Sluicing and the base-generation positions of wh-phrases in Mandarin

Li-jen Shih
Michigan State University

This paper examines the relationship between sluicing and the base-generation positions of wh-phrases in Mandarin. Three arguments are made: (i) The PF-deletion approach (e.g., Merchant 1999) is superior to the interpretation approach (e.g. Chung, Ladusaw and McCloskey 1995); (ii) the two wh-auxiliaries *shenmeshihou* ‘when’ and *zainali* ‘where’ may be base-generated in the Comp domain; (iii) the grammaticality of a sluicing construction in Mandarin also depends on whether the wh-phrase can be unselectively bound or licensed.

1. Introduction

Sluicing is a type of ellipsis structure introduced by a wh-phrase. The bracketed portion in the sentence in (1) represents a sluicing construction:

(1) He bought something, but I don’t know [what _].

Within the bracketed portion, a wh-phrase occurs in isolation with something missing in the following position. In fact, the bracketed portion is normally expected to correspond to an embedded clause, as shown in (2):

(2) He bought something, but I don’t know [CP what, [IP he bought t̄]].

There are two main approaches to the derivation of sluicing in the literature. The first approach, termed the PF-deletion approach, claims that (2) is the structure at Spell-Out and (1) is derived from (2) by deleting the IP at PF (Wang, C.-A., 2002, Merchant 1999, Kizu 2000, 1997, Nishiyama 1995, Takahashi 1994, Ross 1969). The example in (3) shows how (1) is derived in this approach:

(3) Spell-Out: He bought something, but I don’t know [CP what, [IP he bought t̄]].
   LF: He bought something, but I don’t know [CP what, [IP he bought t̄]].
   PF: He bought something, but I don’t know [CP what, [IP he bought t̄]].
In (3), *what* moves to [Spec, CP] before Spell-Out so that it can escape the deletion taking place at PF.

The other approach, termed the interpretation approach (e.g. Chung, Ladusaw and McCloskey 1995, Lobeck 1995), claims that in a sentence like (1) the IP is base-generated empty and the empty IP is reconstructed at some later level of the derivation. For example, Chung, Ladusaw and McCloskey (1995) proposed that the empty IP can be interpreted via IP Recycling, Sprouting, and Merger at LF. With respect to the source of the remnant wh-phrase, they suggested that it is base-generated in [Spec, CP]. The derivation of the sentence *He bought something but I don’t know when* is shown in (4) according to their analysis:

(4) Spell-Out: He bought something, but I don’t know [CP when [IP e]].
LF: He bought something, but I don’t know [CP when, [IP he bought something [PP]].
PF: He bought something, but I don’t know [CP when [IP e]].

At Spell-Out and PF, *when* occupies [Spec, CP] and the IP is empty. In order to interpret this sentence, three operations take place at LF. First, *John bought something* is recycled into the empty IP site (IP Recycling). Second, a PP is created within the recycled IP (Sprouting). Third, the PP is coindexed with *when* (Merger). This way, the ellipsis can be interpreted and the sentence is therefore grammatical.

Before Merchant’s (1999) dissertation, the biggest problem with the PF-deletion approach was its failure to explain why the movement of the wh-phrases is insensitive to islands. For example, the sentence in (5) is assumed to be derived from that in (6), but the sentence in (6) is ungrammatical because *which dialect* moves out of a relative clause:

(5) They want to hire someone who can speak a dialect of Chinese, but I don’t know [CP which dialect [IP e]].

(6) *They want to hire someone who can speak a dialect of Chinese, but I don’t know [CP which dialect, [IP they want to hire someone [who can speak t]].

Merchant (1999) argued that island effects are PF-phenomena, and the violations by the movement of the wh-phrases can be remedied by deleting the IPs (see Merchant 1999: §5 for details). Besides, Merchant (1999) pointed out some serious problems with the interpretation approach. One of them was that it is simply a stipulation to say that the wh-remnants are base-generated in [Spec, CP]. For example, in languages where preposition-stranding is disallowed, the preposition (if there is one) must appear in the Comp domain. Because its appearance is obligatory, the interpretation approach is forced to assume that it is also base-generated there. This sounds like a stipulation. In addition, to account for data from languages where the preposition is optional (e.g. English), the interpretation approach has to further assume that though the preposition is base-generated in the Comp domain, it may not be overtly realized in some languages.

