Towards a unified theory of wh-in-situ and islands

Andrew Murphy

andrew.murphy@uni-leipzig.de

Universität Leipzig

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Abstract

In a number of wh-in-situ languages, only causal wh-adverbs corresponding to 'why' exhibit island effects. The widely adopted approach by Tsai (1994, 1999, 2008) is to draw a distinction between wh-nominals and wh-adverbs, where the former are unselectively bound by an operator in their scope position, the latter must raise at LF, thereby inducing island violations. The result is a hybrid approach where wide scope of wh-words is derived by two distinct mechanisms. In this paper, I show the island-sensitivity of wh-adverbs can be captured in a unified approach based on the observation that island sensitivity correlates with the adjunction height of the adverb. The resulting approach allows us to treat all in situ wh-phrases alike and results in a unified theory of wh-in-situ which does not rely on LF movement. Furthermore, it will be shown how the analysis extends to other observed asymmetries with regard to donkey anaphora and multiple wh-questions.
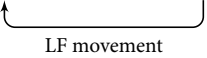
1 Introduction

A long-standing puzzle regarding the analysis of wh-in-situ surrounds the contrast in (1).

(1) a. Ni bijiao xihuan [$_{DP}$ [$_{CP}$ ta zenmeyang zhu de] cai   ] ?
         you more like   he how   cook DE dish
         'What is the means x, such that you like better the dishes which he cooks by x?'

     b. *Ni bijiao xihuan [$_{DP}$ [$_{CP}$ ta weishenme zhu de] cai   ] ?
         you more like   he why   cook DE dish
         'What is the reason x, such that you like better the dishes which he cooks for x?'
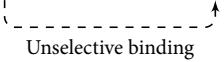
Whereas wh-arguments and wh-adjuncts such as 'how' are unproblematic inside a Complex NP island (1a), causal adjuncts such as 'why' exhibit a surprising sensitivity to this and a number of Ross' other syntactic islands (1b). As well as Mandarin Chinese, this pattern can be found in Japanese, Vietnamese and Korean. The original approach to wh-in-situ by Huang (1982*b*) proposed that languages such as Mandarin Chinese have covert wh-movement at LF, which explains the unexpected island effects with in situ elements (2). Later analyses opted for non-movement approaches such as *unselective binding* (e.g. Pesetsky 1987; Tsai 1994*a*; Cole & Hermon 1998) (3) since LF movement poses a number of theoretical and conceptual problems for the Minimalist Program (see Reinhart 1998; Simpson 2000).

(2) $[_{CP} \text{ wh}_i \text{ C}_{[wh]} [_{TP} \ldots \text{ t}_i \ldots]]$ (3) $[_{CP} \text{ Op}_i \text{ C}_{[wh]} [_{TP} \ldots \text{ wh}_i \ldots]]$

            LF movement   Unselective binding

The contrast in (1) indicates that we are not dealing with an argument/adjunct asymmetry. In fact when one looks at the whole range of data, it seems to only be adjuncts with a 'why' meaning that are subject to island constraints. The now standard account of these facts by Tsai (1994a, 1999, 2008) proposes a distinction between wh-nominals and wh-adverbials (see also Cole & Hermon 1998; Fujii & Takita 2007; Yang 2007; Fujii et al. 2014). The former are assumed to be variables interpreted via unselective binding and include wh-arguments and 'low' wh-adjuncts such as *how*, *when* and *where*. The latter class of wh-adverbials, including causal adjuncts such as *why*, are taken to be operators that cannot be bound and must therefore raise at LF in order to take wide scope. Since movement is only involved with wh-adverbials, their sensitivity. However, the class of wh-adverbials in the languages under discussion seems to contain only the equivalent of *why* and possibly the causal variant of *how/why*-alternating adverbs, which allow both causal and manner readings.

Futhermore, the price of this analysis is that it is necessary to propose two completely distinct and mutually incompatible mechanisms for wh-scope within a single language. In short, exactly which mechanism is assumed for a particular wh-phrase follows from its island sensitivity, when ideally the siutation should be the reverse, i.e. the wh-phrase counts as an operator if it exhibits island-sensitivity. Furthermore, implementing LF movement in the Minimalist Program proves to be an extremely difficult task. An alternative analysis would be to try and propose a single mechanism to derive the scope of in situ wh-phrases, and have the island effects follow from another aspect of the grammar.
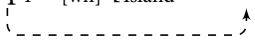
In this article, I propose such an analysis. Rather than assume that the island sensitivity of adverbs with causal interpretation follows from their operator status, the following analysis will capitalize on the generalization that a salient property distinguishing island-sensitive and non-island-sensitive wh-phrases, aside from causal interpretation, is their high position in the tree, namely adjunction to TP. It is particularly insightful to look at the *how/why*-alternating adverb *zenme* in Mandarin Chinese since, with Mandarin Chinese being a head-initial language, the position of the modal relative to the wh-phrase clearly shows that its island-restricted, causal variant is situated above modals, which I assume to be in T (Tsai 1999). This is captured by the following generalization:

(4) *Island sensitivity of in situ wh-adverbs*:
      In wh-in-situ languages, wh-adverbs adjoined to TP cannot occur inside islands.

The relative distribution of adverbs in islands will follow from an analysis that assumes that the only available mechanism for determining wh-scope is operator binding (cf. *unselective binding*). An operator is base-generated in the scope position of a wh-phrase and binds it (3). Since no movement is involved, the circumvention of island violations is predicted since, in order to

scope out of an island, no movement out of the island is required (5).

(5) $[_{CP}$ Op$_1$ C$_{[wh]}$ $[_{Island}$ … wh$_1$ … $]]$

Following insights by Aoun & Li (1993), I show that the island sensitivity of particular wh-adjuncts can be captured by assuming that they require that an operator first be merged locally to the adjunct and then subsequently moved to its scope position. If such an adjunct originates inside an island, then taking wide scope will require movement of the operator and therefore incur island violations (6).

(6)   a. $[_{CP}$ C$_{[wh]}$ $[_{Island}$ Op$_i$ … wh$_i$ … $]]$

       b. $[_{CP}$ Op$_i$ C$_{[wh]}$ $[_{Island}$ t$_{Op}$ … wh$_i$ … $]]$

The question is now what the trigger for this local merger could be. Aoun & Li (1993) essentially attribute this to the ECP, however such an explanation is no longer viable under a Minimalist approach. Instead, I will assume that there is an operator position inside the adjunct itself. Rubin (2003) proposes that adjuncts are embedded in a functional projection, ModP. I propose that the semantics of intersective modification are provided by a modificational operator (Op$_{[MOD]}$) in Spec-ModP that is required by a selectional feature [•Op•] on the Mod head (7).

(7)

ModP
— Op$_{MOD}$
— Mod′
    — Mod
      [•Op•]
    — XP
      Adjunct
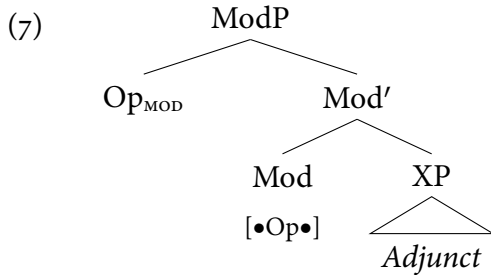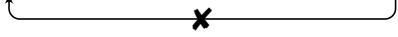
This operator intersects two sets of an appropriate, matching type, e.g. $\langle s, \langle v, t \rangle \rangle$. Here, the v variable (corresponding to the event argument) is shared after modification. Crucially, assuming that TP denotes a proposition of type $\langle s, t \rangle$, this kind of intersective modification is not possible for TP adjuncts since this results in a type clash:

(8)   *vP modifiction:* $\lambda w \lambda e. [\lambda w' \lambda e'. \ldots](w)(e) \quad \wedge \quad [\![\text{Adjunct}]\!](w)(e)$
       TP modification: $\lambda w \lambda e. [\lambda w' \ldots](w)(e) \qquad \wedge \quad [\![\text{Adjunct}]\!](w)(e)$

Consequently, the modificational operator is not present in Spec-ModP of TP adjuncts. However, the Mod head still bears the selectional feature ([•Op•]). Importantly, this is a general feature that can be checked by any operator. If the modificational operator cannot be merged for compatability reasons and another operator is present in the numeration, then this must be

merged in Spec-ModP. If we have a wh-adjunct, the wh-operator ($Op_{[wh]}$) that will bind it must therefore first be merged in Spec-ModP to check the [•Op•] feature (9a). Subsequently, this operator is moved to its scope position (9b).

(9) a. $[_{TP} [_{ModP} Op_{i,WH} [_{Mod'} Mod_{[Op•_{MOD}•]} Adjunct_i]] [_{TP} \ldots]]$
     b. $[_{CP} Op_{i,WH} C_{[•WH•]} [_{island} \ldots [_{TP} [_{ModP} t_{Op} [_{Mod'} Mod Adjunct_i]] [_{TP} \ldots]]]]$

Thus, there is a direct link between TP adjunction and island-sensitivity, since TP adjuncts necessarily lack a modificational operator in Spec-ModP. Thus, the selectional feature for an operator present on Mod instead forces local merge of a wh-operator, thereby deriving Aoun & Li's original insight. Most importantly, we arrive at a unified theory of wh-in-situ since there is a single mechanism for wh-scope (operator binding) and the fact that TP adjuncts are subject to island constraints is made to follow independently from the syntax/semantics of modification.

The paper is structured as follows: Section 2 provides a brief overview of the crucial data as well as previous accounts. Huang's classic account as well as the basic data surrounded islands with wh-in-situ languages will be discussed in Section 2.1. Sections 2.2 & 2.3 discuss the fundamental asymmetry between 'how' and 'why' as well as cases of *how/why*-alternations in Mandarin Chinese, Vietnamese and Japanese. Tsai's account of the island facts is presented in Section 2.4 followed by a critical discussion of its implications in Section 2.5 and the remainer of Section 2. The alternative analysis sketched above will be presented in detail in Section 3 together with a comprehensive compositional semantic analysis for all crucial examples. Section 4 discusses possible further extensions of this approach to data from bare wh-conditionals ('donkey sentences') and multiple wh-interrogatives, and Section 5 concludes.

2 Islands and wh-in-situ

2.1 Wh-in-situ in the GB period

In his seminal paper, Huang (1982*b*) observed that in situ wh-phrases in Mandarin Chinese can take wide scope even when in an embedded clause:

(10) Zhangsan zhidao [_{CP} shei mai-le shu]
      Zhangsan know   who bought book
      a. 'Who does Zhangsan know bought books?'
      b. 'Zhangsan knows who bought books.'   (Huang 1982*b*:371)

When embedded under *zhidao* ('know'), the wh-word *shei* ('who') can be interpreted either in the embedded clause or in the matrix clause. Furthermore, if we have a question-embedding predicate such as *ask*, we know that no wh-movement is permitted in English (11). Similarly, the reading where *shei* takes matrix scope in (12) is impossible.

(11)   a.   John asked (me) [$_{CP}$ who bought a book].

   b.   *Who$_1$ did John ask (me) [$_{CP}$ t$_1$ bought a book]?

(12)   Zhangsan wen wo [$_{CP}$ shei mai-le shu]
   Zhangsan ask me   who bought book
     'Zhangsan asked me for which person x, it is the case that x bought books.'
   #'For which person x, did Zhangsan ask me if x bought books?'

What Huang surmised from these obvious parallels between wh-in-situ and wh-movement languages is that both language types have parallel LFs for wh-questions. In Mandarin Chinese, wh-phrases taking matrix scope also move to their scope position, however this movement takes place at LF and is therefore 'covert'. Covert movement results in the following LF for (10):

(13)   LF: [$_{CP}$ shei$_1$ Zhangsan zhidao [$_{CP}$ t$_1$ mai-le shu]]

Perhaps the most compelling evidence for LF movement comes from the surprising presence of island effects with in situ elements. Huang noted that some wh-phrases cannot occur in the typical island configurations for movement identified by Ross (1967). Consider the minimal pairs in (14) to (16) from Huang et al. (2009:263,266). While the wh-argument *shenme* ('what') is can appear inside Complex NP Islands, Adjunct Islands and Sentential Subject Islands, the corresponding (b) sentences with *weishenme* ('why') are ungrammatical:

(14)   *Complex NP Island* (Mandarin Chinese)

   a.   ni   zui   xihuan [$_{DP}$ [$_{CP}$ mai shenme de] ren   ] ?
      you most like   buy what   DE person
      'For which thing x, do you like the person who bought x?'

   b.   *ni   zui   xihuan [$_{DP}$ [$_{CP}$ weishenme mai shu   de] ren   ] ?
      you most like   why   buy book DE   person
      'For which reason x, do you like the person who bought books for x?'

(15)   *Adjunct Island* (Mandarin Chinese)

   a.   ta   [$_{CP}$ zai Lisi mai shenme yihou] shengqi le?
      he   at Lisi buy what   after   angry   LE
      'For which thing x, did he get angry after Lisi bought x?'

   b.   *ta   [$_{CP}$ zai Lisi weishenme mai shu   yihou] shengqi le?
      he   at Lisi why   buy book after   angry   LE
      'For which reason x, did he get angry after Lisi bought books for x?'

(16)   *Sentential Subject Island* (Mandarin Chinese)

   a.   [$_{CP}$ wo mai shenme] zui   hao?
        I   buy what   most good
      'For which thing x, is it best that I buy x?'

b. *[_CP wo weishenme mai shu] zui   hao?
        I   why   buy book   most good
      'For which reason x, is it best that I buy books for x?'

Since Huang's initial observations about Mandarin Chinese, it has been shown that the same contrast exists in a number of other wh-in-situ languages. For example, Korean permits wh-arguments inside CNPC islands (17), however the wh-adjunct *way* ('why') is not possible (18) (Shin 2005:51).[1]

(17)   *Complex NP Island* (Korean):

   a.   Minswu-ka   [_DP [_CP nwukwu-ka ssu-n   ] chayk-ul] sass-ni?
        Minswu-NOM   who-NOM write-REL book-ACC bought-Q
        'For which person x, is it the case that Minswu bought the books that x wrote?'
   b. *Minswu-ka   [_DP [_CP Senhi-ka   way ssu-n   ] chayk-ul] ilkess-ni?
        Minswu-NOM   Senhi-NOM why write-REL book-ACC read-Q
        'What is the reason x such that Minswu read the book that Senhi wrote for x?'

Entirely parallel data are also attested for Japanese, where *naze* ('why') is impossible inside islands (Lasnik & Saito 1984:245):

(18)   *Complex NP Island* (Japanese):

   a.   [_DP [_CP Taro-ga   nani-o   te-ni ireta] koto] -o   sonnani okotteiru-no?
             Taro-NOM what-ACC obtained fact   -ACC much   angry-Q
        'For which x, are you so angry about the fact that Taro obtained x?'
   b. *[_DP [_CP Taro-ga   naze sore-o te-ni ireta] koto] -o   sonnani okotteiru-no?
             Taro-NOM why it-ACC obtained fact   -ACC much   angry-Q
        'For which reason x, are you so angry about the fact that Taro obtained it for x?'

