GLOW in Asia, Seoul, Korea.

Soh, Hui-Ling. 2005. WH-in-situ in Mandarin Chinese. *Linguistic Inquiry* 36: 143-155.

Stepanov, Arthur and Wei-Tien Dylan Tsai. 2006. The Hows and Whys of How and Why: Unselective Binding and Merger of Wh-Adjuncts, ms.

Tsai,W.-T. Dylan. 1994. *On economizing the theory of A-bar dependencies*. Doctoral dissertation, MIT, Cambridge, Mass.

Tsai, Wei-Tien Dylan. 1999. The hows of why and the whys of how. In Francesca Del Gobbo and Hidehito Hoshi (eds.), *UCI Working Papers in Linguistics* 5, 155-184.

Tsai,W.-T. Dylan. 2004. Left periphery and *how-why* alternations, ms.

Wu, Jianxin. 1999. Syntax and semantics of quantification in Chinese. Doctoral dissertation, University of Maryland at College Park.

Yang, Barry C.-Y. 2006. Intervention Effects and Left Periphery. In *Proceedings of the 8th Soul International Conference on Generative Grammar (SICOGG8)*, Soomyung Women's University, Seoul.