Analyzing Mandarin data in the interpretation approach faces a similar problem. In Mandarin, a sluicing construction involving *weishenme* ‘why’, *shenmeshihou* ‘when’ or *zainali* ‘where’ is possible but one involving *zenmeyang* ‘how’, *shenme* ‘what’ or *shei*
‘who’ is not. As a result, we have to assume that only those in the first set can be base-generated in [Spec, CP] for sluicing but those in the second set cannot, or that some principles may rule out the sluicing constructions involving those in the second set. The first assumption is implausible as it contradicts the more general assumption that the wh-remnants are base-generated in [Spec, CP]. For the second assumption, compare the following two examples:

(7) English: He fixed that car, but I don’t know how.

(8) Mandarin: *ta xiu-le na-liang che, keshi wo bu zhidao zenmeyang.

According to the interpretation approach, the English sentence is grammatical because a well-formed LF can be constructed. In exactly the same way, a well-formed LF can be constructed for the Mandarin sentence. However, the sentence is ungrammatical.

(9) LF: ta xiu-le na-liang che, keshi wo bu zhidao [CP zenmeyang, [IP ta [PP], xiu-he fix-ASP that-CL car but I not know how he fix-le na-liang che]].

There seems to be no principle that can rule (8) out but at the same time rule (7) in. Consequently, the grammaticality contrast between (7) and (8) does not have an explanation. The only possible solution seems to be abandon the stipulation and attribute the grammaticality contrast between (7) and (8) to other factors.

If the wh-remnants are not base-generated in [Spec, CP], where do they come from? As mentioned above, languages where the preposition must appear in the Comp all disallow preposition-stranding in normal wh-movement. Merchant (1999) argued that in these languages both the preposition and the wh-remnant are base-generated in the IP and move together to the Comp before Spell-Out. As a result, when the deletion takes place at PF, they are already out of the IP and hence can escape it. Data from languages such as English also can be explained: Because the preposition either stays in the IP or moves to the Comp before Spell-Out, it optionally appears in sluicing.

The same reasoning can be applied to (8). It is known that Mandarin is a wh-in-situ language. In such languages, wh-phrases do not move at all. Given that Spell-Out feeds PF, the wh-phrase *zenmeyang ‘how’, which is base-generated in the IP, cannot escape the deletion at PF.

The PF-deletion approach seems to predict that sluicing is impossible in Mandarin because wh-phrases in this language do not move. However, sluicing constructions involving *weishenme ‘why’, *shenmeshihou ‘when’ and *zainali ‘where’ are allowed in Mandarin. Why would that be? Before we address the issue, let us look at some data.

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1 I adopt the suggestions by Baker (1970), Reinhart (1998), Tsai (1994), Wu (1999) etc. that wh-in-situ stay in-situ even at LF.
2. Basic data and issues to be addressed

(10) *shei ‘who’, shenme ‘what’
   a. *ta aishang-le [yi-ge nuhair], keshi wo bu zhidao shei.
      he love-ASP one-CL girl but I not know who
      ‘He has fallen in love with a girl, but I don’t know who.’
   b. *ta mai-le [yi-ge dongxi], keshi wo bu zhidao shenme.
      he buy-ASP one-CL thing but I not know what
      ‘He bought something, but I don’t know what.’

   As can be seen in (10a) and (10b), when the wh-remnant is referring to an
   argument in the antecedent, the sluicing construction is bad.

(11) *weishenme ‘why’, zenmeyang ‘how’
   a. ta hen shengqi-de likai-le, keshi wo bu zhidao weishenme.
      he very angry-DE leave-ASP but I not know why
      ‘He left in anger, but I don’t know why.’
   b. *ta xiu-le na-liang che, keshi wo bu zhidao zenmeyang.
      he fix-ASP that-CL car but I not know how
      ‘He fixed the car, but I don’t know how.’

   In (11a) and (11b), weishenme ‘why’ and zenmeyang ‘how’ refer to a covert
   adjunct in the antecedent. While (11a) is good, (11b) is not.

(12) *shenmeshihou ‘when’, zainali ‘where’
   a. ta chu-le chehuo, keshi meiyouren zhidao shenmeshihou.
      he happen-ASP car-accident but no one know when
      ‘He had a car accident, but no-one knows when.’
   b. ta chu-le chehuo, keshi meiyouren zhidao zainali.
      he happen-ASP car-accident but no one know where
      ‘He had a car accident, but no-one knows where.’

   In (12a) and (12b), shenmeshihou ‘when’ and zainali ‘where’ also refer to a covert
   adjunct in the antecedent. As we can see, these two sentences are fine.
   