Furthermore, Vietnamese is also reported to exhibit the very same pattern with *visao* ('why') leading to ungrammaticality in an island configuration (C.-Y. E. Tsai 2009:21f.):

(19)   *Complex NP Island* (Vietnamese)

   a.   Tan thich [_DP nguoi [_CP lam nghe gi   ]] ?
        Tan like   person   do work what
        'What is x such that Tan likes the person who does the work of x?'
   b. *Nam thich [_DP doan [_CP me   visao nau]] ?
        Nam like   food   mother why cook
        'What is the reason x such that Nam likes the books written by Tan because of x?'

The fact that wh-arguments and wh-adjuncts seem to be in complementary distribution in islands led Huang (1982a) to analyze this is an *argument/adjunct asymmetry*. In particular, his claim was that LF movement appears to be impervious to Subjacency, but still respect Chomsky's (1981) *Empty Category Principle* (ECP). The ECP was a constraint on empty elements (in

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[1]Also, see Ko (2005) for an the exceptional behaviour of 'why' with regard to intervention effects in Korean.

particular, traces) stating that these must be 'properly governed'.[2] A trace could be properly governed either by a lexical category, or its antecedent (i.e. the moved item). Thus, traces of arguments were always properly governed (by V or INFL) and therefore satsified the ECP. However, traces of moved adjuncts must be antecedent-governed and this was only possible if the adjunct did not move 'too far', i.e. cross an island boundary (Huang et al. 2009:265). Thus, the ECP account predicts that wh-arguments should not show Subjacency/island effects, whereas wh-adjuncts should. However, even at that time it was clear things were not quite that straightforward. While it is certainly true that *weishenme* ('why') is not possible inside islands, Huang (1982*b*) contains a number of examples in which other adjuncts such as 'when' and 'where' freely occur inside islands:

(20) Ni xiang kan [$_{DP}$ [$_{CP}$ ta shenmeshihou pai de] dianying] ?
      you want see   he when   film DE movie
      'For which time *x*, you want to see movies that he filmed at *x*?'   (Huang 1982*b*:381)

(21) [$_{DP}$ [$_{CP}$ zai nali fei de] niao] zui   ziyou?
             where fly DE birds   most free
      'For which place *x*, are birds that fly at *x* most free?'   (Huang 1982*b*:405)

It is unclear how the ECP can account for such cases since, as adjuncts, their traces would require antecedent-government. The key question at this point is whether there is some other pertinent difference between an adjunct such as 'why' and adjuncts such as 'when' and 'where' that could provide an explanation for this asymmetry. Indeed, it seems that 'when' and 'where' are what we could call low, manner adverbs typically adjoining to *v*P, whereas 'why' falls into the class of causal, propositional adjuncts typically assumed to adjoin to TP (cf. Ernst 2002). This crucial difference between 'high' and 'low' adjuncts will be explored in the following sections and it will be ultimately the key observation on which the analysis to follow will rest.

2.2   The *how/why* asymmetry

There is a well-known asymmetry between *zenmeyang* 'how' and *weishenme* 'why' in Mandarin Chinese regarding the fact that the former is permissible inside island constructions, whereas the latter is not (Lin 1992; Tsai 1994*b*). Consider the following data from Tsai (1994*b*:122):

(22) a. Ni bijiao xihuan [$_{DP}$ [$_{CP}$ ta zenmeyang zhu de] cai   ] ?
          you more like   he how   cook DE dish
          'What is the means *x*, such that you like better the dishes which he cooks by *x*?'

      b. *Ni bijiao xihuan [$_{DP}$ [$_{CP}$ ta weishenme zhu de] cai   ] ?
          you more like   he why   cook DE dish
          'What is the reason *x*, such that you like better the dishes which he cooks for *x*?'

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[2]I will not go into the definition of government here. For the purposes of this illustration, it would suffice to equate it with local c-command, although there are notoriously many components to its precise definition (see Lasnik & Saito 1984, 1992).

Thus, *zenmeyang* 'how' seems to pattern with 'when' and 'where', as shown in examples (20) and (21) in the previous section. Tsai (1999, 2008) shows that the interpretation of the bare wh-adjunct *zenme* (without *-yang*) varies with its syntactic position. First, note that it is impossible for the causal adverb *weishenme* ('why') to occur below a modal (23) or what Tsai (2008:98) calls 'adverbs of quantification' (24), which he assumes to be sentential:

(23) a. Akiu weishenme hui zou?
          Akiu why   will leave

      b. *Akiu hui weishenme zou?
          Akiu will why   leave
          'Why would Akiu leave?'   (Tsai 2008:93)

(24) a. *Akiu keneng weishenme ban   zhe-ge huiyi?
          Akiu possibly why   organize this-CL conference

      b. Akiu weishenme keneng ban   zhe-ge huiyi?
          Akiu why   possibly organize this-CL conference
          'Why is it possible for Akiu to organize the conference?'   (Tsai 1999)

On the other hand, the adverb *zenmeyang* must appear below modals and adverbs:

(25) a. *ta zenmeyang yinggai/bixu/hui chuli   nei-jian shi?
          hw how   should/must/will handle that-CL matter

      b. ta yinggai/bixu/hui zenmeyang chuli   nei-jian shi?
          he should/must/will how   handle that-CL matter
          'By what means x, should/must/will he handle this matter by x?'   (Lin 1992:294)

(26) a. *tamen zenmeyang changchang/zhongshi chuli   zhe-zhong shi?
          they   how   often/always   handle this-kind   matter

      b. tamen changchang/zhongshi zenmeyang chuli   zhe-zhong shi?
          they often/always   how   handle this-kind   matter
          'By what means x, did they often/always handle this kind of matter by x?'
                                                                     (Tsai 2008:96)

Thus, there seems to be a parallel between those adjuncts that can appear inside islands and those that have a 'low' manner reading, e.g. *zenmeyang* ('how'), *shenmeshihou* 'when' (20) and *zai nali* 'where' (21). Furthermore, these are adjuncts that must remain below modals and particular quantificational adverbs. Thus, the generalization emerges that low adverbs with manner readings are island insensitive, whereas causal adverbs (*weishenme* 'why') appearing in a syntactically higher position than modals do in fact display island sensitivity.

2.3 *how/why*-alternations

This conclusion is supported by looking at what Tsai (2008:84) calls '*how-why*-alternations'. Tsai (1999) notes that the interpretation of the bare adverb *zenme* is ambiguous. In principle it allows

for both a causal 'why' reading and a manner 'how' reading:

(27)   Akiu zenme xia   Xiaodi?
       Akiu ZENME scare Xiaodi
       a. 'How does Akiu scare Xiaodi?'
       b. 'Why does Akiu scare Xiaodi?'   (Tsai 1999)

Furthermore, these two readings can be teased apart by looking at the syntactic position of the adverbs. What we observe is that *zenme* is only possible below a modal if it has a manner/means reading (28a). However, if *zenme* precedes a modal it has an obligatory causal reading akin to 'why' (28b):

(28)   a.   Akiu zenme hui/bixu/neng zou?
            Akiu ZENME will/must/can leave
            #'By what means *x*, will/must/can Akiu leave by *x*?'

            'For what reason *x*, will/must/can Akiu leave for *x*'.

       b.   Akiu hui/bixu/neng zenme zou?
            Akiu will/must/can ZENME leave
             'By what means *x*, will/must/can Akiu leave by *x*?'

            #'For what reason *x*, will/must/can Akiu leave for *x*'.   (Tsai 1999)

Interestingly, we can observe the very same phenomenon in Japanese. As Fujii & Takita (2007) note, the adverb *nande* is ambiguous betwen a causal interpretation (29a) and a means interpretation (29b):[3]

(30)   Mari-wa   nande konpyuutaa-o   kowasita-no?
       Mary-TOP NANDE comuputer-ACC broke-Q
       a. 'Why did Mary break the computer?'
       b. 'By what means did Mary break the computer?'   (Fujii & Takita 2007:111)

Furthermore, C.-Y. E. Tsai (2009) notes that the same is true of *lamsao* in Vietnamese. While it has a manner reading in a low, postverbal position below modals (31a), it takes on a causal reading when it precedes a modal (31b):

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[3]An anonymous reviewer points out that the PP *dooyuu riyuu-de* 'for what reason' (29) seems to occur relatively high in the structure but is not island-sensitive, as noted by Fujii & Takita (2007:114).

(29)   [dooyuu riyuu-de]   Ken-ga   kasikoi   no ?
        what   reason-with Ken-NOM intelligent.PRS Q
       'For what reason is Ken the best?'

They analyze this on a par with *wei-le shenme* in Mandarin Chinese, which Tsai (1999) shows – unlike causal *weishenme* – patterns with low, non-causal adverbs in that it is not only island-insensitive but also obligatory occurs below adverbs of quantification. It is also interesting to note that this example does not contain topic marking on the subject (unlike (30)), but nominative marking. If we assume that topic marking takes place in a high left-peripheral position (Watanabe 2003), then *dooyuu riyuu-de* would differ from *naze/nande* in being base-generated in a much higher position and subject to different compositional principles (see Stepanov & Tsai 2008).

(31) a. Nam co-the di Dai-Bac lamsao?
Nam can go Taipei LAMSAO
'By what means can Nam go to Taipei?'

b. Nam lamsao co-the di Dai-Bac?
Nam LAMSAO can go Taipei
'How come Nam can go to Taipei?'   (C.-Y. E. Tsai 2009:73)

Recall that our generalization thus far was that causal adverbs above modals exhibit island sensitivity, whereas manner adverbs below modals do not. This observation also holds true of *zenme*. If *zenme* occurs inside an island, then the only avaiable reading is the manner one.[4] Furthermore, *zenme* must precede modals inside islands, consistent with our generalization about TP adjuncts. This is shown for the Complex NP Island in (32) and the Sentential Subject Island in (33).

(32) Ni tongqing [$_{DP}$ [$_{CP}$ (*zenme) bixu (zenme) zheng qian de] ren]?
you sympathize   ZENME must ZENME earn money DE person
'By what means *x*/#for what reason *x*, do you sympathize with people who have to earn money by *x*?' (e.g. by begging)

(33) [Zhangsan (*zenme) yao (zenme) shangxue] zui hao?
  Zhangsan ZENME can ZENME study   most good
'By what means *x*/#for what reason *x*, is it most good that Zhangsan can continue to study by *x*' (e.g. he has a scholarship)

As we would expect, the same is also true of *how/why*-alternating adverbs in Japanese and Vietnamese. For Japanese *nande*, the only possible interpretation inside an island is the low instrumental/manner reading. The causal reading is entriely impossible (Fujii & Takita 2007:111):

(34) Ken-wa [$_{DP}$ [$_{CP}$ Mari-ga nande kaita] ronbun] -o hinhansita-no?
Ken-TOP   Mary-NOM NANDE wrote paper   -ACC criticized-Q
  a. 'For which manner/means *x*, did Ken criticize the paper that Mary wrote with/by *x*?'
#b. 'For which reason *x*, did Ken criticize the paper that Mary wrote for *x*?'

Finally, the alternating adverb *lamsao* in Vietnamese is also only possible inside islands if it occurs in its low position with a manner reading. The causal variant in its higher preverbal position is ungrammatical conforming to our expectations (C.-Y. E. Tsai 2009):

(35) a. Tan thich [$_{DP}$ nguoi [$_{CP}$ lam nghe lamsao]] ?
Tan like   person   do work LAMSAO
'For which manner *x*, does Tan like the person who does work by *x*?'

b. *Tan thich [$_{DP}$ nguoi [$_{CP}$ lamsao lam nghe]] ?
Tan like   person   LAMSAO do work
'For which reason *x*, does Tan like the person who does work for *x*?'

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[4]The fact that causal readings of 'how' in Mandarin Chinese are not possible inside islands was noted by Tsai (1999) and Tsai (2008:83), however he does not provide examples.

These findings support the observation by Tsai (1999) that the island sensitivity of wh-adverbs in wh-in-situ languages is linked to causal interpretation and a high position in the structure. Since both *weishenme* and the causal variant of *zenme* obligatorily precede modals in Mandarin Chinese,[5] we can reasonably assume that causal wh-adverbs are adjoined to TP. We also see that postverbal position in Vietnamese is associated with manner readings, whereas preverbal/premodal position forces a causal interpetation of adverbs (31). Consequently, only the former is possible inside syntactic islands. We can therefore assume that adverbs such as 'why' and causual variants of 'how' are adjoined to TP, whereas other adverbs are adjuncts to *v*P. We are then dealing with an asymmetry between TP adjuncts and *v*P adjuncts, namely that only the latter can appear inside islands. This can be captured by the following generalization:

(36)   *Island sensitivity of in situ wh-adverbs*:
        In wh-in-situ languages, wh-adverbs adjoined to TP cannot occur inside islands.

In the following section, we will consider Tsai's (1999,2008) account of this generalization. Ultimately, it will be shown, however, that the retention of covert movement in his analysis proves to be untenable under contemporary Minimalist assumptions.

2.4   Tsai's (1999, 2008) account

The generalization that causal adverbs in Mandarin Chinese and other wh-in-situ languages is explained by Tsai (1999, 2008) with what we could call a 'hybrid approach' to wh-in-situ. There have been a number for proposals of how to capture wide scope of wh-phrase without recourse to LF movement (e.g. by *unselective binding*; Tsai 1994*a*, or *choice functions*; Reinhart 1998; see Section 3.2 for further discussion and Cheng 2009 for an overview). Tsai (1999, 2008) follows Tsai (1994*a*) in assuming that the scope of wh-arguments is determined by unselective binding via a covert operator. The unselective binding approach assumes that wh-phrases are variables that can be bound by an interrogative operator base-generated in its scope position. For Mandarin Chinese, a language in which wh-arguments do not exhibit movement-related Subjacency effects, Tsai (1994*a*) assumes that the operator binding in-situ wh-arguments is merged directly in Spec-CP (see also Aoun & Li 1993) (37). This explains the lack of island sensitivity, since no actual movement is involved.

(37) $[_{CP}$ Op_i $C_{[wh]}$ $[_{TP} \dots wh_i \dots]]$

The same scope-taking mechanism is then also assumed by Tsai (1999, 2008) for wh-adverbs such as 'where', 'when' and 'how'. Since the scope of these adverbs is determined without movement, their lack of island-sensitivity is expected. The question then arises as to how to account for the island-sensitivity observed with 'why' and causal variants of alternating 'how'-adverbs.