   In English, sluicing constructions involving who, what, why, how, when or where
   are all possible. Two asymmetries therefore arise. One is the asymmetry between English
   and Mandarin: The wh-remnant can refer to an argument or an adjunct in English but
   only to an adjunct in Mandarin. The other is the asymmetry between zenmeyang ‘how’
   and the other interrogative adjuncts in their ability to serve as the remnant in Mandarin.
   The first asymmetry has to do with whether wh-phrases overtly move to [Spec, CP] in the
   language. In English, wh-phrases all move to [Spec, CP] before Spell-Out (Multiple-wh
   questions are not considered here). As a result, all the six wh-phrases are able to serve as
the remnant. Mandarin, on the other hand, is a wh-in-situ language, where wh-phrases stay where they are base-generated throughout the derivation. If a wh-phrase is base-generated in IP, a sluicing construction with it as the remnant is impossible, given that it would get deleted at PF.

The question now is how to account for the second asymmetry. Lin (1992) argued that while *zenmeyang* ‘how’ is base-generated in VP, *weishenme* ‘why’ is actually base-generated in [Spec, CP]. If this is correct, the fact that *weishenme* ‘why’ can serve as the remnant in sluicing but *zenmeyang* ‘how’ cannot has a straightforward explanation. Given that *weishenme* ‘why’ is base-generated in [Spec, CP] but *zenmeyang* ‘how’ in VP, only *weishenme* ‘why’ can escape the deletion at PF. As to *shenmeshihou* ‘when’ and *zainali* ‘where’, we suspect that they also can be base-generated in the Comp domain. Based on the adverb licensing theory (Travis 1988, C.-C. J. Tang 1990), I will suggest that these two wh-adjuncts indeed can be base-generated there. As a result, we obtain a uniform explanation for the second asymmetry. Like *weishenme* ‘why’, *shenmeshihou* ‘when’ and *zainali* ‘where’ can serve as the remnant in sluicing because they can be generated outside of the IP in the first place.

While *shenmeshihou* ‘when’ and *zainali* ‘where’ can be the remnants in the sluicing constructions derived from islands or the complements of opinion verbs, *weishenme* ‘why’ cannot. Wu (1999) claimed that *weishenme* ‘why’ cannot be unselectively bound because it does not qualify for being a variable. I will show that this is exactly the reason why sluicing constructions derived from these embedded clauses are ungrammatical if *weishenme* ‘why’ serves as the remnant.

In §3, I will briefly summarize Lin’s (1992) arguments that while *zenmeyang* ‘how’ is based-generated in IP, *weishenme* ‘why’ is in fact base-generated in [Spec, CP]. I will then show how this is related to sluicing. In §4, I will argue that *shenmeshihou* ‘when’ and *zainali* ‘where’ can be base-generated in the Comp domain. I suggest that sluicing constructions involving these two adjuncts can be analyzed the same way as those involving *weishenme* ‘why’. In §5, I will show that whether the wh-phrase can be unselectively bound or licensed also plays a role in sluicing. The conclusion will be given in §6.

3. **The base-generation positions for *weishenme* ‘why’ and *zenmeyang* ‘how’ and their relations to sluicing**

It has been suggested in the literature that the reason adjunct be base-generated in [Spec, CP] (e.g. Ko 2005 for Korean and Japanese, Rizzi 1999 for Romance languages). Lin (1992) argued that the Mandarin counterpart is generated in that position as well. He observed that *weishenme* ‘why’ and *zenmeyang* ‘how’ have different distributions in simplex sentences and in a variety of embedded constructions. In simplex sentences, *weishenme* ‘why’ occurs either sentence-initially or between the subject and the modal, but *zenmeyang* ‘how’ only occurs after the modal. The embedded constructions Lin (1992) considered include islands (sentential subjects, relative clauses and adnominal clauses) and the complements of opinion verbs (the *xiwang* ‘hope’ type) and conjecture verbs (the *shuo* ‘say’ type). He found that while *zenmeyang* ‘how’ can appear in all these constructions, *weishenme* ‘why’ can only appear in the complements of conjecture verbs.

In terms of the phrase structure of these embedded constructions, Lin (1992)
suggested two possibilities. The first possibility was that though embedded clauses in Chinese generally project to IP, the complements of conjecture verbs exceptionally project to CP (T.-C. Tang 1988a, b). The second possibility was that all types of embedded construction in Chinese project to CP. However, following Rizzi’s (1990) idea that some Comps may serve as head governors but others may not, Lin (1992) suggested differentiating two types of Comp in Chinese. The first type is able to serve as a head governor and can be filled with a lexical word; the second type, on the other hand, does not qualify for being a head governor and cannot be lexically filled. Given that among the various types of embedded construction only the complements of conjecture verbs can host *weishenme* ‘why’ and question particles, it follows that only conjecture verbs select the first type of Comp.