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[5]As previously mentioned, Mandarin Chinese is the only language which one could realiably use for this diagnostic since Japanese and Korean are both head final.
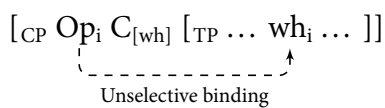
Tsai's approach here is to draw a distinction between what he calls *nominal* and *adverbial* wh-phrases (also see Nishigauchi 1990; Fujii & Takita 2007; Fujii et al. 2014; Tsai & Chang 2003; Stepanov & Tsai 2008). For Tsai, adverbs such as *zai nali* ('where' lit. 'at where') and *shenme shihou* ('when' lit. 'what time') count as nominal wh-phrases since they contain a genuine nominal component. Consequently, these wh-adverbs can be bound by a higher operator. For the causal adverbs exhibiting island effects, Tsai assumes that these are operators rather than variables. He argues that causal adverbs therefore have to undergo covert movement to their scope position:[6]

> The residue of the above unselective binding approach consists of exactly those wh's that can neither stay in the scope of sentential operators, nor be construed as existential [i.e. *weishenme*, causal *zenme*]. Since these wh-adverbs do not introduce variables in situ, the only way for them to take sentential scope is to undergo LF movement.
>
> (Tsai 1999)

According to Tsai, we therefore have two different mechanisms for deriving wide-scope of in situ wh-phrases, unselective binding for wh-nominals (wh-arguments and wh-adverbs such as 'when', 'where' and 'how') and LF movement for wh-adverbs with causal interpretations:

(38) *wh-nominals*:
$[_{CP}$ Op$_i$ C$_{[wh]}$ $[_{TP}$ … wh$_i$ …]]
Unselective binding

(39) *wh-adverbials*:
$[_{CP}$ wh$_i$ C$_{[wh]}$ $[_{TP}$ … t$_i$ …]]
LF movement
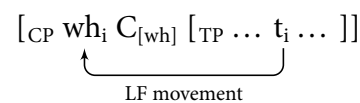
In his account, the fact that causal wh-adverbs undergo covert movement explains why they cannot occur in the scope of modals or possibility adverbs, as in example (24) repeated below.

(40) a. *Akiu keneng weishenme ban   zhe-ge huiyi?
          Akiu possibly why   organize this-CL conference

      b. Akiu weishenme keneng ban   zhe-ge huiyi?
          Akiu why   possibly organize this-CL conference
          'Why is it possible for Akiu to organize the conference?'   (Tsai 1999)
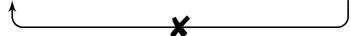
Since *weishenme* has to raise to Spec-CP at LF, crossing the intervening adverb would either induce a Relativized Minimality violation (Tsai 1999) or an intervention effect (Tsai 2008). This explains why causal adverbs are not possible in this position. Furthermore, the fact that only causal adverbs are island-sensitive (cf. (14b) repeated below as (41)) follows on Tsai's account since only these adverbs undergo LF movement:

(41) *ni   zui   xihuan $[_{DP}$ $[_{CP}$ weishenme mai shu   de] ren   ] ?
       you most like   why   buy book DE   person
       'For which reason x, do you like the person who bought books for x?'

---

[6]This is approach is also adopted by Tsai (2008:114).

(42) $[_{CP}$ wh$_i$ C$_{[wh]}$ $[_{TP}$ … $[_{DP}$ $[_{CP}$ … t$_i$ … $]]$ … $]]$

However, it is worth noting that Tsai's analysis comes at a price. In order to account for the fact that a subset of wh-adverbs exhibit island-sensitivity, an entirely separate, incompatible scope mechanism must be proposed for these and only these elements. We therefore have a 'hybrid approach' to variation with wh-in-situ constructions – some wh-phrases are unselectively bound by an operator, others must raise at LF. This seems to undermine the entire spirit of non-movement accounts such as unselective binding, and furthermore proves to be unworkable in light of efforts to dispense with LF movement in the Minimalist Program (Chomsky 1995; see Simpson 2000 and Section 2.5 for discussion). In light of this, it seems that a new explanation for the island-sensitivity of wh-adverbs, since Tsai's account crucially still relies on movement operations at LF, and a mixed system of in situ scope licensing. In the course of the paper, I will propose an alternative approach that directly ties island-sensitivity to adjunction height, and does so with a single mechanism for deriving the scope of wh-in-situ. Before we turn to this proposal, the following section will elaborate further on the status of covert movement at LF in the Minimalist Program and emphasize the problems for Tsai's approach to the puzzle of islands and wh-in-situ.

2.5 'Covert movement' in Minimalism

One of the main efforts of the Minimalist Program (Chomsky 1995 *et seq.*) was to strip away many of the technical assumptions that had accumulated in the GB-period. Among the notable casualties was the concept of *government* and, with it, related constraints such as the *Empty Category Principle* (ECP). This dealt a hammer-blow to Huang's seminal account, and subsequent accounts inspired by it (e.g. Watanabe 1992; Aoun & Li 1993). Without the ECP, the cornerstone of the LF movement account of the basic argument/adjunct asymmetry was lost (see Section 2.1). However, the notion of covert movement did not disappear straight away. In Early Minimalism (Chomsky 1993 and the early chapters of Chomsky 1995), a distinction between overt and covert movement was retained. In particular, movement was assumed to be subject to the *Procrastinate* principle. Consider the formulation of *Procrastinate* in Collins (2001:55):

(43)   *Procrastinate*:
         Covert movement is less costly than overt movement

In these early developments of Minimalism, *Procrastinate* was coupled with a distinction between 'strong' and 'weak' features, with the former requiring immediate checking in Narrow Syntax, but the latter able to be checked at LF. This meant that movement was delayed until LF if possible due to economy. The distinction between a language with overt wh-movement and a wh-in-situ language would therefore lie in the strength of the [wh]-feature. Note, however, that this approach still naïvely predicts that all in situ wh-phrases should exhibit the same degree of sensitivity to islands (since all undergo movement), contrary to fact.

Later developments in Chomsky (1995) moved away from this view of movement in favour of feature movement (*Move-F*). Here, the idea is that what syntax actually wants to move is the feature itself, e.g. the [wh]-feature on a wh-phrase, and that overt movement is a side-effect of this, instantiated as Pied-Piping (Chomsky 1995:262). The feature movement approach no longer required that covert movement apply post-syntactically in the LF component (Boeckx 2008:119, although see Pesetsky 2000; Soh 2005; Yang 2012 for analyses of wh-in-situ involving feature movement at LF). Nevertheless, even having just feature movement apply covertly (i.e. at LF) still seems to be at odds with the fundamental Minimalist assumption that all operations are driven by third-factor interface requirements, as captured by the *Strong Minimalist Thesis*:

(44)   *Strong Minimalist Thesis* (Chomsky 2008:135):
        Language is an optimal solution to interface conditions

If movement operations are driven by the need to check uninterpretable features prior to Spell-Out, it is unclear how movement could ever be driven by some interface requirement.[7] If the principle of *Full Interpretation* (Chomsky 1995) is to be taken seriously as what determines whether a derivation crashes or not, then delaying any feature-checking operation (whether feature or phrasal movement) to LF seems impermissible.

This concern may have been what prompted later developments of Minimalism (Chomsky 2000, 2001, 2008) to move away from *Move-F* in favour of what we might call *Agree-based Minimalism*. Whereas a simple relation of ϕ-agreement between, say, T and a nominal would have previously been modelled as an instance of *Move-F*, Chomsky (2000 *et seq.*) instead proposed the now standardly adopted operation of *Agree*. In this framework, movement at LF is no longer assumed to be an option: 'There is a single cycle; all operations are cyclic. Within narrow syntax, operations that have or lack phonetic effects are interspersed. There is no distinct LF component within narrow syntax' (Chomsky 2000:131). Thus, we are still left with the challenge of how to account for wide scope phenomena of in-situ elements such as wh-in-situ or Quantifier Raising (May 1977, 1985).

The view of covert movement that has since emerged makes use of the Copy Theory of Movement (Chomsky 1995), i.e. movement does not leave a trace in its lower positions, but rather a copy. It is then the job of PF to determine which of the multiple copies of a chain is spelled out (see Nunes 2004, for example). Overt movement is then treated as Spell-Out of the higher copy and 'covert' movement as Spell-Out of the lower copy as in (46). Thus, movement is overt in both cases and the difference lies in whether it is the higher or lower copy that is pronounced.

(45)   *Overt movement*:   (46)   *'Covert' movement*:
        [$_{CP}$ wh … [$_{TP}$ … ~~wh~~ …]]   [$_{CP}$ ~~wh~~ … [$_{TP}$ … wh …]]

---

[7]Furthermore, it is unclear how LF movement can be succesfully incorporated into the phase model (Chomsky 2001, 2008; see Hsu 2010).

This approach involving Spell-Out of a lower copy, sometimes referred to as *Single Output Syntax* (Bobaljik 1995; Groat & O'Neil 1996; Bobaljik 2002; Potsdam & Polinsky 2012), is arguably the most widely accepted view of covert movement under current Minimalist assumptions (for further arguments that lower copies are spelled out, see e.g. Lidz & Idsardi 1998; Franks & Bošković 2001; Wurmbrand & Bobaljik 2005; Bošković & Nunes 2007; Abe & Hornstein 2012; Polinsky & Potsdam 2013).

Given the current theoretical landscape, it seems that any appeal to covert movement would have to involve *bona fide* syntactic movement followed by Spell-Out of a lower copy, rather than actual LF movement. For Tsai's approach, this means that if we are forced to treat all instances of in-situ wh-adverbs as the Spell-Out of a lower copy of a wh-phrase moved in syntax, we expect uniform island sensitivity, which is of course not the case. We would be forced to maintain some arbitrary division of adjuncts into wh-adverbials, which behave like 'real' wh-phrases (moving in overt syntax) and wh-nominals, which are indefinite-like variables that are unselectively bound. As previously mentioned, there is not obvious reason a priori why this syntactic distinction should exist. In this theory, the only reason why causal wh-adjuncts are assumed to be akin to wh-arguments is because they are island-restricted, and this argument is ultimately circular: causal wh-adjuncts are operator-like because they are island-sensitive, and they are island-sensitive because they are operators that undergo movement. Thus, we are still forced to posit two radically different mechanisms of wh-scope internal to one language motivated solely on the basis of different island sensitivity. Instead, it would be preferrable to be to treat all wh-phrases alike and have the island effects (and other adjunct asymmetries, see Section 4.1) follow from some other principles of the grammar.

2.6 Interim summary

So far, we have seen that wh-in-situ languages display selective island-sensitivity: adverbs with a causal meaning occurring higher than T cannot scope out of islands, whereas all other wh-phrases can. The most widely adopted approach to date, put forward by Tsai (1999, 2008), advocates a hybrid approach to wh-in-situ in which island-sensitive wh-adverbs are so because of the fact that they, unlike other wh-phrases, undergo covert movement at LF. As we have seen, the anachronous assumption of LF movement retained from the GB-era is no longer tenable in recent Minimalist approaches. In what follows, I will show that a unified approach to wh-in-situ, in which the scope of all wh-phrases is licensed in the same way, is possible. Crucially, the observed asymmetry in island-sensitivity between causal and non-causal adjuncts will be traced back to their adjunction height. The solution I propose is that there is something special about the syntax of TP adjuncts themselves that interacts with wh-scope licensing to derive island-sensitivity.

3 Towards a unified account

Recall the generalization in (36) repeated below:

(47) *Island sensitivity of in situ wh-adverbs*:
      In wh-in-situ languages, wh-adverbs adjoined to TP cannot occur inside islands.

Rather than claim, as Tsai (1999, 2008) does, that these adverbs have to raise to take scope, I will assume that all in situ wh-phrases are variables that are bound by a higher operator. This is in the spirit of so-called *unselective binding* analyses, in which wh-phrases are treated like indefinites in having a variable-like meaning (see Cheng 1991; Li 1992; Haspelmath 1997; Hagstrom 1998; Bruening & Tran 2013; *pace* Bruening 2007). As we saw in Section 2.4, operator binding approaches assume that an operator is merged in the scope position of the wh-phrase and binds it. If a wh-phrase appears inside an island, we expect no island effects since the operator is base-generated in Spec-CP (48). This seems to be more or less the correct prediction for wh-arguments and the majority of wh-adjuncts in wh-in-situ languages.[8]

(48) $[_{CP} Op_i C_{[wh]} [_{Island} \ldots wh_i \ldots]]$

      Operator binding

For the causal 'why' adjuncts that do exhibit island-sensitivity, one can adopt the approach proposed by Aoun & Li (1993). Aoun & Li (1993:224f.) assume that the operator must be merged locally to wh-adjuncts for ECP reasons since wh-phrases, being interpreted as variables, are also subject to ECP-like restrictions. As such, adjuncts must have their binding operator (or its trace) in the minimal clause in which it occurs (49a):

(49) *Restrictions on wh-in-situ* (Aoun & Li 1993:219)
      a. A wh-in-situ such as *why* in adjunct position must have an antecedent (i.e. must be antecedent-governed) in the minimal clause in which it occurs.
      b. A wh-in-situ such as *who* or *what* in argument position need not have a local antecedent in the minimal clause in which it occurs.

Given (49), the operator binding the wh-adjunct is first merged locally to the wh-phrase (50a), so it is properly governed by the trace, and then later moves to its scope position (50b).

(50) a. $[_{CP} C_{[wh]} \ldots [_{CP} \ldots Op_i wh_i \ldots]]$

      b. $[_{CP} Op_i C_{[wh]} \ldots [_{CP} t_i \ldots wh_i \ldots]]$

---

[8] It is, however, well-documented that Japanese exhibits wh-island effects (Watanabe 1992). I follow Tsai's (1994a) *Lexical Merger Hypothesis* in which the operator unselectively binding the wh-phrase is not merged in its scope position (Spec-CP) in Japanese, but in fact lower in the DP itself.
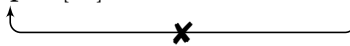
Since this operator movement takes place in narrow syntax, if the wh-phrase is inside an island then this movement will incur an island violation.

Although this approach derives the correct results for *why*, it overgenerates and predicts that all adjuncts should be subject to island constraints. While the core insight will be the one I will ultimately adopt, it is still necessary to determine what exactly it is that singles out causal adverbs for island sensitivity. I will follow the proposal by Rubin (2003) that adjuncts contain additional functional structure, namely a Mod(ifier)P projection. Furthermore, I propose that the basic modificational semantics is contributed by an operator merged in Spec-ModP. Thus, all adjuncts have the following structure:

(51)   [$_{\text{ModP}}$ Op$_{\text{MOD}}$ [$_{\text{Mod}'}$ Mod [… Adverb …]]]

As will be shown in the following section, I take intersection to be the default case for modification. The semantics contributed by the operator in Spec-ModP results in intersective modification. It will be shown that adjuncts occurring above TP are incompatible with intersective modification (since we are dealing with a proposition) and therefore the operator in Spec-ModP is not licensed. Nevertheless, ModP still has the syntactic property of requiring an operator in its specifier and this results in the wh-operator being merged locally to TP-adjunct and then later moved to its scope position. As with Aoun & Li's approach, if the adjunct is inside an island then this movement will result in ungrammaticality:

(52)   [$_{\text{CP}}$ Op$_i$ C$_{[\text{wh}]}$ [$_{\text{Island}}$ … [$_{\text{TP}}$ [$_{\text{ModP}}$ t$_{\text{Op}}$ [$_{\text{Mod}'}$ Mod [… Adverb$_i$ …]]] [$_{\text{TP}}$ …]]]]

Crucially, since it is only TP adjuncts that are incompatible with intersective modification, lower *v*P-adjuncts will contain the modificational operator and merge their wh-operators outside the island, thereby circumventing island violations:

(53)   [$_{\text{CP}}$ Op$_i$ C$_{[\text{wh}]}$ [$_{\text{Island}}$ … [$_{v\text{P}}$ [$_{\text{ModP}}$ Op$_{\text{MOD}}$ [$_{\text{Mod}'}$ Mod [… Adverb$_i$ …]]] [$_{v\text{P}}$ …]]]]

This analysis will allow us to derive island effects while still maintaining a uniform approach to wh-licensing (via operator binding). The following sections will lay out the theoretical assumptions and finer details of the analysis.

3.1 The syntax and semantics of modification

Rubin (1994, 1996, 2003) proposes that adjuncts contain an additional layer of functional structure that he calls Mod(ifier)P. The motivation for this functional projection is partly conceptual and partly empirical. As for the conceptual argument, Rubin (2003) notes that in order to implement Chomsky's (2004) claim that adjuncts undergo pair-Merge rather set-Merge, the syntactic component requires some way of distinguishing phrases (e.g. PPs) used as adjuncts from those used as complements. Rubin claims that the presence of a ModP can serve as this indicator, i.e. 'ModPs undergo pair-Merge'. The empirical argument comes from the fact that some languages

evince a morphological difference between phrases used predicatively and attributively (i.e. as adjuncts). For example, Rubin (2003:665) provides the following example from Romanian:

(54)   a.   Covorul acela este sub   masa
            rug.the   that   is   under table
            'That rug is under the table'

       b.   Nu-mi   place   covorul *(de) sub   masa
            not-to.me pleases rug.the   MOD under table
            'I don't like the rug under the table'

Here, the morpheme *de* is obligatorily present only with PPs used as adjuncts. Rubin takes this as an indication that the PP in (54b) actually has the following structure, with *de* as the head of ModP:

(55)

```
            ModP
           /    \
        Mod      PP
         de     /  \
               P    NP
              sub  masa
```
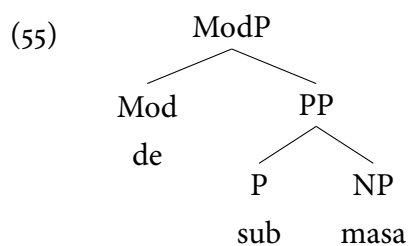
On the semantic side, I assume that, in the vast majority of cases, modification by adjuncts involves intersection (Larson 1998; Maienborn 2001; McNally & Boleda 2004; Castroviejo & Gehrke 2014). For example, in a simple case of nominal modification such as *fast car*, we have the intersection of the set of fast entities and the set of cars (see Morzycki to appear).[9]
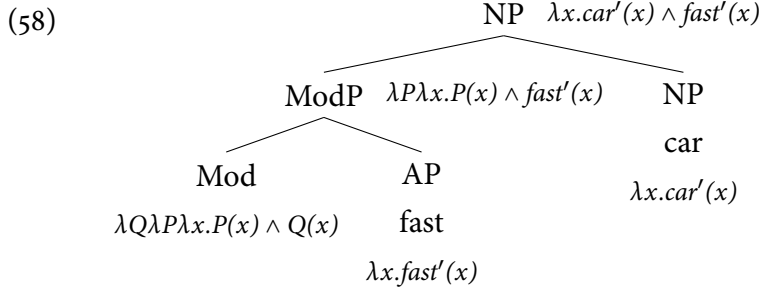
(56)   a. $[\![car]\!] = \lambda x.car'(x)$
       b. $[\![fast]\!] = \lambda x.fast'(x)$
       c. $[\![fast\ car]\!] = \lambda x.\ [\![fast]\!](x) \cap [\![car]\!](x)$

One standard way of capturing this is to assume a rule of *Predicate Modification* (Heim & Kratzer 1998) as in (57):

(57)   *Predicate Modification* (Heim & Kratzer 1998:65):
       If α is a branching node, $\{\beta,\gamma\}$ is the set of α's daughters, and $[\![\beta]\!] \in D_{\langle e,t \rangle}$ and $[\![\gamma]\!] \in D_{\langle e,t \rangle}$, then $[\![\alpha]\!] = \lambda x \in D_{\langle e \rangle}.\ [\![\beta]\!](x) = [\![\gamma]\!](x) = 1$.

Rubin (2003) proposes that the ModP can contribute this directly by having it take both the denotation of the adjunct and the modified phrases as arguments (see also Scontras & Nicolae 2014). On this approach, the Mod head is of type $\langle\langle e,t \rangle, \langle\langle e,t \rangle, \langle e,t \rangle\rangle\rangle$:

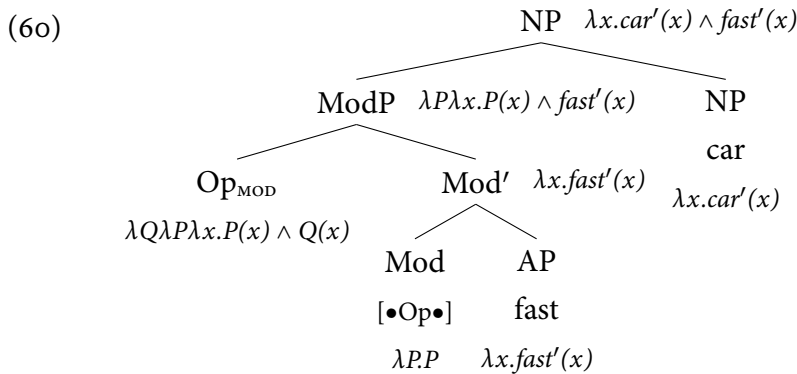[9]For now, I will abstract away from world variables and intensions.

(58)

$$NP \quad \lambda x.car'(x) \wedge fast'(x)$$

$$ModP \quad \lambda P \lambda x.P(x) \wedge fast'(x)$$

$$NP$$
car
$$\lambda x.car'(x)$$

$$Mod$$
$$\lambda Q \lambda P \lambda x.P(x) \wedge Q(x)$$

$$AP$$
fast
$$\lambda x.fast'(x)$$

However, it is well-known that not all adjectives are intersective. For example, some are *subsective* adjectives such as *a skillful surgeon*, where the the set of skillful surgeons is a subset of the set of surgeons, or *non-subsective* adjectives such as a *former president* (Castroviejo & Gehrke 2014). In both cases, the modification here does not involve set intersection. Nevertheless, syntactically we would want to treat these as adjuncts, presumably undergoing pair-Merge and thereby having a ModP layer. Since there is no clearly observable syntactic difference between intersective and non-intersective adjuncts, it seems that we need to divorce the semantics of modification from the syntax of modification. What we need is that all adjuncts are encased in a ModP shell, but that the intersective semantics that Rubin (2003) assumes is optional. One option would be to simply assume different instances of the Mod head, each with the relevant semantics for the modification at hand. I will avoid this lexical proliferation by instead assuming that the Mod head is semantically vacuous and that intersective semantics is contributed by a modificational operator merged in Spec-ModP:

(59) $[\![Op_{MOD}]\!] = \lambda Q \lambda P \lambda x.P(x) \wedge Q(x)$

The role of the Mod head is purely syntactic: its job is to ensure that an operator is merged in its specifier. This is ensured by endowing Mod with a selectional feature [•Op•] that can be checked by merging an operator in its specifier. With these assumptions in place, (58) now looks as follows:

(60)

$$NP \quad \lambda x.car'(x) \wedge fast'(x)$$

$$ModP \quad \lambda P \lambda x.P(x) \wedge fast'(x)$$

$$NP$$
car
$$\lambda x.car'(x)$$

$$Op_{MOD}$$
$$\lambda Q \lambda P \lambda x.P(x) \wedge Q(x)$$

$$Mod' \quad \lambda x.fast'(x)$$

$$Mod$$
[•Op•]
$$\lambda P.P$$

$$AP$$
fast
$$\lambda x.fast'(x)$$

For those adjuncts that cannot be interpreted by intersective modification, I assume that they do not bear Op_{MOD} and thus the [•Op•] feature is fallible (cf. Preminger 2014), i.e. an operator must be merged in Spec-ModP unless this results in semantic incompatibility. These adverbs are then

interpreted by non-compositional means (see Section 3.4).

3.2 The syntax and semantics of wh-in-situ

In this section, I will lay out the semantics of interrogatives and wh-phrases assumed for the analysis to follow. If we take the uncontroversial view that the meaning of an interrogative clause constitutes a set of propositions (Hamblin 1958, 1973; Karttunen 1977; Groenendijk & Stokhof 1984), then we can adopt the following typical semantic representation for a wh-interrogative:[10]

(62) $[\![$What did John read?$]\!] = \lambda p \exists x. p = \lambda w.$ John read x in w

Here, the denotation of the question is a set of propositions with existential quantification over the object position. This corresponds to a set of answers such as {'John read *War & Peace*', 'John read a magazine', 'John read the newspaper', … }. A typical approach to derive this compositionally would be to assume that the trace or copy[11] created by movement is interpreted as a variable and this variable is existentially bound by the moved wh-phrase:

(63)
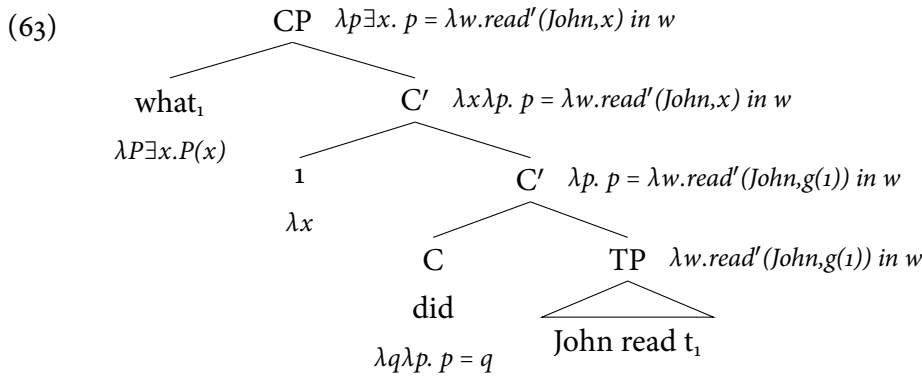
Here, linguistic objects are interpreted by an interpretation function relative to the assignment function g (Heim & Kratzer 1998; Büring 2005). The assignment function in the above example will map expressions with the index 1 to the variable x: $[\![\bullet]\!]^{w,g^{[1 \to x]}}$. This allows us to compositionally derive the denotation in (62).[12] For wh-in-situ languages, we can emulate this exact

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[10]Note that I will refrain from adding a further world variable for the matrix clause to simplify the denotations. I assume that the matrix w would be introduced at a node above CP or alternatively by the C head. Omitting it will not change anything in the current analysis, but positing it would be necessary to capture *de re* and *de dicto* distinctions with wh-phrases as in (61) (cf. Groenendijk & Stokhof 1984):

(61)   John knows which hockey fans came to the party.
   a.   'John knows Mary and Bill came to the party, and he knows that they are hockey fans.'   *(de re)*
   b.   'John knows Mary and Bill came to the party, but he doesn't know that they are hockey fans.'
                                                                                                    (de dicto)

[11]This approach requires an additional mechanism such as *Trace Conversion* (see Fox 1999, 2002; Sauerland 1998, 2004).

[12] There is a slight technical problem here. In order to get the meaning to compose in the correct order (i.e to get λp before $\exists x$) we would actually need to have the denotation of the wh-phrase combine with the TP meaning, and only after that introduce the set of propositions contributed by the interrogative C head. There are at least two technical solutions to this problem that I have encountered. The first involves positing a more finely articu-

configuration with a few minor differences. Rather than the wh-phrase moving and binding its trace, the wh-phrase itself is interpreted as the variable (cf. Cheng 1991) and is bound via co-indexation with a higher operator with the same semantics as the wh-phrase in (63). With the assignment function mapping elements bearing an index i to x, we will arive at the correct interpretation for an in situ wh-question such as (64).

(64)   Zhangsan xihuan shenme?
       Zhangsan like   what
       'What does Zhangsan like?'

(65)

CP $\lambda p \exists x.\ p = \lambda w.like'(Zhangsan, x)\ in\ w$

Op$_i$ C′ $\lambda x \lambda p.\ p = \lambda w.like'(Zhangsan, x)\ in\ w$
$\lambda P \exists x.P(x)$

i   C′ $\lambda p.\ p = \lambda w.like'(Zhangsan, g(i))\ in\ w$
λx

C   TP $\lambda w.like'(Zhangsan, g(i))\ in\ w$
$\lambda q \lambda p.\ p = q$

Zhangsan like what$_i$
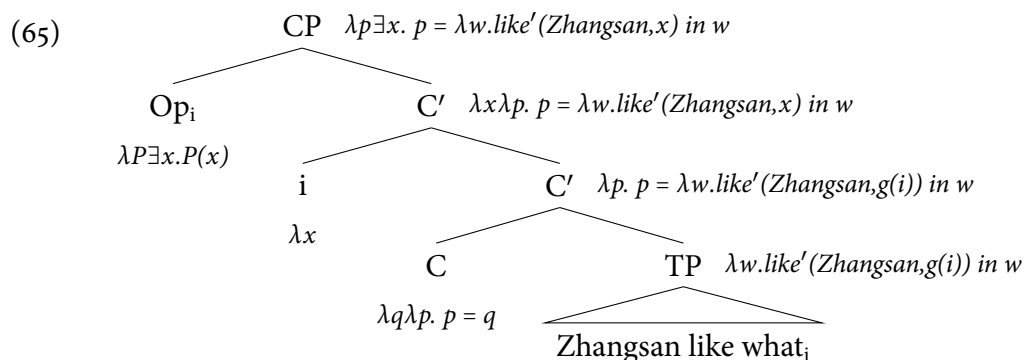
This is an analysis often referred to as *unselective binding*, where an operator binds a wh-phrase with a variable-like meaning (e.g. Pesetsky 1987; Tsai 1994*a*; Cole & Hermon 1998; Bruening & Tran 2006*b*). However, it has been noted that there are a number of problems with this kind of approach. First, when dealing with a complex wh-phrase such as *which book*, we have to find a space in the denotation for the restrictor of the wh-phrase (*book*), since with *which book*, x must also necessarily be in the set of books. We can assume the denotation in (66), however note that the restrictor is interpreted in situ.