Which possibility is correct does not concern us at this point. According to the theory of adverb licensing (Travis 1988), adverbs are licensed by features contained in the heads. Since features can only percolate inside the maximal projections, adverbs must be base-generated within the maximal projections of their licensing heads. C.-C. J. Tang (1990) suggested that the adverb licensing theory can be applied to all kinds of adverbial elements, including adjuncts. Based on their suggestions, Lin (1992) argued that while *zenmeyng* ‘how’ is base-generated in IP, as is usually assumed, *weishenme* ‘why’ is in fact base-generated in [Spec, CP].

Given that *shei* ‘who’, *shenme* ‘what’ and *zenmeyng* ‘how’ are based-generated in IP, there is no way they can escape the deletion at PF. The impossibility of forming a sluicing construction with *shei* ‘who’, *shenme* ‘what’ or *zenmeyng* ‘how’ is shown below:

(13)  *shei* ‘who’ (=10a)
   a. Spell-Out/LF
      ta aishang-le yi-ge nuhair, keshi wo bu zhidao [IP ta aishang-le shei].
      he love-ASP one-CL girl but I not know he love-ASP who
      ‘He fell in love with a girl, but I don’t know who he fell in love with.’
   b. PF
      *ta aishang-le yi-ge nuhair, keshi wo bu zhidao [IP ta aishang-le shei].
      he love-ASP one-CL girl but I not know he love-ASP who

(14)  *shenme* ‘what’ (=10b)
   a. Spell-Out/LF
      ta mai-le yi-ge dongxi, keshi wo bu zhidao [IP ta mai-le shenme].
      he buy-ASP one-CL thing but I not know he buy-ASP what
      ‘He bought something, but I don’t know what he bought.’
   b. PF
      *ta mai-le yi-ge dongxi, keshi wo bu zhidao [IP ta mai-le shenme].
      he buy-ASP one-CL thing but I not know he buy-ASP what

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T.-C. Tang (1988a, b) observed that in Chinese question particles such as *ma* and *ne* cannot appear in embedded clauses except for the complements of conjecture verbs. See Lin (1992:309) for examples.
(15)  *zenmeyng ‘how’ (=11b)
   a. Spell-Out/LF
      *ta xiu-le na-liang che, keshi wo bu zhidao [IP ta zemeyang xiu-le na-
         he fix-ASP that-CL car but I not know he how fix-ASP that-
         liang che].
      ‘He fixed the car, but I don’t know how he fixed the car.’
   b. PF
      *ta xiu-le na-liang che, keshi wo bu zhidao [IP ta zemeyang xiu-le
         he fix-ASP that-CL car but I not know he how fix-ASP
         na-liang che].
      ‘He fixed the car, but I don’t know how.’

Since *weishenme ‘why’ is base-generated in [Spec, CP], it is immune from the
deletion in the first place. The derivation of the sentence in (11a) is shown in (16):

(16)  *weishenme ‘why’ (=11a)
   a. Spell-Out/LF
      ta hen shengqi-de likai-le. keshi wo bu zhidao [CP weishenme [IP ta
         he very angry-DE leave-ASP but I not know why he
         hen shengqi-de likai-le]].
      ‘He left in anger, but I don’t know why he left in anger.’
   b. PF
      ta hen shengqi-de likai-le. keshi wo bu zhidao [CP weishenme [IP ta
         he very angry-DE leave-ASP but I not know why he
         hen shengqi-de likai-le]].
      ‘He left in anger, but I don’t know why.’

4. The base-generation positions for *shenmeshihou ‘when’ and *zainali
   ‘where’ and their relations to sluicing

According to C.-C. J. Tang (1990), an adjunct can be licensed by different heads
and hence can be base-generated in various positions. In the original version of the
adverb licensing theory (Travis 1988), a head can license different adverbs because
different adverbs may have the same scope of modification. Similarly, an adjunct may be
licensed by different heads because an adjunct may have different scopes of modification.
With these assumptions in hand, consider the following sentences:
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(17) *shenmeshihou* ‘when’

a. \[ [CP yinwei Zhan-sans you shi suoyi \{IP ta bu neng shenmeshihou lai\}]? \]
   because Zhan-sans have matter so he not can when come

b. \[ [CP yinwei Zhan-sans you shi suoyi \{IP ta shenmeshihou bu neng lai\}]? \]
   because Zhan-sans have matter so he when not can come

c. \[ [CP yinwei Zhan-sans you suoyi \{IP shenmeshihou \{IP ta bu neng lai\}\}]? \]
   because Zhan-sans have matter so when he not can come

d. \[ [CP shenmeshihou [CP yinwei Zhan-sans you suoyi[IP ta bu neng lai]]? \]
   ‘When is the time x such that Zhan-sans can’t come at x because he has something to do?’