(66)   ⟦Which book did John read?⟧ = $\lambda p \exists x.\ p = \lambda w.$ John read x in $w \wedge x$ is a book in w

3.2.1   Choice functions

A problem for this kind of unselective binding approach to wh-in-situ was highlighted by Reinhart (1998:36f.) with her famous *Donald Duck* examples. If we consider the in situ phrase *which philosopher* in (67), we see that it appears in the antecedent of a conditional.

(67)   Who will be offended if we invite which philosopher?
       $\lambda p \exists y \exists x.\ p = y$ is a philosopher $\wedge$ we invite $y \rightarrow x$ will be offended

---

lated syntax that does actually situate interrogative meaning above the landing site of the wh-phrase. For example, adopting Rizzi's (1997) Split-CP Hypothesis, Cable (2010:78) assumes that wh-phrases target the specifier of a FocP projection that is lower than the 'seat of interrogative force' in ForceP. A different option, if one wanted to keep a single CP, would be to introduce the set of propositions in C, but as a variable bound by a high λp node above the wh-phrase (see Šimík 2011:19). In order to not further complicate exposition, I will continue to side-step this issue as in (63), although the reader should assume one of these approaches to be implicit in the analysis.

We know from propositional logic that if the antecedent (p) of a (material) conditional ($p \rightarrow q$) is false, then the consequent (q) is still true. Reinhart's objection is, therefore, that if the wh-phrase is interpreted inside the antecedent of a conditional, then we no longer require that y be a philosopher. Given the truth conditions in (67), the answer 'Max will be offended if we invite Donald Duck' should be in the set of true answers, since although Donald Duck is not a philosopher (making p false), the implication is still true. As a solution to this problem, Reinhart proposes using *choice functions* for the interpretation of wh-in-situ. A choice function is a function that applies to a (non-empty) set and returns an individual from that set. For example, if we take the set of books ($\{x: x$ is a book$\}$), then we can envisage a number of possible choice functions, each returning a possibly different member of this set:

(68)   a. $f_1(\llbracket$book$\rrbracket) = $ *War & Peace*
       b. $f_2(\llbracket$book$\rrbracket) = $ *Catcher in the Rye*
       c. $f_3(\llbracket$book$\rrbracket) = $ *1984*
         …

Reinhart (1998:41) notes that this also solves the *Donald Duck problem* since the 'values permitted in the answer can only be from the philosopher set'. Choice functions have featured widely in analyses of (wide-scope) indefinites (e.g. Engdahl 1980; Heim 1982; Winter 1997; Reinhart 1997; Kratzer 1998; Matthewson 1999). The idea is that the meaning of an indefinite corresponds to existential quantification over choice functions:

(69)   John read a book
       $\exists f.$ John read f(book)

The truth conditions for (69) entail that there is a choice function (e.g. one of those in (68)) that returns a book that John read as its value, i.e. there exists a book that John read. This denotation is then functionally equivalent to one with existential quantification over individuals.

     The choice function approach has also been successfully extended to the analysis of both in situ and ex situ wh-questions (Reinhart 1998; Sauerland 1998; von Stechow 2000; Lin 2004; Ruys 2000; Sauerland 2004; Bruening & Tran 2013; van Urk 2015). We can therefore once again tinker with our semantic assumptions above and replace existential quantification over individuals with quantification over choice functions. Let us assume that the meaning of both indefinites and wh-phrases in wh-in-situ languages is simply an unbound choice function variable applied to whatever set the restrictor denotes:[13]

(70)   a. $\llbracket$shenme ('what')$\rrbracket = f$
       b. $\llbracket$shenme shu ('which book')$\rrbracket = f(\lambda x.$book$'(x))$ (abbreviated as f(book))

---

[13] This differs from approaches that assume that a Q-particle is merged locally to the wh-phrase and then moved to its scope position (Hagstrom 1998; Cable 2010). These approaches do not assume that wh-phrases contain a choice function variable, since it is the movement of the Q-particle that creates this variable.

When binding is established between the higher wh-operator and the wh-phrase, the assignment function will ensure that the unbound choice function variable in the wh-phrase is bound by the existential quantification (now over choice functions) introduced by the operator:

(71) Zhangsan xihuan shenme shu?
      Zhangsan like   what   book
      'Which book does Zhangsan like?'

(72)

$$\text{CP} \quad \lambda p \exists f.\ p = \lambda w.like'(Zhangsan, f(book))\ in\ w$$

Op$_i$ $\qquad$ C′ $\quad \lambda x \lambda p.\ p = \lambda w.like'(Zhangsan, x(book))\ in\ w$

$\lambda P \exists f.P(x)$

i $\qquad\qquad$ C′ $\quad \lambda p.\ p = \lambda w.like'(Zhangsan, g(i)(book))\ in\ w$

λx

C $\qquad\qquad$ TP $\quad \lambda w.like'(Zhangsan, g(i)(book))\ in\ w$

$\lambda q \lambda p.\ p = q$ $\qquad$ Zhangsan like which book$_i$
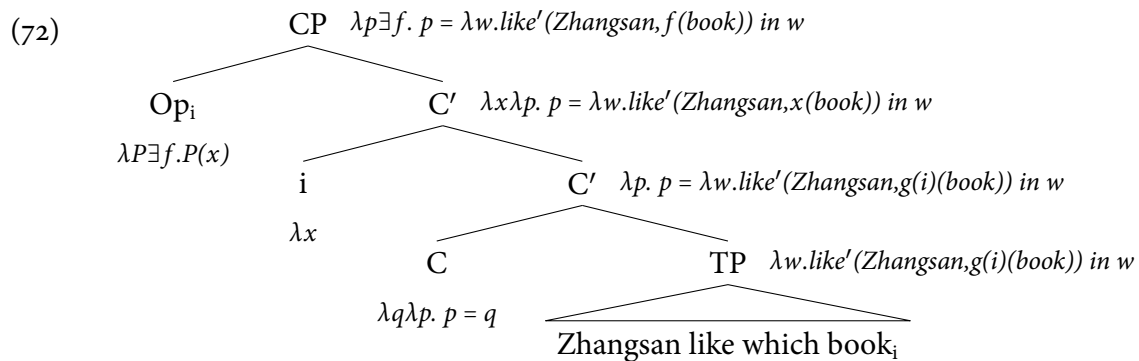
3.2.2 Event semantics

There is one final piece of the semantics that we need. In addition to the denotation above, I assume Neo-Davidsonian semantics (cf. Davidson 1967) in which the denotation of a verb such as *read* involves an event argument (73a). Furthermore, following Kratzer (1996), I adopt argument severance and the idea that the external argument is introduced by *v* via *Event Identification* (73b).

(73) a. $[\![read]\!] = \lambda x \lambda w \lambda e.\ read(e, w) \wedge Theme(e, w, x)$
      b. $[\![[_{vP}\ John\ [_{VP}\ read\ War\ \&\ Peace]]\!] = \lambda w \lambda e.\ read(e, w) \wedge Agent(e, w, J) \wedge Theme(e, w, W\&P)$

It is clear from (73b) that *v*Ps are of type $\langle s, \langle v, t \rangle \rangle$. In order to create a proposition of type $\langle s, t \rangle$, existential closure of the event variable is introduced by T as by Kratzer 1996:125 and Hornstein & Pietroski 2009 (also see Diesing 1992 and Cable 2010:68). The complete analysis of a sentence such as (71) looks as follows:

(74)

$$\text{CP} \quad \lambda p \exists f.\, p = \lambda w.\exists e.\ \text{like}(e, w) \wedge Ag(e, w, Z) \wedge \textit{Th}(e, w, f(book)) \quad (\langle s, t\rangle)$$
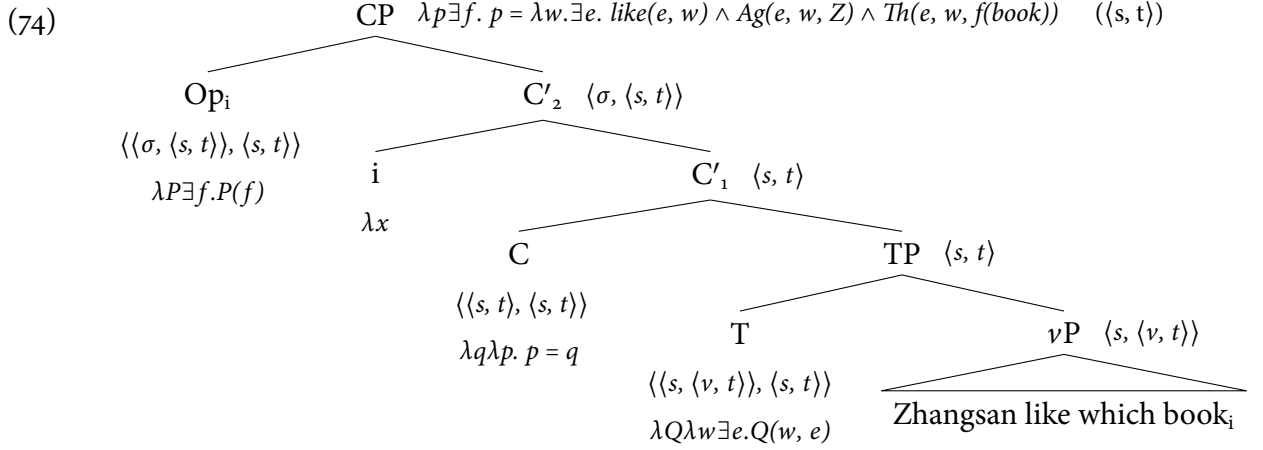
$$\llbracket vP \rrbracket^{w,g^{[i\to x]}} \quad = \quad \lambda w_{\langle s\rangle}\lambda e_{\langle v\rangle}.\ \text{like}(e, w) \wedge Ag(e, w, Z) \wedge \textit{Th}(e, w, g(i)(book))$$

$$
\begin{aligned}
\llbracket TP \rrbracket^{w,g^{[i\to x]}} \quad &= \quad \llbracket T \rrbracket^{w,g^{[i\to x]}}(\llbracket vP \rrbracket^{w,g^{[i\to x]}}) \\
&= \quad [\lambda Q_{\langle s,\langle v,t\rangle\rangle}\lambda w_{\langle s\rangle}\exists e.Q(w, e)]\ (\lambda w'_{\langle s\rangle}\lambda e'_{\langle v\rangle}.\text{like}(e', w') \wedge Ag(e', w', Z) \wedge \textit{Th}(e, w, g(i)(book))) \\
&= \quad \lambda w_{\langle s\rangle}\exists e.\ [\lambda w'_{\langle s\rangle}\lambda e'_{\langle v\rangle}.\text{like}(e', w') \wedge Ag(e', w', Z) \wedge \textit{Th}(e, w, g(i)(book))](w, e) \\
&= \quad \lambda w_{\langle s\rangle}\exists e.\ \text{like}(e, w) \wedge Ag(e, w, Z) \wedge \textit{Th}(e, w, g(i)(book))
\end{aligned}
$$

$$
\begin{aligned}
\llbracket C'_1 \rrbracket^{w,g^{[i\to x]}} \quad &= \quad \llbracket C \rrbracket^{w,g^{[i\to x]}}(\llbracket TP \rrbracket^{w,g^{[i\to x]}}) \\
&= \quad [\lambda q\lambda p.\, p = q]\ \lambda w_{\langle s\rangle}\exists e.\ \text{like}(e, w) \wedge Ag(e, w, Z) \wedge \textit{Th}(e, w, g(i)(book)) \\
&= \quad \lambda p.\, p = \lambda w_{\langle s\rangle}\exists e.\ \text{like}(e, w) \wedge Ag(e, w, Z) \wedge \textit{Th}(e, w, g(i)(book))
\end{aligned}
$$

$$
\begin{aligned}
\llbracket C'_2 \rrbracket^{w,g^{[i\to x]}} \quad &= \quad \lambda x\lambda p.\, p = \lambda w_{\langle s\rangle}\exists e.\ \text{like}(e, w) \wedge Ag(e, w, Z) \wedge \textit{Th}(e, w, g(i)(book)) \\
&= \quad \lambda x\lambda p.\, p = \lambda w_{\langle s\rangle}\exists e.\ \text{like}(e, w) \wedge Ag(e, w, Z) \wedge \textit{Th}(e, w, [i\to x](i)(book)) \\
&= \quad \lambda x\lambda p.\, p = \lambda w_{\langle s\rangle}\exists e.\ \text{like}(e, w) \wedge Ag(e, w, Z) \wedge \textit{Th}(e, w, x(book))
\end{aligned}
$$

$$
\begin{aligned}
\llbracket CP \rrbracket^{w,g^{[i\to x]}} \quad &= \quad \llbracket Op \rrbracket^{w,g^{[i\to x]}}(\llbracket C'_2 \rrbracket^{w,g^{[i\to x]}}) \\
&= \quad [\lambda P\exists f.P(f)]\ (\lambda x\lambda p.\, p = \lambda w_{\langle s\rangle}\exists e.\ \text{like}(e, w) \wedge Ag(e, w, Z) \wedge \textit{Th}(e, w, x(book))) \\
&= \quad [\lambda p\exists f.\ [\lambda x.\, p = \lambda w_{\langle s\rangle}\exists e.\ \text{like}(e, w) \wedge Ag(e, w, Z) \wedge \textit{Th}(e, w, x(book))](f)]^{14} \\
&= \quad \lambda p\exists f.\, p = \lambda w_{\langle s\rangle}\exists e.\ \text{like}(e, w) \wedge Ag(e, w, Z) \wedge \textit{Th}(e, w, f(book))
\end{aligned}
$$

With these assumptions now in place, the following sections will lay out how the semantics of adjuncts is derived and how all of these assumptions can derive the relevant island data.

3.3 vP adjuncts

Recall that I am following Rubin's (2003) proposal that adjuncts are housed in a ModP projection. In addition, I assumed that the semantics of modification is, in the default case, intersective and that it this is contributed by an operator in Spec-ModP with the following semantics:

(75) $\quad \llbracket Op_{\text{MOD}} \rrbracket^{w,g} = \lambda Q_{\langle s,\langle \sigma,\tau\rangle\rangle}\lambda P_{\langle s,\langle \sigma,\tau\rangle\rangle}\lambda w_{\langle s\rangle}\lambda x_{\langle \sigma\rangle}.\ P(w, x) \wedge Q(w, x)$

---

[14]See footnote 12 for an explanation of the mysterious shift of λp in this step.

The semantic type of the arguments taken by this operator is underspecified. We saw in (60) that the modificational operator can take arguments of type $\langle s, \langle e, t \rangle \rangle$ (e.g. *fast* and *car*), however for vP-adjunction, the type of its arguments will differ. Therefore, we require that this operator by type-flexible so it can also combine with arguments of type $\langle s, \langle v, t \rangle \rangle$. With adjectival modification, σ will correspond to type $\langle e \rangle$, whereas it will stand for type $\langle v \rangle$ with adverbs. To illustrate, consider the non-wh vP adjunct in (76).

(76)   Zhangsan zai Beijing kanjian-le Wangwu?
         Zhangsan at   Beijing see-LE   Wangwu
         'Zhangsan saw Wangwu in Beijing'

The PP *zai Beijing* 'in Beijing' has the denotation in (77). Here, it is assumed that locative meaning is attributed by a PLACE operator resulting a meaning that could be paraphrased as 'the set of events that took place in Beijing in w'.
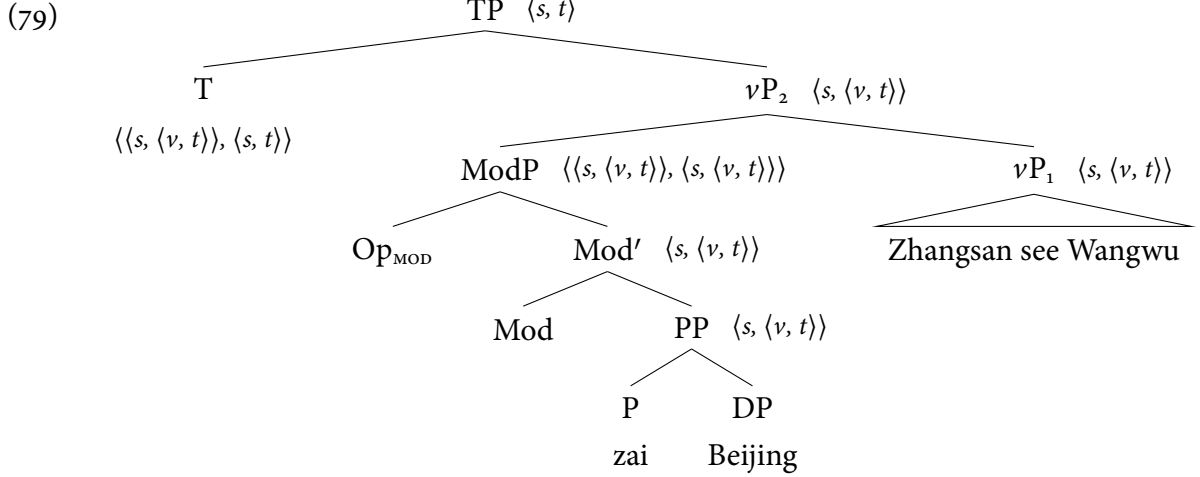
(77) $[\![$zai Beijing$]\!]^{w,g} = \lambda w \lambda e.\ \text{PLACE}(e, w, \text{Beijing})$

Recall that the syntax of ModP is such that its head bears a selectional feature for an operator, meaning that an operator must be merged in its specifier. The syntax of the PP *zai Beijing* is as given in (78).

(78)

$$
\begin{array}{c}
\text{ModP} \quad \langle \langle s, \langle v, t \rangle \rangle, \langle s, \langle v, t \rangle \rangle \rangle \\
\diagdown \\
\text{Op}_{\text{MOD}} \qquad \text{Mod}' \quad \langle s, \langle v, t \rangle \rangle \\
\diagdown \\
\text{Mod} \qquad \text{PP} \quad \langle s, \langle v, t \rangle \rangle \\
[\bullet\text{Op}\bullet] \qquad \diagdown \\
\text{P} \qquad \text{DP} \\
\text{zai} \qquad \text{Beijing}
\end{array}
$$

$$
\begin{aligned}
[\![\text{ModP}]\!]^{w,g} \;&=\; [\![\text{Op}_{\text{MOD}}]\!]^{w,g}([\![\text{Mod}']\!]^{w,g}) \\
&=\; [\lambda Q_{\langle s, \langle \sigma, \tau \rangle \rangle} \lambda P_{\langle s, \langle \sigma, \tau \rangle \rangle} \lambda w_{\langle s \rangle} \lambda x_{\langle \sigma \rangle}.\ \text{P}(w, x) \wedge \text{Q}(w, x)]\ (\lambda w' \lambda e.\ \text{PLACE}(e, w', \text{Beijing})) \\
&=\; \lambda P_{\langle s, \langle v, t \rangle \rangle} \lambda w_{\langle s \rangle} \lambda x_{\langle v \rangle}.\ \text{P}(w, x) \wedge [\lambda w' \lambda e.\ \text{PLACE}(e, w', \text{Beijing})](w, x) \\
&=\; \lambda P_{\langle s, \langle v, t \rangle \rangle} \lambda w_{\langle s \rangle} \lambda x_{\langle v \rangle}.\ \text{P}(w, x) \wedge \text{PLACE}(x, w, \text{Beijing})
\end{aligned}
$$

If we now consider how modification takes place compositionally, it becomes clear why we need the modificational operator. The vP of type $\langle s, \langle v, t \rangle \rangle$ cannot combine with the PP (also of type $\langle s, \langle v, t \rangle \rangle$) via function application. Recall that, rather than opt for a special rule such as *Predicate Modification* (Heim & Kratzer 1998), we use the modificational operator to raise the type of ModP to one that can take the vP as an argument (79).

(79)

TP $\langle s, t \rangle$

T $\langle \langle s, \langle v, t \rangle \rangle, \langle s, t \rangle \rangle$

vP$_2$ $\langle s, \langle v, t \rangle \rangle$

ModP $\langle \langle s, \langle v, t \rangle \rangle, \langle s, \langle v, t \rangle \rangle \rangle$

vP$_1$ $\langle s, \langle v, t \rangle \rangle$

Op$_{\text{MOD}}$

Mod$'$ $\langle s, \langle v, t \rangle \rangle$

Zhangsan see Wangwu

Mod

PP $\langle s, \langle v, t \rangle \rangle$

P

DP

zai

Beijing

$\begin{aligned}
\llbracket v\text{P}_2 \rrbracket^{w,g} &= \llbracket \text{ModP} \rrbracket^{w,g}(\llbracket v\text{P}_1 \rrbracket^{w,g}) \\
&= [\lambda \text{P}_{\langle s, \langle v, t \rangle \rangle} \lambda w_{\langle s \rangle} \lambda x_{\langle v \rangle}.\ \text{P}(w, x) \wedge \text{PLACE}(x, w, \text{Beijing})] \\
&\qquad (\lambda w'_{\langle s \rangle} \lambda e_{\langle v \rangle}.\ \text{see}(e, w) \wedge \text{Ag}(e, w', Z) \wedge \text{Th}(e, w', W)) \\
&= \lambda w_{\langle s \rangle} \lambda x_{\langle v \rangle}.\ [\lambda w'_{\langle s \rangle} \lambda e_{\langle v \rangle}.\ \text{see}(e', w') \wedge \text{Ag}(e', w', Z) \wedge \text{Th}(e, w', W)](w, x) \\
&\qquad \wedge \text{PLACE}(x, w, \text{Beijing}) \\
&= \lambda w_{\langle s \rangle} \lambda x_{\langle v \rangle}.\ \text{see}(x, w) \wedge \text{Ag}(x, w, Z) \wedge \text{Th}(x, w, W) \wedge \text{PLACE}(x, w, \text{Beijing})
\end{aligned}$

$\begin{aligned}
\llbracket \text{TP} \rrbracket^{w,g} &= \llbracket \text{T} \rrbracket^{w,g}(\llbracket v\text{P}_2 \rrbracket^{w,g}) \\
&= [\lambda Q \lambda w \exists e.\ Q(w, e)]\ (\lambda w' \lambda x.\ \text{see}(x, w') \wedge \text{Ag}(x, w', Z) \wedge \text{Th}(x, w', W) \wedge \text{PLACE}(x, w', B)) \\
&= \lambda w \exists e.\ [\lambda w' \lambda x.\ \text{see}(x, w') \wedge \text{Ag}(x, w', Z) \wedge \text{Th}(x, w', W) \wedge \text{PLACE}(x, w', B)](w, e) \\
&= \lambda w \exists e.\ \text{see}(e, w) \wedge \text{Ag}(e, w, Z) \wedge \text{Th}(e, w, W) \wedge \text{PLACE}(e, w, B)
\end{aligned}$

For the derivation of a question with a wh-adjunct (80), there will be a minimal difference to the semantics above, namely, we will replace the PP's denotation with one containing a choice function variable applied to the set of locations of some event e in w (81).

(80) Zhangsan zai nali   kanjian-le Wangwu?
      Zhangsan at where see-LE   Wangwu
      'Where did Zhangsan see Wangwu?'

(81) $\llbracket \text{zai nali} \rrbracket^{w,g[i \to x]} = \lambda w \lambda e.\ g(i)(\lambda y.\text{PLACE}(e, w, y))$

Apart from this detail, the derivation up to TP is the same as in (79) resulting in the following denotation for the TP:

(82) $\llbracket \text{TP} \rrbracket^{w,g[i \to x]} = \lambda w \exists e.\ \text{see}(e, w) \wedge \text{Ag}(e, w, Z) \wedge \text{Th}(e, w, W) \wedge g(i)(\lambda y.\text{PLACE}(e, w, y))$

As in (74), a wh-operator is merged in Spec-CP to check the [wh]-feature on C. From this position, it binds the wh-phrase in situ and the compositional semantics runs along the same lines as in (74) with the existential quantification over the choice function variable $g(i)$.

(83)

$$\text{CP} \quad \lambda p \exists f. \ p = \lambda w \exists e. \ see(e, w) \wedge Ag(e, w, Z) \wedge Th(e, w, W) \wedge f(\lambda y.\text{PLACE}(e, w, y))$$

Tree:

- $\text{Op}_i \quad \langle\langle e, \langle s, t\rangle\rangle, \langle s, t\rangle\rangle \quad \lambda P \exists f. P(f)$
- $\text{C}'_2 \quad \langle e, \langle s, t\rangle\rangle$
  - $i \quad \lambda x$
  - $\text{C}'_1 \quad \langle s, t\rangle$
    - $\text{C} \quad \langle\langle s, t\rangle, \langle s, t\rangle\rangle \quad \lambda q \lambda p. \ p = q$
    - $\text{TP} \quad \langle s, t\rangle$ — Zhangsan where$_i$ see Wangwu
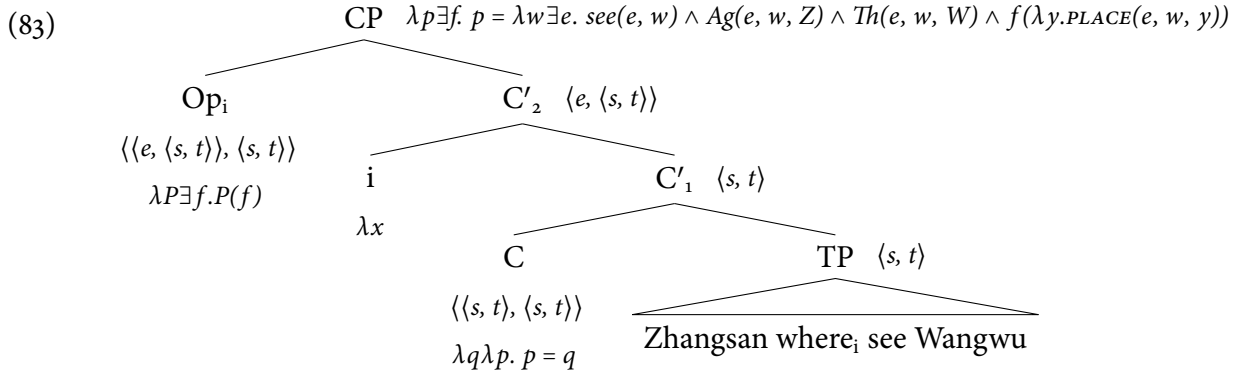
The denotation we arrive at for (80) is the set of propositions such that there is a choice function returning the location of a seeing event in which Zhangsan saw Wangwu (84).

(84) $[\![\text{CP}]\!]^{w,g^{[i \to x]}} = \lambda p \exists f. \ p = \lambda w \exists e. \ see(e, w) \wedge Ag(e, w, Z) \wedge Th(e, w, W) \wedge f(\lambda y.\text{PLACE}(e, w, y))$
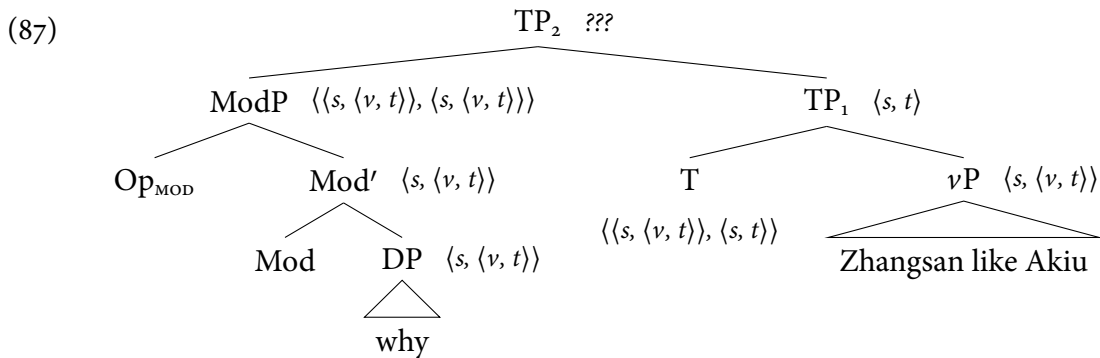
3.4 TP adjuncts

There is a crucial difference with TP adjuncts, however. Recall from the denotation of the modificational operator in (75), repeated as (85), that it takes arguments which are two-place predicates of type $\langle s, \langle \sigma, \tau\rangle\rangle$, which corresponds to adjectival modification ($\langle s, \langle e, t\rangle\rangle$) or adverbial (event) modification ($\langle s, \langle v, t\rangle\rangle$), for example.

(85) $[\![\text{Op}_{\text{MOD}}]\!]^{w,g} = \lambda Q_{\langle s, \langle \sigma, \tau\rangle\rangle} \lambda P_{\langle s, \langle \sigma, \tau\rangle\rangle} \lambda w_{\langle s\rangle} \lambda x_{\langle \sigma\rangle}. \ P(w, x) \wedge Q(w, x)$

A problem now arises with adjuncts to TP. Since the event argument of the verb has already been bound by the existential closure introduced by T, TPs are of type $\langle s, t\rangle$. The denotation of Mod does not allow it to combine with a TP since it does not combine with arguments of type $\langle s, t\rangle$, but rather with arguments of a higher type. As we can see in (87), ModP cannot compose with TP via function application since there is a type clash.