(18) *zainali* ‘where’

A asks B:

a. \[ [CP yinwei shi shangye qu suoyi \{IP women dagai hui zainali zhao- bu-dao ting-che-de difang\}]? \]
   find park-car-DE place

b. \[ [CP yinwei shi shangye qu suoyi \{IP women zainali dagai hui zhao- bu-dao ting-che-de difang\}]? \]
   find park-car-DE place

c. \[ [CP yinwei shi shangye qu suoyi \{IP zainali \{IP women dagai hui zhao- bu-dao ting-che-de difang\}\}]? \]
   find park-car-DE place

d. \[ [CP zainali [CP yinwei shi shangye qu suoyi \{IP women dagai hui zhao- bu-dao ting-che-de difang\}]? \]
   ‘Where is the place x such that we probably can’t find a parking space because it is a business district?’

In these sentences, *shenmeshihou* ‘when’ and *zainali* ‘where’ appear in as many as four positions: After the modal, between the subject and the modal, between the connective *suoyi* ‘so’ and the subject, and before the reason clause. According to the
adverb licensing theory, they are licensed by three heads and base-generated in four positions: Those in the (a) sentences are licensed by \( V^0 \) and base-generated in the VP; those in the (b) and (c) sentences are licensed by \( I^0 \) and base-generated in the IP (but external to the VP) and in a position adjoined to the IP, respectively; those in the (d) sentences are licensed by \( C^0 \) and base-generated in a position adjoined to the CP. The fact that they can be licensed by \( C^0 \) suggests that they can be base-generated in any position in the Comp domain. I assume that clause-initial \textit{shenmeshihou} ‘when’ and \textit{zainali} ‘when’ are base-generated in [Spec, CP] unless a reason clause appears.

The fact that \textit{shenmeshihou} ‘when’ and \textit{zainali} ‘where’ can be base-generated in the Comp domain explains why sluicing constructions involving them are possible: They are external to the IP in the first place and thus can escape the deletion at PF. The examples in (19) and (20) are the derivations for the sentences in (13a) and (13b), respectively.

(19) \textit{shenemshihou} ‘when’ (=12a)

a. Spell-Out/LF

\[
\text{ta chu-le che-huo, keshi meiyouren zhidaoh [CP shenemshihou [IP ta he happen-ASP car-accident but no-one know when he chu-le che-huo]].}
\]

‘He had a car accident, but no one knows when he had a car accident.’

b. PF

\[
\ldots meiyouren zhidaoh [CP shenemshihou [IP ta chu-le che-huo]]
\]

‘He had a car accident, but no one knows when.’

(20) \textit{zainali} ‘where’ (=12b)

a. Spell-Out/LF

\[
\text{ta chu-le che-huo, keshi meiyouren zhidaoh [CP zainali [IP ta he happen-ASP car-accident but no one know where he chu-le che-huo]].}
\]

‘He had a car accident, but no one knows where he had a car accident.’

b. PF

\[
\ldots meiyouren zhidaoh [CP zainali [IP ta chu-le che-huo]].
\]

‘He had a car accident, but no one knows where.’
5. Revisiting *weishenme* ‘why’, *shenmeshihou* ‘when’ and *zainali* ‘where’

Recall that *weishenme* ‘why’ cannot appear in islands and in the complements of opinion verbs. As a result, the sluicing constructions derived from these embedded clauses are bad. The reason that they are bad is not because *weishenme* ‘why’ would get deleted at PF, but because the LFs are ill-formed. What is interesting is the fact that sluicing constructions derived from these embedded clauses are good if the wh-remnants are *shenmeshihou* ‘when’ or *zainali* ‘where’. Below are some examples: (Note that the sentences in (21)–(23) are bad but those said by B in (24)–(27) are good.)