(86)   Zhangsan weishenme kanjian-le Akiu
Zhangsan why   see-LE   Akiu
'Why did Zhangsan see Akiu?'

(87)

Tree:

- $\text{TP}_2 \quad ???$
  - $\text{ModP} \quad \langle\langle s, \langle v, t\rangle\rangle, \langle s, \langle v, t\rangle\rangle\rangle$
    - Op_{MOD}
    - $\text{Mod}' \quad \langle s, \langle v, t\rangle\rangle$
      - Mod
      - $\text{DP} \quad \langle s, \langle v, t\rangle\rangle$ — why
  - $\text{TP}_1 \quad \langle s, t\rangle$
    - $\text{T} \quad \langle\langle s, \langle v, t\rangle\rangle, \langle s, t\rangle\rangle$
    - $v\text{P} \quad \langle s, \langle v, t\rangle\rangle$ — Zhangsan like Akiu

27

As a result, the presence of the modificational operator in Spec-ModP is simply not compatible with TP adjuncts, and it must therefore be absent. Instead, I propose that TP adjuncts are interpreted by means of the syncategorematic rule of *Proposition Modification* in (88).[15,16]

(88)   *Proposition Modification*:
       If $[\![\gamma]\!]$ is a branching node with daughters $[\![\alpha]\!] \in D_{\langle s, t \rangle}$ and $[\![\beta]\!] \in D_{\langle s, \langle v, t \rangle \rangle}$, then, modulo λ-type shifting for $[\![\alpha]\!]$, $[\![\gamma]\!] = \lambda w \exists e. [\![\alpha]\!](w)(e) \wedge [\![\beta]\!](w)(e)$.

$$
\begin{array}{ccc}
[\![\alpha]\!] & [\![\beta]\!] & \rightarrow \quad \lambda w \exists e. \quad [\![\alpha]\!](w)(e) \quad \wedge \quad [\![\beta]\!](w)(e) \\
\langle s, t \rangle & \langle s, \langle v, t \rangle \rangle & \qquad\qquad \langle s, \langle v, t \rangle \rangle \quad\quad \langle s, \langle v, t \rangle \rangle \\
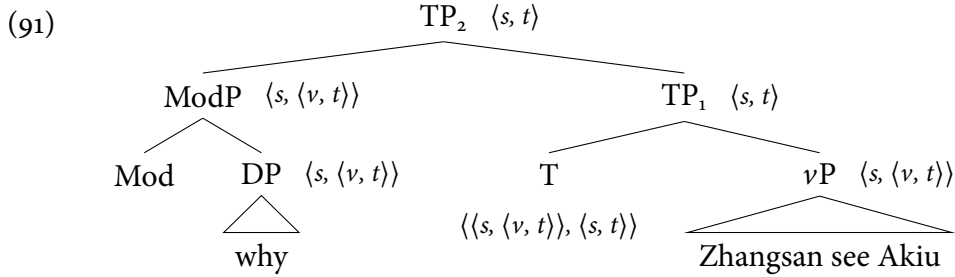\exists e \rightarrow \lambda e
\end{array}
$$

(89)   *λ-type shifting*:
       $\exists \rightarrow \lambda$

This rule is required in place of function application, since we need to raise the type of TP to $\langle s, \langle v, t \rangle \rangle$ as well as intersect the events. This type raising is what I call *λ-type shifting* and is the mirror image of the already proposed *∃-type shifting* utilized in work on focus semantics (cf. Schwarzschild 1999:149f., Merchant 2001). Let us assume that a causal adverb such as 'why' denotes a choice function applying to the set of events e' that were the cause of the event denotated by the proposition (e) in w (90) (cf. Tsai 1999).

(90) $[\![\text{weishenme}]\!]^{w,g^{[i \to x]}} = \lambda w \lambda e. \, g(\mathrm{i})(\lambda e'.\textsc{cause}(e', e, w))$

If we apply the rule in (88) to the example in (87), we derive the correct result for TP modification:

(91)

$$
\begin{array}{c}
\text{TP}_2 \;\; \langle s, t \rangle \\
\diagup \qquad\qquad \diagdown \\
\text{ModP} \;\; \langle s, \langle v, t \rangle \rangle \qquad\qquad \text{TP}_1 \;\; \langle s, t \rangle \\
\diagup \;\;\; \diagdown \qquad\qquad\qquad \diagup \qquad\qquad \diagdown \\
\text{Mod} \quad \text{DP} \;\; \langle s, \langle v, t \rangle \rangle \qquad \text{T} \qquad\qquad v\text{P} \;\; \langle s, \langle v, t \rangle \rangle \\
\triangle \qquad\qquad \langle \langle s, \langle v, t \rangle \rangle, \langle s, t \rangle \rangle \qquad \diagup \qquad \diagdown \\
\text{why} \qquad\qquad\qquad\qquad\qquad \text{Zhangsan see Akiu}
\end{array}
$$

$[\![\text{TP}_2]\!]^{w,g^{[i \to x]}}$

$= \quad \lambda w \exists e. \, [\lambda w'_{\langle s \rangle} \lambda e'_{\langle v \rangle}. \, \text{see}(e', w') \wedge \text{Ag}(e', w', Z) \wedge \text{Th}(e', w', A)](w)(e)$

$\qquad \wedge \, [\lambda w' \lambda e'. \, g(\mathrm{i})(\lambda e''.\textsc{cause}(e'', e', w'))](w)(e) \qquad\qquad\qquad$ (by (88))

$= \quad \lambda w \exists e. \, \text{see}(e, w) \wedge \text{Ag}(e, w, Z) \wedge \text{Th}(e, w, A) \wedge g(\mathrm{i})(\lambda e'.\textsc{cause}(e', e, w))$

Once the wh-phrase is bound by a wh-operator in Spec-CP in a similar fashion to (83), we arrive at the following denotation for (86), namely the set of propositions for which there is a choice

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[15] This rule is modelled on Heim & Kratzer's (1998) *Predicate Modification*, see (57).

[16] It is, of course, possible to posit a different operator that is present only with TP adjuncts. Even then, function application will not suffice as we need still need to somehow 're-open' the existentially bound event variable slot. The rule in (88) kills two birds with one stone, so to speak. Furthermore, the absence of an operator with TP adjuncts has welcome syntactic consequences, as shown in Section 3.5.

function returning an event such that this event is the cause of a seeing event in which Zhangsan saw Akiu:

(92) $\llbracket CP \rrbracket^{w,g^{[i \to x]}} = \lambda p \exists f.\ p = \lambda w \exists e.\ \text{see}(e, w) \wedge \text{Ag}(e, w, Z) \wedge \text{Th}(e, w, A) \wedge f(\lambda e'.\textsc{cause}(e', e, w))$

3.5   Deriving island-sensitivity

This asymmetry between TP and vP adjuncts with regard to the possibility of the modificational operator in Spec-ModP can now give an explanation of their divergent behaviour inside syntactic islands. Recall from example (22), repeated in (93) below, that vP adjuncts such as *zenmeyang* ('how') can scope out of islands, whereas TP adjuncts such as *weishenme* ('why') cannot.

(93)   a.   Ni   bijiao xihuan [$_{DP}$ [$_{CP}$ ta zenmeyang zhu   de] cai   ] ?
             you more like   he how   cook DE   dish
             'What is the means x, such that you like better the dishes which he cooks by x?'

       b.   *Ni   bijiao xihuan [$_{DP}$ [$_{CP}$ ta weishenme zhu   de] cai   ] ?
             you more like   he why   cook DE   dish
             'What is the reason x, such that you like better the dishes which he cooks for x?'

Let us consider the derivation of (93a), for example. First, the Mod head takes the wh-adjunct as its complement (94a). Mod also bears a selectional feature for an operator, which is checked by merging the modificational operator Op_{MOD} in its specifier (94b). Subsequently, ModP is adjoined to vP (94c) inside the Complex NP island (94d). Structure building then continues up to the point of the matrix (interrogative) CP. In order to check the [wh] feature on C, a wh-operator is merged in Spec-CP, which binds the wh-phrase in situ. The semantic composition proceeds as laid out in the previous section. Since the wh-operator is base-generated in Spec-CP, above the island, having the wh-adjunct inside in an island is unproblematic.

(94)   a.   [$_{ModP}$ Mod$_{[\bullet Op \bullet]}$ zenmeyang]
       b.   [$_{ModP}$ Op$_{\text{MOD}}$ [$_{Mod'}$ Mod zenmeyang]]
       c.   [$_{v\text{P}}$ [$_{ModP}$ Op$_{\text{MOD}}$ [$_{Mod'}$ Mod zenmeyang]] [$_{v\text{P}}$ …]]
       d.   [$_{\text{island}}$ … [$_{v\text{P}}$ [$_{ModP}$ Op$_{\text{MOD}}$ [$_{Mod'}$ Mod zenmeyang]] [$_{v\text{P}}$ …]]]
       e.   [$_{CP}$ Op$_{i,\text{WH}}$ C$_{[\bullet \text{WH} \bullet]}$ [$_{\text{island}}$ … [$_{v\text{P}}$ [$_{ModP}$ Op$_{\text{MOD}}$ [$_{Mod'}$ Mod zenmeyang$_i$]] [$_{v\text{P}}$ …]]]]

Things are different for TP adjuncts, however. Recall from the previous section that TP adjuncts cannot compose via function application and are therefore incompatible with the intersective semantics introduced by the modificational operator. Semantically, TP adjuncts do not allow for the modificational operator to be in their specifier. However, the Mod head still bears a selectional feature for an operator ([$\bullet$Op$\bullet$]). This means that if there is an operator in the numeration that can be merged in Spec-ModP, it will be in order to check this feature. If we have a wh-adjunct adjoined to TP, there will necessarily also be a wh-operator to bind it. Ordinarily,

this operator is merged directly in its scope-taking position at Spec-CP, thereby circumventing the island. However, given the obligatory absence of Op$_{\text{MOD}}$ with TP adjuncts and the syntactic requirement to have an operator in Spec-ModP, TP adjunctsrequire that the wh-operator first merge in Spec-ModP to check the [•Op•] feature and then later move up to the matrix CP to check the [WH]-feature (95d).[17],[18]

(97) a. [$_{\text{ModP}}$ Mod$_{[\bullet\text{Op}\bullet]}$ weishenme]
      b. [$_{\text{ModP}}$ Op$_{i,\text{WH}}$ [$_{\text{Mod}'}$ Mod weishenme$_i$]]
      c. [$_{\text{TP}}$ [$_{\text{ModP}}$ Op$_{i,\text{WH}}$ [$_{\text{Mod}'}$ Mod weishenme$_i$]] [$_{\text{TP}}$ …]]
      d. [$_{\text{CP}}$ Op$_{i,\text{WH}}$ C$_{[\bullet\text{WH}\bullet]}$ [$_{\text{TP}}$ [$_{\text{ModP}}$ t$_{\text{Op}}$ [$_{\text{Mod}'}$ Mod weishenme$_i$]] [$_{\text{TP}}$ …]]]

One immediate consequence of this is that if a TP adjunct is inside an island, movement of the operator from Spec-ModP to Spec-TP will cross an island boundary. Since operator movement is syntactic and subject to island constraints, a TP adjunct inside an island will result in island-violating movement:

(98) [$_{\text{CP}}$ Op$_{i,\text{WH}}$ C$_{[\bullet\text{WH}\bullet]}$ [$_{\text{island}}$ … [$_{\text{TP}}$ [$_{\text{ModP}}$ t$_{\text{Op}}$ [$_{\text{Mod}'}$ Mod weishenme$_i$]] [$_{\text{TP}}$ …]]]]

We now have an explanation for the island-sensitivity of adjuncts that stems from independently observed facts about their adjunction height. Since TP adjuncts, by hypothesis, will always force a wh-operator to merge early in Spec-ModP and then later move to its scope position, this will prevent them from occurring inside islands. This also allows us to make sense of *how/why*-alternations. We saw that there are adverbs such as *zenme* in Mandarin Chinese that exhibit variability in meaning that correlates with their adjunction height. In example (32), repeated below, we see that TP-adjoined, premodal *zenme* is not possible inside islands.

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[17] As a reviewer correctly points out, the underlying logic of this account is one of economy/earliness. Another way of conceiving of the intuition here is that operators must be enter the derivation at the earliest possible opportunity. As soon as the modificational operator is not able to be merged in Spec-ModP, the earliest position to merge the wh-operator is in the ModP. Furthermore, the reviewer notes that this is parallel to the classic *Merge over Move* paradigm (e.g. Chomsky 1995, 2000; Frampton & Gutmann 1999; Deal 2009; Castillo et al. 2009) in (95), where an expletive must enter the derivation at the earliest possible point (Spec-TP$_1$):
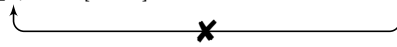
(95) a. [$_{\text{TP}_2}$ There$_1$ seems [$_{v\text{P}}$ [$_{\text{TP}_1}$ t$_1$ to [$_{v\text{P}}$ be someone in the room]]]]
      b. *[$_{\text{TP}_2}$ There seems [$_{v\text{P}}$ [$_{\text{TP}_1}$ someone$_1$ to [$_{v\text{P}}$ be t$_1$ in the room]]]]

[18] There is still the question of the surface position of the subject, as pointed out by a reviewer. While the subject must be interpreted below causal wh-adjuncts such as *weishenme*, it precedes them. Since Chao (1968), Mandarin Chinese has been argued to be a 'topic prominent' language (see Chafe 1976; Li & Thompson 1981; von Prince 2012; Paul & Whitman to appear). Furthermore, there is good evidence for a left-peripheral Topic projection, which can host topics of various kinds (e.g. Paul 2005, 2015; Cheung 2014; Pan 2014). I follow Yang (2014) in assuming that there is a left-peripheral TopP and, if no other topic is base-generated or moved there, the subject moves there to check an EPP feature (96b) (also see Ai 2014:132).

(96) a. [$_{\text{TopP}}$ XP [$_{\text{Top}'}$ Top$_{[\text{EPP}]}$ [$_{\text{TP}}$ Subj [$_{\text{T}'}$ …]]]]
      b. [$_{\text{TopP}}$ Subj$_1$ [$_{\text{Top}'}$ Top$_{[\text{EPP}]}$ [$_{\text{TP}}$ t$_1$ [$_{\text{T}'}$ …]]]]

(99) Ni tongqing   [$_{DP}$ [$_{CP}$ (*zenme) bixu (zenme) zheng qian   de] ren]?
     you sympathize   ZENME must ZENME earn   money DE person
     'By what means x/#for what reason x, do you sympathize with people who have to earn
     money by x?' (e.g. by begging)

An alternating wh-adverb such as *zenme* (also cf. *nande* in Japanese and *lamsao* in Vietnamese;
Section 2.3) can be merged either at vP or TP. In the latter case, it will force the wh-operator to
be merged locally and move to its scope position (Aoun & Li's 1993 original idea). Thus, the se-
mantic intricacies of modification will result in only TP-level *zenme* exhibiting island sensitivity
(100b).