*weishenme* ‘why’

(21) Sentential subject  

a. Spell-Out/*LF  
   ta mei lai. [IP [CP *weishenme* [IP ta mei lai]] bijiao kexin]?
   he not come why he not come more believable
   ‘He didn’t come. What is the reason x such that his not coming for x is more believable?’

b. PF  
   ...[IP [CP *weishenme* [IP ta mei lai]] bijiao kexin]?
      why he not come more believable

(22) Adnominal clause  

a. Spell-Out/*LF  
   [IP [CP *weishenme* [IP ta mei lai]] de shuofa bijiao kexin]?
   why he not come AD story more believable
   ‘What is the reason x such that the story that he didn’t come for x is more believable?’

b. PF  
   [CP *weishenme* [IP ta mei lai]] de shuofa bijiao kexin?
      why he not come AD story more believable

(23) Complement of opinion verbs  

a. Spell-Out/*LF  
   [IP ni xiangxin/xiwang/jiading [CP *weishenme* [IP ta mei lai]]]?
      you believe/hope/assume why he not come
   ‘Why do you believe/hope/assume he didn’t come?’

b. PF  
   ni xiangxin/xiwang/jiading [CP *weishenme* [IP ta mei lai]]?
      you believe/hope/assume why he not come
shenmeshihou ‘when’

(24) Sentential subject/Adnominal clause/Complement of opinion verbs

A: wo ting-shuo Zhangsan hui lai.
   I hear-say Zhangsan will come
   ‘I heard that Zhangsan would come.’

B:

a. Spell-Out/LF

   wo ye ting-shuo-le. [CP shenmeshihou [IP Zhangsan hui lai]] zui you
   I also hear-say-ASP when Zhangsan will come most have

   keneng?/[CP shenmeshihou [IP Zhangsan hui lai]] de kenengxing zui
   possible when Zhangsan will come DE possibility most

da?/ni xiwang/xiangxin/?jiading [CP shenmeshihou [IP Zhangsan hui lai]]? big youhope/believe/assume when Zhangsan will come
   ‘I also heard of it. When is the time x such that his coming in x is most possible?/When is the time x such that the possibility that he will come at
   x is greatest?/When do you hope/believe/assume he will come?’

b. PF

   …[CP shenmeshihou [IP Zhangsan hui lai]] zui you keneng?
   when Zhangsan will come most have possible

   /[CP shenmeshihou [IP Zhangsan hui lai]] de kenengxing zui da?
   when Zhangsan will come DE possibility most big

   /ni xiwang/xiangxin/?jiading [CP shenmeshihou [IP Zhangsan hui lai]]?
   you hope/believe/assume when Zhangsan will come

zainali ‘where’

(25) Sentential subject

A: women mingtian taolun zhe-jian shi, xing ma?
   we tomorrow discuss this-CL matter okay QP
   ‘We will discuss this matter tomorrow. Is it okay?’

B:

a. Spell-Out/LF

   xing. [CP zainali [IP women mingtian taolun zhe-jian shi]] bijiao hao?
   okay where we tomorrow discuss this-CL matter more good
   ‘It’s okay. Where is the place x such that our discussing the matter in x is
der better?’
b. PF

…[CP [IP women mingtian taolun zhe jian shi]] bijiao hao?
where we tomorrow discuss this-cl matter more good

(26) Adnominal clause/Complement of *xiwang* ‘hope’ and *jiading* ‘assume’
A: laoban mingtian qing women chi-wan-fan.
boss tomorrow treat us eat-late-rice
‘Boss will treat us to dinner tomorrow.’

B:

a. Spell-Out/LF

[CP [IP laoban mingtian qing women chi-wan-fan]] de kenengxing
where boss tomorrow treat us eat-late-rice AD possibility

zui da? ni xiwang? jiading [CP [IP laoban mingtian qing women
most big you hope/assume where boss tomorrow treat us

chi-wan-fan]]
eat-late-rice
‘Where is the place x such that the possibility that boss will treat us to
dinner tomorrow at x is greatest?/Where do you hope/assume boss will
treat us to dinner tomorrow?’

b. PF

[CP [IP laoban mingtian qing women chi-wan-fan]] de kenengxing
where boss tomorrow treat us eat-late-rice AD possibility

zui da? ni xiwang? jiading [CP [IP laoban mingtian qing women
most big you hope/assume where boss tomorrow treat us

chi-wan-fan]]
eat-late-rice

(27) Complement of *xiangxin* ‘believe’
A: Zhangsan shang xingqi qing Lisi chi-wan-fan.
Zhangsan up week treat Lisi eat-late-rice
‘Zhangsan treated Lisi to dinner last week.’