(100)a.   [$_{CP}$ Op$_{i,WH}$ C$_{[\bullet WH\bullet]}$ [$_{island}$ … [$_{vP}$ [$_{ModP}$ Op$_{MOD}$ [$_{Mod'}$ Mod zenme$_i$]] [$_{vP}$ …]]]]
     b.   [$_{CP}$ Op$_{i,WH}$ C$_{[\bullet WH\bullet]}$ [$_{island}$ … [$_{TP}$ [$_{ModP}$ t$_{Op}$ [$_{Mod'}$ Mod zenme$_i$]] [$_{TP}$ …]]]]

This analysis captures the cross-linguistic asymmetry we initially observed between 'high' causal
adverbs and 'low' manner adverbs. Furthermore, we do not need to posit two distinct classes of
wh-items, each with distinct scope licensing mechanisms.

4 Extensions

The approach developed in the preceding section can also be extended to cover seemingly un-
related data pertaining to further argument/adjunct or causal/manner adjunct asymmetries. In
particular, it has been noted that causal adjuncts differ from other adjuncts and wh-phrases not
just with regard to their island-sensitivity, but also in their permissibility in so-called 'bare con-
ditionals' or 'donkey sentences' as well as their sensitivity to wh-island/Superiority effects. The
following sections will briefly show how the present account can also handle these observations
given the system developed thus far.

4.1 Bare wh-conditionals

In wh-in-situ languages, 'donkey anaphora' (Lewis 1975) or 'bare conditionals' refer to condi-
tional constructions wh-phrases are variables bound by universal quantification:

(101)   Shei xian lai,   shei xian chi
         who first come who first eat
         'Whoever comes first, eats first'
         $\forall x.$ come.first$'(x) \rightarrow$ eat.first$'(x)$

They are often dubbed 'bare' conditionals since they typically do not contain a word correspond-
ing to 'if'. I follow Cheng & Huang (1996) and Wu (1999) in analyzing this construction as
unselective binding of both wh-phrases by a universal quantificatonal operator (102) (but cf.
Bruening & Tran 2006*a*; Cheung 2007).

(102) $[_{CP}$ Op$_{\forall, i}$ $[_{\&P}$ $[_{TP}$ who$_i$ come $]$ $[_{\&'}$ & $[_{TP}$ who$_i$ eat $]]]]$

Wu (1999:30) notes that while the kind of low vP adjuncts that are not sensitive to islands are possible in bare conditionals (103a,b), causal TP adjuncts such as *weishenme* are not (103c).

(103)　a.　ni　chi nali,　wo chi nali.
　　　　　　you eat where I　eat where
　　　　　　'For every place x, if you eat at x, I will eat at x'

　　　　b.　ni　shenme shihuo qu, wo ye　shenme shihuo qu.
　　　　　　you when　　　　go I　also when　　　　　go
　　　　　　'For every time x, if you go at x, I will also go at x'

　　　　c.　＊ni　weishenme qu, wo ye　weishenme qu.
　　　　　　you why　　　go I　also why　　　go
　　　　　　'For every reason x, if you go for x, I will go for x.'

Furthermore, Tsai (1999) reports that with the alternating *how-why* adverb *zenme*, it can only occur in bare conditionals when it has the low, manner reading:

(104)　a.　Akiu hui zenme qu, wo jiu　hui zenme qu.
　　　　　　Akiu will how　go I　then will how　go
　　　　　　'For every means/manner x, if Akiu will go by x, then I will go by x.'

　　　　b.　＊Akiu zenme hui qu, wo jiu　zenme hui qu.
　　　　　　Akiu how　will go I　then how　will go
　　　　　　Int. 'For every reason x, if Akiu will go because of x, then I will go because of x.'

There is a parallel to island facts here: pre-modal 'causal' *zenme* is not possible in islands or in bare conditionals, whereas its post-modal 'manner' counterpart is. It is possible to capture the fact that the same adjuncts that show sensitivity to islands are also not possible in bare conditionals in the following way. We can maintain our assumption that the main difference between vP and TP adjuncts is whether Op$_{\text{MOD}}$ is merged in their specifier. Whereas vP adjuncts allow/require this, TP adjuncts are not compatible with Op$_{\text{MOD}}$, which means that the syntactic operator position in Spec-ModP will be filled by other operators if these are present in the numeration. We saw that this can force wh-operator to exceptionally be merged low and subsequently moved higher. We can see the very same selectional 'misfiring' occuring with the Op$_\forall$ operator involved in bare conditionals.
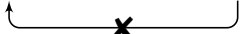
　　Following Cheng & Huang (1996), there is a single operator that binds both variables in an example such as (101). This is ordinarily base-generated in Spec-CP (or some position above the coordination), where it binds both wh-phrases. With vP adjuncts, this is unproblematic since each ModP contains Op$_{\text{MOD}}$ which checks the respective feature on the Mod head:

(105) $[_{CP}$ Op$_{\forall,i}$ $[_{\&P}$ $[_{TP}$ you eat $[_{ModP}$ Op$_{\text{MOD}}$ $[_{Mod'}$ Mod where$_i$ $]]$ $]$ $[_{\&'}$ & $[_{TP}$ I eat $[_{ModP}$ Op$_{\text{MOD}}$ $[_{Mod'}$ Mod where$_i$ $]]]]]]$

With TP adjuncts, the situation is parallel to with the wh-operator: The ModPs in each conjunct will not be semantically compatible with Op_{MOD}, however each Mod will still bear a selectional feature for an operator in its specifier ([•Op•]). In bare conditionals, the universal operator $Op_∀$ will be obligatorily merged in one of the conjuncts first and then moved to its scope position at Spec-CP to bind both wh-phrases. The problem with this derivation is that the operator then has to move out of a single conjunct as in (107), thereby violating the *Coordinate Structure Constraint* (Ross 1967).[19]

(106) $[_{\&P} [_{TP} [_{ModP} Op_{∀,i} [_{Mod'} Mod \; why_i]] [_{TP} \ldots]] [_{\&'} \& [_{TP} [_{ModP} why] [_{TP} \ldots]]]]$

(107) $[_{CP} Op_{∀,i} [_{\&P} [_{TP} [_{ModP} t_{Op} [_{Mod'} Mod \; why_i]] [_{TP} \ldots]] [_{\&'} \& [_{TP} \ldots [_{ModP} why_i] \ldots]]]]$

Consequently, the reason why causal adverbs are not possible in bare conditionals is in fact near-identical to the explanation for their island-sensitivity: causal adverbs in bare conditionals also involve movement out of an island.

4.2 Multiple wh-questions

Huang (1982*b*) observed an interesting fact about multiple wh-phrases in situ in Mandarin Chinese, namely that it is possible for either wh-phrase to take widest scope (108).

(108) Ta xiang zhidao [_{CP} shei mai-le shenme]?
he wonder who buy-LE what
a. 'For which person *x*, is he wondering what *x* bought?'
b. 'For which thing *x*, is he wondering who bought *x*?'

This suggests that the mechanism licensing wh-scope is not sensitive to Superiority/wh-islands. Under the current approach let us assume, following Aoun & Li (1993), that multiple in situ wh-questions involve two wh-operators, each binding a different wh-phrase. Furthermore, let us assume that an operator binds a variable by establishing co-reference for the purposes of the assignment function. In order to do this, it must c-command the wh-phrase phase-locally (cf. Hicks 2009 for anaphora). In order to not violate the *Phase Impenetrability Condition* (Chomsky 2000, 2001), both wh-phrase are merged in the lowest CP and bind one of the wh-phrases in their scope.[20] Furthermore, these specifiers can be merged in any order as shown in (109) and (110).

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[19] An anonymous reviewer points that it could be possible to think of the first clause as a 'conditional-like adjunct adjoined to the second clause'. They then suggest that the ilicit movement step in (107) would be ruled out by the *Adjunct Island Condition*. I certainly also find this a viable option and which approach is correct would seem to ultimately depend on the correct analysis of bare wh-conditionals (either asyndetic coordination, as here, or an adjunction structure). I cannot further elaborate on this issue, however, for reasons of space.

[20] They may be merged even lower if *v*P is a phase, see Keine (2016) for recent critical discussion of the status of *v*P as a phase, however.

(109) $[_{CP}$ $[_{TP}$ ta xiang zhidao $[_{CP}$ Op$_j$ Op$_i$ $[_{TopP}$ shei$_i$ mai-le shenme$_j$]]]]

(110) $[_{CP}$ $[_{TP}$ ta xiang zhidao $[_{CP}$ Op$_i$ Op$_j$ $[_{TopP}$ shei$_i$ mai-le shenme$_j$]]]]

Assuming that only the outermost of multiple Ā-specifiers counts a closer to the probe due to the Minimal Link Condition (Richards 2001:102), then whichever operator was merged last will move to Spec-CP to take matrix scope:

(111) $[_{CP}$ Op$_j$ $[_{TP}$ ta xiang zhidao $[_{CP}$ t$_j$ Op$_i$ $[_{TopP}$ shei$_i$ mai-le shenme$_j$]]]]

(112) $[_{CP}$ Op$_i$ $[_{TP}$ ta xiang zhidao $[_{CP}$ t$_i$ Op$_j$ $[_{TopP}$ shei$_i$ mai-le shenme$_j$]]]]

This allows either the wh-operator binding the subject or the object to have widest scope, depending on their position in the left periphery of the embedded clause. Interestingly, we do find Superiority effects with multiple wh-questions involving *weishenme* as shown in example (113) from (Aoun & Li 1993:221).

(113) Ta xiang.zhidao $[_{CP}$ shei weishenme likai-le]?
       he wonder   who why   leave-LE
       a.   'For which person *x*, does he wonder why *x* left?'
       b. # 'For which reason *x*, does he wonder who left for *x*?'

This fact follows from our previous assumptions about *weishenme*, namely that the operator binding it is merged in a lower position than with wh-arguments. Since *weishenme* is incompatible with the modificational operator, the wh-operator associated with it is first merged at Spec-ModP rather than Spec-CP, where it binds the wh-phrase (setting the assignment function). The operator binding the wh-argument *shei* is merged at Spec-CP as shown in (114).

(114) $[_{CP}$ Op$_j$ C $[_{TopP}$ shei$_j$ $[_{TP}$ $[_{ModP}$ Op$_i$ $[_{Mod'}$ Mod why$_i$]] $[_{TP}$ …]]]]

When the wh-operator binding *weishenme* moves to create a second specifier of the embedded CP, it obligatorily 'tucks in' to the lower specifier, as argued for by (Richards 1999, 2001):

(115) $[_{CP}$ Op$_j$ Op$_i$ C $[_{TopP}$ shei$_j$ $[_{TP}$ $[_{ModP}$ t$_i$ $[_{Mod'}$ Mod why$_i$]] $[_{TP}$ …]]]]

Since only the closest goal can move to matrix Spec-CP, there is no way for a wh-operator originating in ModP to take widest scope (due to *tucking in*), and the operator binding the wh-

argument moves (116).

(116) $[_{CP} Op_j [_{C'} C_{[WH]} \ldots [_{CP} t_j Op_i C [_{TopP} shei_j [_{TP} [_{ModP} t_i [_{Mod'} Mod \, why_i]] [_{TP} \ldots]]]]]]$

We therefore see that the assumption that wh-operators associated with causal adjuncts are initially merged lower in the structure than wh-arguments not only explains their island-sensitivity, but also why they shown exceptional behaviour with regard to Superiority effects.

5   Conclusion

In this paper, I have argued that the asymmetry we find between causal adverbs and other wh-phrases with regard to islands does not necessitate the assumption that these wh-phrases are somehow instrinsically different. The widely accepted analysis proposed by Tsai (1999, 2008) proposes a distinction between wh-nominal and wh-adverbials that is based almost entirely on their deviant behaviour with regard to islands. The result is to treat an incredibly small class of items (essentially 'why' and causal variants of 'how') as exceptional and warranting an entirely distinct scope mechanism, namely LF movement. However, given the now defunct nature of LF movement in the Minimalist Program, one would have to claim that this movement takes place in Narrow Syntax with later realization of the lowest copy. We have seen that this approach would then struggle to explain why we find an asymmetry with regard to locality if all movement takes place in Narrow Syntax.

This paper has sought to develop an account of island sensitivity which capitalizes on the observation that adjuncts above T are island sensitive, whereas those below T are not. It has been argued that this follows from the syntax/semantics of modification. Following the ModP proposal in Rubin (2003) coupled with the new assumption that ModP requires a special kind of operator in its specifier, it was shown that whereas vP adjuncts are type-compatible with this operator, TP adjuncts are not. The operator-selecting property of ModP can then force the wh-operator to be merged in place of the modificational operator in Spec-ModP. This means that only TP adjuncts have the unique property of requiring syntactic movement to their scope-taking position. This has the welcome result that if a TP adjunct occurs inside an island, then it will not be able to scope out of the island.

The majority of this article has focussed on Mandarin Chinese, however the conclusions drawn here hold for the other wh-in-situ langauges discussed (Japanese, Vietnamese, Korean) with some minimal differences. For example, Watanabe (1992) and Tsai (1994a) have shown that, in some cases, the wh-operator in Japanese must be merged locally (in Spec-DP) with wh-arguments, deriving wh-island effects. The underlying logic is the same as in the present account, however. Being SVO, Mandarin Chinese can clearly show that island sensitivity correlates with adjunction height due to the position of adjuncts relative to modals,. This cannot be diagnosed quite as easily in head-final languages such as Japanese and Korean. Further diagnostics in these

languages, such as scopal relations, would ideally show that causal adverbs are indeed higher than T, but for now I will leave this to future research.

In sum, the present analysis correctly derives the selective island sensitivity of causal wh-adverbs while mainting a single approach to wh-scope involving operator binding and quantification over choice functions. Consequently, we do not have to make use of LF movement, or indeed treat island-sensitive wh-phrases as somehow inherently different. Instead, the observed differences in island-sensitivity follow naturally from the mechanics compositional interpretation, that is, what makes TP adjuncts special is that they are incompatible with intersective modification. In the light of recent developments in the Minimalist Program, this is a welcome result as we can dispense with LF movement and thereby arrive at a unified approach to wh-in-situ licensing and the island-sensitivity of causal adjuncts in a number of East Asian languages.

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