B:

a. Spell-Out/LF

zhende! ni xiangxin [CP [IP Zhangsan shang xingqi qing Lisi
really you believe where Zhangsan up week treat Lisi

chi-wan-fan]]
eat-late-rice
‘Really? Where do you believe Zhangsan treated Lisi to dinner?’
b. PF

\[ \text{… ni xiangxin [CP zainali [in} \text{Zhangsan shang xingqi qing Lisi chi wan-} \]

\[ \text{you believe where Zhangsan up week treat Lisi eat-late-} \]

\[ \text{fan}? \]

\[ \text{rice} \]

Note that in (24)–(27) the two adjuncts \textit{shenmeshihou} ‘when’ and \textit{zainali} ‘where’ must be based-generated in the Comp domain otherwise they would get deleted at PF. This fact suggests that neither of the two suggestions made by Lin (1992) as mentioned in §3 is correct. The reason is simple: If \textit{weishenme} ‘why’ cannot appear in the sluicing constructions derived from the embedded clauses, nor can \textit{shenmeshihou} ‘when’ and \textit{zainali} ‘where’.

Here I adopt the idea that wh-in-situ do not undergo LF-extraction and could be considered variables bound by an abstract Q-morpheme via unselective quantification (e.g. Reinhart 1998, Tsai 1994, Wu 1999). For example, the LF of the sentence \textit{Who bought what} can be represented as \textit{Q<}\textit{i}, \textit{j}> [\textit{who} \textit{i} [\textit{t} bought \textit{what}]] in this approach. Unlike the LF-movement approach, this approach assumes that wh-in-situ still stay in-situ at LF, and they are unselectively bound by a Q-operator.

The question now is how to explain the ill-formedness of the LFs in (21)–(23), given that \textit{weishenme} ‘why’ in these LFs is expected to be unselectively bound. Wu (1999) suggested that while wh-NPs such as \textit{who} and \textit{what} can be unselectively bound, the reason adverb \textit{why} cannot, and the reason is that unlike \textit{who} and \textit{what}, \textit{why} does not denote a set of individuals. He claimed that though \textit{who} and \textit{what} can be considered consisting of two morphemes (i.e. wh+pronominal), \textit{why} cannot be analyzed this way. Because \textit{why} lacks a pronominal component, it cannot serve as a variable, and hence cannot be unselectively bound. One piece of evidence for this argument comes from the fact that only \textit{who} and \textit{what} can combine with the morpheme \textit{ever} (\textit{whoever}, \textit{whatever}, \textit{*whyever}). Assuming that the quantificational force is supplied by \textit{ever} (Wu 1999: Fn 12), the incompatibility of \textit{why} and \textit{ever} indicates that \textit{why} cannot be bound via unselective quantification.

The second piece of evidence that \textit{why} cannot be unselectively bound comes from the contrast of the following two sentences:

(28) a. What book does everyone like?

b. Why does everyone like this book? (Wu 1999:27)

The (a) sentence has two readings. It can be answered by saying \textit{Everyone likes ...} or \textit{John likes ..., Bill likes ..., Helen likes ...} etc. The (b) sentence, on the other hand, has only one reading, since \textit{Everyone likes this book because...} is the only answer to the question. This fact shows that a pairing relation between a member of the set denoted by \textit{why} and a member of the set denoted by \textit{everyone} is impossible. The reason is clear: \textit{Why} simply does not denote a set of individuals.

The third piece of evidence is the fact that in Chinese the so-called donkey sentences cannot be formed with \textit{weishenme} ‘why’. Compare the sentences in (29):
Cheng and Huang (1994) suggested that donkey sentences in Chinese can be analyzed as the wh-phrases being unselectively bound by an operator. The reason that it is impossible to form a donkey sentence with weishenme ‘why’ is that weishenme ‘why’ does not denote a set of individuals and thus is not qualified for being a variable.

Now that the reason adverb cannot be unselectively bound, how do we explain sentences like *Why did he do that and I wonder why he did that?* Wu (1999) suggested that in these contexts there are two ways why can be licensed. First, a Q-morpheme can be inserted at LF. This type of licensing, however, observes a locality condition. In other words, though a reason adverb in a matrix clause gets licensed, one in an embedded clause does not. The sentences in (21)–(23) are ungrammatical for this reason. Second, the reason adverb can be licensed by Comp that is specified for [+wh]. For example, the verb wonder selects [+wh] Comp for its embedded clause. As a result, the reason adverb in *I wonder why he did it* is licensed. Note that the reason adverb in the LF of the sentence in (16) (=11a) is also licensed this way. Besides, if the reason adverb is licensed this way, its scope covers the embedded clause only.

We now turn to the question, why are the LFs in (24)–(27) well-formed? The only explanation seems to be that the two adjuncts can be unselectively bound. We may want to test these two adjuncts using Wu’s (1999) criteria.

First, in English *when* and *where* can combine with the morpheme *ever* (e.g. *John studies whenever Bill studies*; *John studies wherever Bill studies*). Second, sentences such as *When did everyone get here? and Where did everyone eat?* have two readings. Besides *Everyone got here at ... and Everyone ate at ..., the two sentences can be answered by saying *John got here at ..., Bill got here at ... and John ate at ..., Bill ate at ... *, respectively. Third, donkey sentences can be formed with shenmeshihou ‘when’ and zainali ‘where’ in Mandarin. For example:

(30) a. Zhangsan shenmeshihou zou, Lisi jiu shenmeshihou qu.
   Zhangsan when walk Lisi when walk
   ‘For every x, x is a point in time, if Zhangsan leaves at x, Lisi leaves at x.’

   Zhangsan where eat-rice Lisi where eat-rice
   ‘For every x, x is a place, if Zhangsan eats at x, Lisi eats at x.’
These pieces of evidence indicate that the two adjuncts both denote a set of individuals and thus can be thought of as consisting of a pronoun and the [+wh] feature. Because they have a pronominal component in them, they can be unselectively bound as variables. This in turn explains why the LFs in (24)–(27) are well-formed.

The final question we need to answer is why *weishenme* ‘why’ can appear in the complements of conjecture verbs. An example is given blow:

(31) ni shuo/cai/renwei [weishenme ta zuotian mei lai]?
you say/guess/think why he yesterday not come
‘Why do you say/guess/think he didn’t come yesterday?’

Wu (1999) suggested that a conjecture verb selects neither [+wh] nor [−wh] and that it and its subject form the so-called parenthetical phrase. That is, the seeming embedded clause in (31) is in fact not embedded in a matrix clause. He argued that evidence comes from the contrast of the following two sentences:

(32) a. ta weishenme lai, ni shuo/cai/renwei?
he why come you say/guess/think
‘Why do you say/guess/think he came?’

b. * ta weishenme lai, ni xiwang/xiangxin/dangxin?
he why come you hope/believe/worry
‘Why do you hope/believe/worry he came?’

(Wu 1999:41)

The examples in (32) show that though the complement clauses of conjecture verbs can be preposed, those of opinion verbs cannot. This fact indicates that the relationship between a conjecture verb and its complement clause is weak. In addition, among the various types of embedded construction in Chinese, the complements of conjecture verbs are the only one that can host a question particle. This fact also justifies the reasoning that the complements of conjecture verbs are not embedded clauses. If this argument is correct, a Q-morpheme can be inserted at the LF of the sentence in (31).

Since the reason adverb in (31) is licensed, the clause can be sluiced at PF.

(33) a. Spell-Out/LF
Q<i> <ni shuo/cai/renwei> [CP weishenme, [IP ta zuotian mei lai]]?
you say/guess/think why he yesterday not come
‘Why do you say/guess/think he didn’t come yesterday?’

b. PF
ni shuo/cai/renwei [CP weishenme [IP ta zuotian mei lai]]?
you say/guess/think why he yesterday not come
‘You say/guess/think why?’
5. Conclusion

We have seen that shenmeshihou ‘when’ and zainali ‘where’ display a wider distribution than other wh-phrases in sluicing. Shei ‘who’, shenme ‘what’ and zenmeyang ‘how’ cannot be the remnant because they are base-generated in IP and there is no way they can escape the deletion at PF. Weishenme ‘why’, which is base-generated in [Spec, CP] but cannot be unselectively bound, can be the remnant only if it is licensed by an inserted Q-morpheme or by a [+wh] Comp. Shenmeshihou ‘when’ and zainali ‘where’ can be base-generated in the Comp domain and can be unselectively bound. As a result, they are capable of serving as the remnant in sluicing under any condition given that both the LF and PF are always well-formed. The table below is a summary:

Table 1: Features of Wh-words

<table>
<thead>
<tr>
<th>Wh-Word</th>
<th>Base-generation position(s)</th>
<th>Unselectively bound</th>
<th>Serving as the remnant in sluicing</th>
</tr>
</thead>
<tbody>
<tr>
<td>shei ‘who’,</td>
<td>In VP</td>
<td>Yes</td>
<td>Never</td>
</tr>
<tr>
<td>shenme ‘what’</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>zenmeyang ‘how’</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>weishenme ‘why’</td>
<td>In the Comp domain</td>
<td>No</td>
<td>Depend on whether it can be licensed</td>
</tr>
<tr>
<td>shenmeshihou ‘when’, zainali ‘where’</td>
<td>In the Comp domain; in IP but external to VP; in VP</td>
<td>Yes</td>
<td>Always</td>
</tr>
</tbody>
</table>

References